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The Effect of Monetary Policies in COVID and Post-COVID on the Apple Stock Price and Beta

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Abstract: Central bank interventions, such as monetary policies, influence market activities in many ways. For example, the stock price and beta value. Monetary policy is a mechanism to stabilize the market by adjusting the interest rate. Theoretically, the interest rate negatively relates to stock price and beta value. However, based on other previous research, the relationship can vary across industries and countries. Other determinants can also co-influence the stock activities, including business policies. Thus, each company experienced various results from the monetary policies during the COVID and post-COVID periods. Specifically, how did Apple Inc.'s stock price and beta value react to the monetary policies released by FOMC? This paper explores Apple Inc. stock price and beta under the influence of monetary policies in the COVID and post-COVID period. Additionally, this paper finds that there is a significant negative relationship between the interest rates and stock price in COVID, and an insignificant negative relationship in post-COVID; There is an insignificant negative relationship between the interests rates and stock beta in COVID, and an insignificant positive relationship in post-COVID. Hence, stock price and beta are largely influenced by market dynamics and extrinsic factors. The contradictory result can be caused by the policies Apple Inc. released and the imprecise calculation.

Keywords: Stock price, Beta value, Monetary policy, Interest rate, COVID-19.

1. Introduction

The COVID-19 pandemic first occurred in China and then spread out globally. The number of COVID-19 cases drastically increased in the US since March 2020. Across the globe, economic activities were soon shut down due to the government policy on the COVID-19 pandemic, such as quarantine protocols, travel restrictions, and border control. The economy of many countries, including the US, declined dramatically, resulting in a severe economic recession. The stock market, for instance, experienced a sharp decline because of the paralyzed international supply chain. Soon, the Federal Reserve implemented an expansionary monetary policy to revive the economy [1]. Besides the expansionary monetary policy that the FOMC, the Federal Open Market committee, released in March 2020, also implemented a contractionary monetary policy to suppress inflation in 2022 and 2023, during the post-COVID period [2]. As a part of economic functionalities, central bank intervention plays an essential role in market systems. Thus, it is crucial to investigate how the stock market responds to the monetary policies in the COVID and post-COVID period. Apple Inc. is one of the most renowned technology companies worldwide. By looking at the stock price change and beta

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value change after the disclosure of monetary policies during COVID and the post-COVID period, the relationship between the monetary policy and Apple stock price and beta value can be investigated by analyzing the change of the price and beta monthly, quarterly, semi-yearly, and yearly in 6 months after the policy released. Monetary policies, including interest rate changes, can significantly influence market conditions. Analyzing the effects of monetary policies on Apple's stock price and beta value provides insights into market trends and dynamics.

2. Literature Review

Monetary policies consist of the adjustment of the interest rate. Expansionary monetary policy and contractionary monetary policy are the two mechanisms to stabilize the market. According to the empirical analysis, there is a negative relationship between interest rate and stock price. Gunardi et al. concluded that the interest rate negatively influences stock prices in Indonesia and Malaysia during COVID-19, which means that the lower the interest rates are, the higher the stock prices are. The negative relationship between beta and interest rates can be explained through the concept of stock return [3]. Based on the study conducted by Asgari et al., the Tehran Stock Exchange data shows that beta has a significant positive relationship with stock return [4]. Moreover, Based on the investigation of manufacturing companies listed on the Indonesia Stock Exchange from 2017 to 2020, the researchers concluded that the beta value has a significant relationship with stock returns [5]. Additionally, Assefa et al. claimed a negative relationship between stock returns and interest rates [6]. Thus, combining these studies, the interest rate has a negative relationship with the beta value.

However, these two relationships vary across countries and industries. For example, in the transportation sub-sector in Indonesia, Amanda et al. found that the effect of interest rates on stock prices contradicts the theoretical relationship [7]. Moreover, Bing suggested that the relationship between beta and return can be either negative or positive, which is determined by the positivity of the excess market return [8]. Fletcher, Jonathan concluded from the study of international stock returns: the beta-return relationship varies depending on the stock performance in months [9]. Furthermore, Elsas et al. suggested that conditionally there is a positive and statistically significant relationship between beta and realized returns according to the German stock market [10]. Therefore, the relationship between beta and interest rates can vary depending on different circumstances.

3. Methodology

3.1. Hypothesis

Monetary policies are classified into expansionary monetary policy (decreasing interest rate) and contractionary monetary policy (increasing interest rate).

There is a significant negative relationship between Apple stock price and interest rate.

There is a significant negative relationship between the beta of Apple’s stock and interest rate.

3.2. Variables

1) Dependent variables: Apple beta and stock price.

2) Independent variable: monetary policies/interest rate.

3.3. Statistical Techniques

Data used in the study include historical Apple Inc. stock price, stock return, and S&P 500 return, which are collected from Yahoo Finance; The monetary policies (adjustment of interest rates) released dates are collected from Forbes. Calculations of stock return and beta are used within the framework of the CAPM model[11]:

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$$E(r_i) = r_f + \beta \left[E\left(r_m\right) - r_f \right] \quad (1)$$

$$\beta_i = \frac{\mathrm{COV}\left(r_m, r_i\right)}{\mathrm{Var}\left(r_m\right)} \quad (2)$$

Beta is the measure of the relationship between the return of an investment and the market's return. The beta value indicates the systematic risk of a stock. If the beta is negative, the stock return has a negative relationship with the market Return; If the beta is positive, then a positive relationship is shown [12].

4. Result and Data Analysis

4.1. Expansionary Monetary Policy and Apple Inc. Stock Price in COVID

After the release of the expansionary monetary policy, Apple Inc. stock price increases steadily from March 16th 2020 to August 16th 2020. Although the stock price decreased by 2.164% in September, the price continued increasing from October 16th 2020 to February 16th 2021. There is a drop of 5.721% in stock price within a month after February 16th 2021. Even though the decline of stock price exists in the percentage of change monthly and quarterly, based on the semi-yearly and yearly data, the Apple Inc. stock price increased 85.997% in the first half of the year, 12.353% in the second half of the year, and 108.974% over one year.

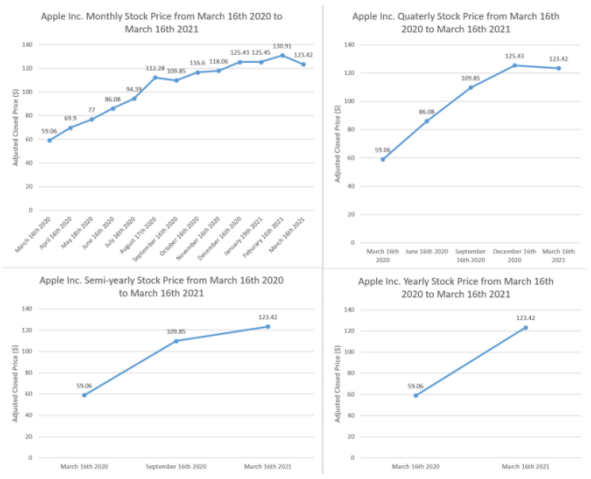

Figure 1: Apple Inc. Stock Price from March 16th 2020 to March 16th 2021 Monthly, Quarterly, Semi-yearly, and Yearly.

Combined with the graph, there are fluctuations in the monthly graph due to the two decreases in the stock price. Apple Inc. stock price increased in a big trend over the year, from $59.06 to $123.42 after a year. Moreover, the slope of the stock price in the graph decreases over the year, indicating that Apple Inc.'s stock price increases at a decreasing rate within a year.

4.2. Contractionary Monetary Policy and Apple Inc. Stock Price in Post-COVID

After the release of the contractionary monetary policy, Apple Inc. stock price increased 2.764% in the first month. Even though the stock price decreases monthly after April 18th 2022 at 9.455% and 11.849%, the stock price ascends again. There are a many fluctuations in the monthly table. The quarterly table also shows the same pattern, a decline follows an increase. According to the

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semi-yearly table, in the first half of the year the stock price decreases 3.551%, and increases 0.659% in the second half of the year, resulting in a decline of 1.595% over the year.

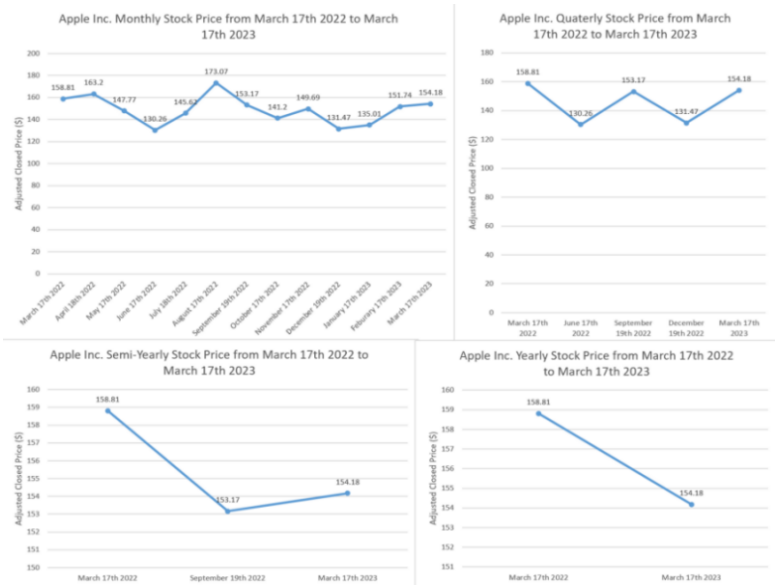

Figure 2: Apple Inc. Stock Price from March 17th 2022 to March 17th 2023 Monthly, Quarterly, Semi-yearly, and Yearly.

Combined with the graph, the stock price fluctuates frequently in the monthly and quarterly graph due to the unstable change of the stock price. According to the monthly and quarterly graph, Apple Inc. stock price fluctuates in a certain range from $130 to $175, and the stock prices on March 17th 2022 and on March 17th 2023 do not change significantly (remain in the range from $150 to $160), albeit the apparent decrease in the yearly graph.

4.3. Expansionary Monetary Policy and Apple Inc. Stock Beta in COVID

After the release of the expansionary monetary policy, Apple Inc. Beta value decreased in the first three month at 19.097%, 25.977%, and 0.265%, and overall declines 40.272% in the first quarter. After the first quarter, the beta value increases in the following two months and decreases at the end of the second quarter. However, the beta value hikes 169.181% in the second quarter. Canceling the decrease in the first quarter, there is an increase of 60.777% in the first half of the year. In the second half of the year, there is a decrease of 14.158% due to the volatile fluctuation monthly. Over the year, an increase of 38.013% is shown.

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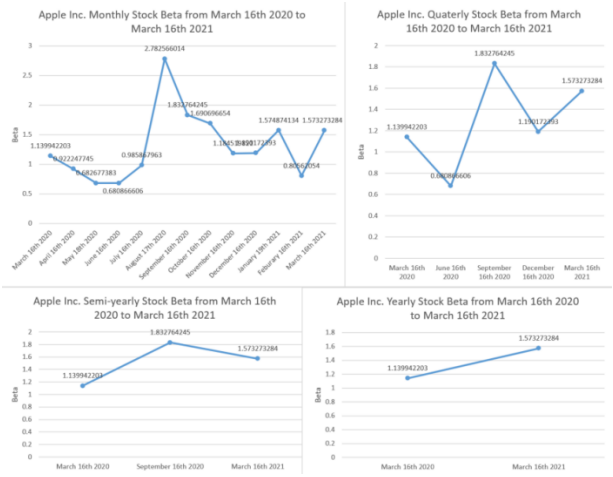

Figure 3: Apple Inc. Beta Value from March 16th 2020 to March 16th 2021 Monthly, Quarterly, Semi-yearly, and Yearly.

Combined with the graph, Apple Inc. beta value is relatively unstable. The beta value first decreases at a decreasing rate and increases at an increasing rate. After the beta value peaked on August 17th 2020, it declined drastically and increased slightly in the last months and quarter in 2023. Although the beta value maintains an upward trend in the yearly graph, the value fluctuates significantly within a year.

4.4. Contractionary Monetary Policy and Apple Inc. Stock Beta in Post-COVID

After the release of the contractionary monetary policy, Apple Inc. beta value fluctuates frequently. There is always a decline followed after an increase. For example, based on the monthly table, the beta value increases 58.486% from October 17th to November 17th 2022 and declines 12.032% monthly on December 19th 2022. This pattern also shows quarterly and semi-yearly. As a result, the beta value does not change significantly over the year. On March 17th 2022, the beta value is 1.112. It increased to 1.116 on March 17th 2023 after a year.

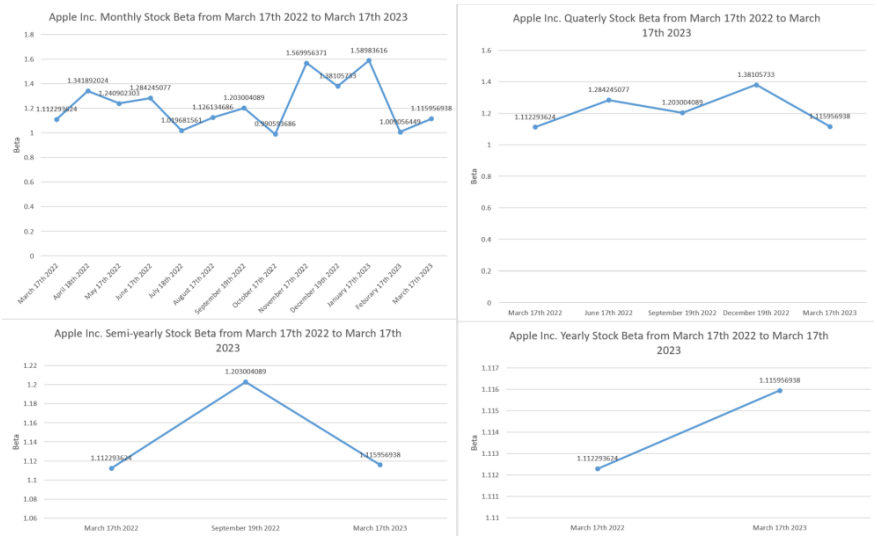

Figure 4: Apple Inc. Beta Value from March 17th 2022 to March 17th 2023 Monthly, Quarterly, Semi-yearly, and Yearly.

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In the graph, the unstable fluctuations are shown distinctively. Although the rate of change is different in each month, quarter, and half of the year, a decline is followed after a increase, except for the increase of beta value from July 18th 2022 to September 19th 2022 when the beta value rises consecutively in two months. Within a year, the beta value shows an upward trend. However, the change is not significant.

5. Conclusion

When the expansionary monetary policy was released on March 16th, 2020, Apple Inc.'s stock price increased by around 108.974%. Even though there are distinct fluctuations, the overall trend is rising. Hence, the stock price increases as the interest rate decreases, which supports the hypothesis. In the post-COVID period, the Federal Reserve issued the contractionary monetary policy. Comparing the stock price on March 17th 2022, to the price on March 17th 2023, the price only decreased 1.595%, which is insignificant relative to the 108.974% increase during COVID-19. Therefore, although the relationship between stock price and interest rates is negative during COVID-19 and post-COVID, the significance level varies in two periods (in COVID, the relationship is significant, whereas during post-COVID, the relationship is insignificant). On the other hand, Apple Inc.'s beta value and interest rate showed a significantly negative relationship in 2020, when contractionary monetary policy was released. According to the graph, the fluctuations are volatile. Apple Inc.'s beta value increased by 38.013% in a year, from March 16th 2020 to March 16th 2021. However, the relationship between Apple Inc.'s stock beta and interest rate in the post-COVID period is insignificantly positive. As the interest rate decreased on March 17th, 2022, the beta value increased 0.329% within a year. The beta value roughly fluctuates in the same range based on the figure. Therefore, the hypothesis is partially rejected. The controversy may cause by other determinants, such as the broader market reactions and investor sentiment surrounding changes in sales can impact the stock's volatility and therefore its beta. Researchers can use more precise calculations to estimate the beta value for future studies and investigate when investors react to the policies.

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