Stock Repurchase Programs: A Key to Stronger Investments?

Talon Gough

ABSTRACT

This paper investigates whether companies that institute large buybacks will see a large stock increase in subsequent quarters. If the hypothesis holds, we should observe a correlation between buyback value and stock performance relative to the S&P 500. This could provide investors with a predictive tool for movements in stock, and potentially enhance safety. We analyzed data from 2022-2023 from the top 10 largest companies by market cap (as of 8/92024) in the S&P 500 and Russell 2000, comparing it to a control group, the S&P 500. Data regarding common shares outstanding, net income, short/long/total liabilities, and buyback value per quarter were gathered from each company's 10-Qs and 10-K's. Closing share prices were obtained from Yahoo Finance. This study revealed no correlation between buyback value and company performance. However, the data provides insight into the financial characteristics of companies that engage in buybacks, how company performance changes as repurchase values grow, and comparison between stock repurchases between the S&P 500 and the Russell 2000.

INTRODUCTION

Throughout investment history, investors have sought strategies to identify strong investment opportunities. For example, on September 17th of 2013, General Electric had repurchased roughly $50 billion worth of its own stock. At that time the shares were listed at $117.18 each. By the end of the year, the stock price had risen to $134.33 a share, reflecting a more than 12% increase in value. This paper aims to test the hypothesis that companies that institute large buybacks will see a large stock increase in subsequent quarters. By identifying a correlation between companies that institute large buybacks and stock price increases, investors could use buyback value as an additional factor in their investment decisions, making them both safer and more reliable. While we cannot definitively prove that stock price increases are a direct result of buybacks, we can be reasonably confident in the correlation.

A stock buyback occurs when a company repurchases some of its outstanding shares. Companies buy back stock primarily because they want the share price to go up, which as a result earns the company more money. Additionally, buybacks might serve strategic purposes. Why might companies buy back stock? Or in other words invest in themselves? Well one reason might be to consolidate ownership. Owning a share of a company means a few things, for one you have a vote on company policies and some financial decisions. The second reason is often why someone buys a share in the first place; equity in the company. By buying back stock in your company, you are taking away the amount of say/votes people have in the company, and gaining equity (Segal, *3 Reasons Companies Choose Stock Buybacks)*.[1] Another reason a

company might buy back its stock could be to project financial stability to investors, as a company struggling financially might drive investors away. In summary, while stock buybacks are strategic, they are done with the expectation of higher share prices.

In recent years, companies such as Apple, Google, Meta, and Microsoft have been among the top stock buyers. The companies at the top of this chart are generally well established and financially stable. For instance, Tesla, which in 2022 had its share of financial struggles, and did not buy back any of its stock for the next few years. However, Apple, being a well known powerhouse, has been a leading repurchaser of its own stock. In conclusion, companies with substantial liabilities, low earnings, or any other reflection of financial stability are less likely to buy back stock. In times of peril, a company might even choose to sell some of their own stock, whereas those that are strong financially are less inclined to do so.

With fear of a market correction upcoming, investors look to take advantage of the strong run the market has had this year in 2024. However, during troubling times investors may find trouble finding safe, reliable investments. If a correlation between a company's buyback value and stock price is found, it could do just that. Investors often analyze data to determine potential investments, and buyback value could become an important piece of this analysis. Typically, before an investment is made, investors look at company filings and reports, if a company does not meet certain criteria, they would not make the investment. If there is a correlation between buyback value and stock price increase, buyback value could be another factor that would help mitigate risk.

To test our hypothesis, we analyzed the top 10 companies from the S&P 500 and Russell 2000, examining their 10 Q filings and pulling data from various categories. We then compared this data with the performance of the S&P 500 as a whole. By finding trends between a specific company buying back stock and stock performance (this could be found several ways), we observed that companies performing well often engaged in buybacks. Although we can't prove buying back stock directly leads to stock increase, we can become more and more confident through further testing of more companies and data.

METHODOLOGY

To begin the experiment, data was gathered from the top ten highest-value companies within the S&P 500, and separately from the top ten highest-value companies in the Russell 2000. A comparative analysis was then conducted between these two groups of companies, along with a third reference point: the S&P 500 index as a whole. The rationale behind analyzing both the Russell 2000 and the S&P 500 was twofold: first, to explore how stock repurchases vary across companies of different sizes and market capitalizations, and second, to ensure that the findings could be applied broadly to a range of company types, from large-cap to smaller-cap

companies. The S&P 500 was chosen as the control group because it is widely recognized, contains some of the largest and most influential companies in the market, and has a relatively neutral distribution of companies that engage in stock buybacks. This allows for a balanced comparison, enabling an assessment of both individual company performance and broader market trends (*S&P 500*).[2]

To collect relevant data, quarterly SEC filings for the years 2022 and 2023 were reviewed. This specific time frame was selected to avoid potential distortions from the economic disruptions caused by the COVID-19 pandemic, ensuring that the results reflect current market conditions and trends. By focusing on this recent period, the data gathered is more applicable to today's business environment, which has seen shifts in both market behavior and financial strategies.

The SEC's quarterly and annual filings for each of the companies in the analysis were carefully examined. Special attention was given to companies with fiscal years that do not align with the calendar year. For these companies, data from the closest quarter to the respective calendar quarter was selected to maintain consistency. Historical closing share price data from Yahoo Finance was used to complement the SEC filings. Key financial metrics, including net income, the number of common shares outstanding, short-term and long-term liabilities, and the number of shares repurchased, were extracted from the filings. These figures were then cross-referenced with the share price data to calculate market capitalization, estimated and actual buyback values, and the buyback percentage relative to market cap.

One key metric focused on was net income, which reflects a company's profitability after all expenses have been deducted from its total revenue. Net income is a measure of financial health, offering insight into whether a company is generating sufficient profit to sustain its operations, reinvest in growth, and meet its financial obligations. A positive net income indicates operational efficiency and profitability, which are essential for attracting investment and ensuring long-term sustainability. The hypothesis was that a positive correlation would exist between net income and stock repurchases, as financially healthy companies are more likely to engage in buybacks to return value to shareholders (Bonifacio, *Net Income: Understanding the Bottom Line of Business Finances*).[3]

Another critical variable in the study was the number of common shares outstanding. This metric provides an essential measure of the company's size and plays a central role in valuation. By multiplying the number of shares outstanding by the closing share price, market capitalization was calculated. This figure is also important when examining stock repurchases, as it enables the calculation of the percentage of shares repurchased relative to the total number of shares outstanding. Larger companies may repurchase more shares in total value or volume, but smaller companies might have a more significant impact on their stock price by repurchasing a higher percentage of their outstanding shares. This is particularly relevant when analyzing the effect of buybacks on stock price and market perception.

The number of shares repurchased was the central focus of this study. The main hypothesis was that companies engaging in stock buybacks tend to perform well in terms of financial growth and stock price. Therefore, tracking the number of shares repurchased was crucial for understanding the dynamics between repurchases and company performance. However, as the analysis progressed, it became clear that other factors such as net income, market capitalization, and liabilities also played a significant role in shaping the companies' decisions to repurchase stock. These additional variables revealed trends and patterns that were not initially anticipated, offering deeper insights into the financial health of companies engaged in stock buybacks.

To assess the relationship between stock buybacks and company performance, buyback values for each quarter were compared with the corresponding performance of each company. The performance metric used was the company's closing share price relative to the broader market performance, specifically that of the S&P 500 index. By using the S&P 500 as a benchmark, the analysis aimed to determine if a company's stock repurchase activity was directly correlated with its performance in relation to the market. The initial results showed only a minimal association, suggesting that, at least on a quarterly basis, stock buybacks may not have an immediately observable impact on share price performance relative to the market.

However, recognizing that stock buybacks might have more long-term effects, the analysis was refined. Instead of focusing on quarterly buyback figures, the total value of stock repurchases over the two-year period for each company was calculated. These cumulative buyback values were then compared to each company's overall performance relative to the market (S&P 500) during the same period. This adjustment led to more significant findings, revealing a stronger correlation between total buyback value and company performance over the longer term. This suggests that stock repurchases may have a delayed or cumulative effect on a company's stock price, rather than an immediate, short-term impact.

To explore the relationship between stock repurchases and a company's financial health, the analysis was expanded to include additional financial indicators such as net income and liabilities. By comparing buyback figures to net income and liabilities for each quarter, insights were gained into the financial condition of companies engaging in stock repurchases. The goal was to determine whether a company's income or liabilities made it more inclined to repurchase shares, identifying any patterns or trends in the decision-making process behind stock buybacks and how these actions might reflect a company's broader financial strategy.

For the companies within the Russell 2000, the data collection process was slightly different. Repurchase amounts for these companies were reported in terms of the number of shares repurchased. The analysis shifted to focus on the percentage of shares repurchased relative to the total shares outstanding, which provided a more accurate representation of the scale of buybacks relative to company size. This approach allowed for tracking how repurchase activity

impacted stock performance relative to the market. The data for Russell 2000 companies appeared somewhat more erratic compared to the more stable trends seen with the S&P 500 companies, indicating that stock repurchases may have a more diverse or unpredictable impact on smaller-cap companies. It suggested that smaller-cap companies, such as those in the Russell 2000, may experience different market responses to buybacks than larger-cap companies in the S&P 500.

This analysis revealed that stock buybacks are not a one-size-fits-all strategy. The effect of repurchases on a company's stock price and overall performance varies depending on factors such as company size, financial position, and broader market conditions. These findings highlight the complexity of stock buybacks and suggest that a company's decision to repurchase shares is influenced by a combination of internal financial health and external market factors.

Stock Splits

Because the companies in the S&P 500 grow so rapidly, many of them undergo a stock split during the two year time period we are analyzing data from. Stock splits are when a company divides its existing shares outstanding into smaller shares, increasing the total number of shares, whilst decreasing the price. A company might do this because the price of one share has grown too large and the company would like to keep it low. Because the common shares outstanding in each of the SEC filings was sometimes taken a few weeks after the end of the quarter, and the closing share price was taken at the end of the quarter, if a stock split happened between the two dates, we would end up with the pre-split closing share price and a post-split shares outstanding value. To compensate, we approached dividing the share price by the stock split ratio to find what the closing share price would be after the split. This was an issue only encountered with the S&P 500 companies, and the exact time frame the splits happened are shown highlighted in yellow in **Figures 1 and 2**.

RESULTS

The following data is for the S&P 500 portion of the experiment:

Figure 1:

Date	Real Quarter	Quarter	Industry	Company	Ticker	Common Shares Ou	Closing Share F
4/1/2022	Q1 21	Q1 FY2022	S&P500		S&P500		$3,972.89
7/1/2022	Q2 21	Q2 FY2022	S&P500		S&P500		$4,927.50
9/30/2022	Q3 21	Q3 FY2022	S&P500		S&P500		$4,307.54
12/30/2022	Q4 21	Q4 FY2022	S&P500		S&P500		$4,766.18
4/1/2022	Q1 22	Q1 FY2022	S&P500		S&P500		$4,545.86
7/1/2022	Q2 22	Q2 FY2022	S&P500		S&P500		$3,825.33
9/30/2022	Q3 22	Q3 FY2022	S&P500		S&P500		$3,585.62
12/30/2022	Q4 22	Q4 FY2022	S&P500		S&P500		$3,849.50
3/31/2023	Q1 23	Q1 FY2023	S&P500		S&P500		$4,109.31
6/30/2023	Q2 23	Q2 FY2023	S&P500		S&P500		$4,450.38
9/29/2023	Q3 23	Q3 FY2023	S&P500		S&P500		$4,288.05
12/29/2023	Q4 23	Q4 FY2023	S&P500		S&P500		$4,769.83
9/25/2021 - 12/25/2021	Q4 21	Q1 FY2022	Technology	Apple	AAPL	16,319,441,000	$174.61
12/26/2021 - 3/26/2022	Q1 22	Q2 FY2022	Technology	Apple	AAPL	16,185,181,000	$136.72
3/27/2022 - 6/25/2022	Q2 22	Q3 FY2022	Technology	Apple	AAPL	16,070,752,000	$138.20
6/26/2022 - 9/24/2022	Q3 22	Q4 FY2022	Technology	Apple	AAPL	15,908,118,000	$129.93
9/25/2022 - 12/31/2022	Q4 22	Q1 FY2023	Technology	Apple	AAPL	15,821,946,000	$164.90
1/1/2023 - 4/1/2023	Q1 23	Q2 FY2023	Technology	Apple	AAPL	15,728,702,000	$193.97
4/2/2023 - 7/1/2023	Q2 23	Q3 FY2023	Technology	Apple	AAPL	15,634,232,000	$171.21
7/2/2023 - 9/30/2023	Q3 23	Q4 FY2023	Technology	Apple	AAPL	15,908,118,000	$192.53

Market Cap	Net Income (3 months	Short term liabilities	Long term liabilities	Total Liabilities	Buyback per quarter
$2,849,537,593,010	$34,630,000,000	$147,574,000,000	$161,685,000,000	$309,259,000,000	116831797
$2,212,837,946,320	$25,010,000,000	$127,508,000,000	$155,755,000,000	$283,263,000,000	167495611
$2,220,977,926,400	$19,442,000,000	$129,873,000,000	$148,329,000,000	$278,202,000,000	157018813
$2,066,941,771,740	$20,721,000,000	$153,982,000,000	$148,101,000,000	$302,083,000,000	193950589
$2,609,038,895,400	$29,998,000,000	$137,286,000,000	$152,734,000,000	$290,020,000,000	115221346
$3,050,896,326,940	$24,160,000,000	$120,075,000,000	$149,927,000,000	$270,002,000,000	98468835
$2,676,736,860,720	$19,881,000,000	$124,963,000,000	$149,801,000,000	$274,764,000,000	105134046
$3,062,789,958,540	$25,764,000,000	$145,308,000,000	$145,129,000,000	$290,437,000,000	177115255

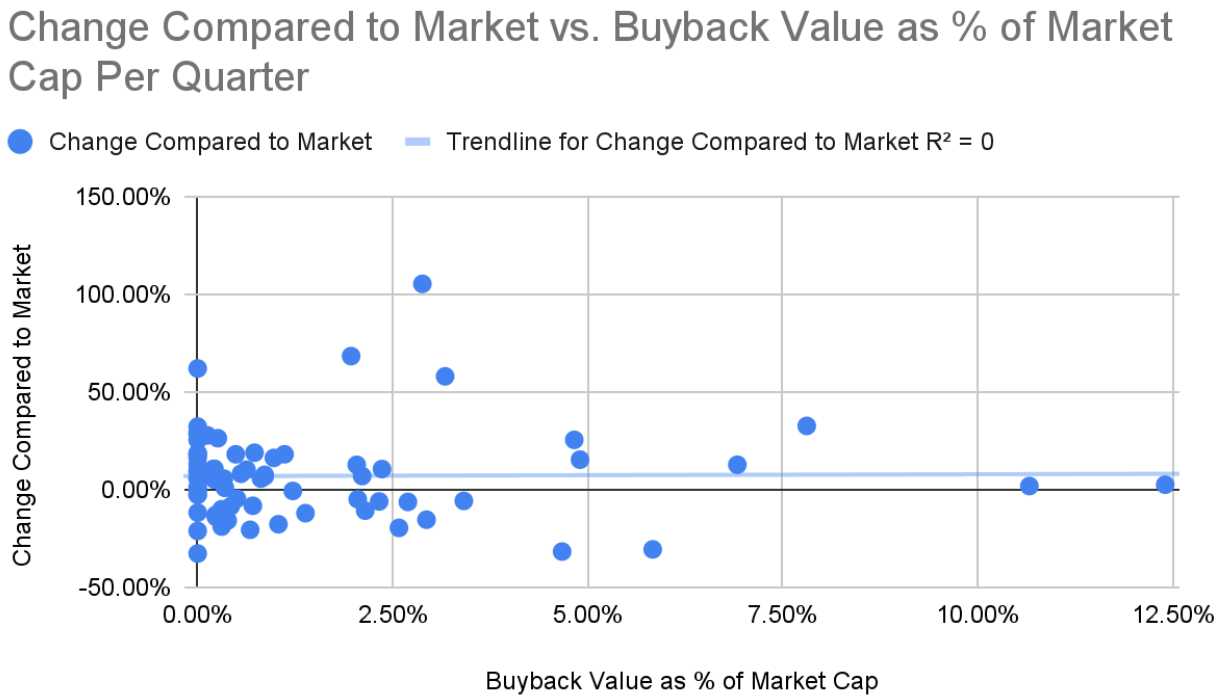
Buyback value per quarter	Buyback % of Market Cap	Change in Market cap	% Change in Market Cap	% impact	Change compar
			24.03%		
			-12.58%		
			10.65%		
			-4.62%		
			-15.85%		
			-6.27%		
			7.36%		
			6.75%		
			8.30%		
			-3.65%		
			11.24%		
$20,400,000,000					
$22,900,000,000	0.80%	-$636,699,646,690	-22.34%	-3.5967%	-17.72%
$21,700,000,000	0.98%	$8,139,980,080	0.37%	266.5854%	16.22%
$25,200,000,000	1.13%	-$154,036,154,660	-6.94%	-16.3598%	-0.67%
$19,000,000,000	0.92%	$542,097,123,660	26.23%	3.5049%	18.87%
$19,100,000,000	0.73%	$441,857,431,540	16.94%	4.3227%	10.19%
$18,000,000,000	0.59%	-$374,159,466,220	-12.26%	-4.8108%	-20.56%
$34,100,000,000	1.27%	$386,053,097,820	14.42%	8.8330%	18.07%

This figure presents data for one company (Apple) alongside the control group (S&P 500). In Image One, columns 1 through 6 contain basic company information. While this data is not directly used in our analysis, it provides insight into the types of companies engaging in stock buybacks. The date column was crucial in ensuring accurate quarter-to-quarter comparisons, as some companies' fiscal years do not align with the standard calendar year. The "Common Shares Outstanding" column, though not useful for direct data comparisons, plays a key role in calculating other financial metrics such as market capitalization and certain buyback percentages. The closing share price, when multiplied by shares outstanding, yields the market cap, which is shown in the next two columns. The closing share price was also used to track company performance. Additionally, the liabilities and net income columns provide insight into a company's financial state at the time of buybacks. This allows us to analyze not only whether buybacks impact performance but also the financial condition of the companies engaging in them. Of course, the data on stock buybacks is the most important component of the table and is utilized in every chart we create. For S&P 500 companies, buyback values were recorded in dollar amounts. The "Buyback per Quarter" and "Buyback % of Market Cap" columns are derived from the "Buyback Value per Quarter" column.

- Buyback per Quarter is calculated by dividing the buyback value by the closing share price, providing an estimate of the number of shares repurchased.
- Buyback as a % of Market Cap is determined by dividing the buyback value by the market cap.
- % Impact is found by dividing the buyback value per quarter by the change in market cap.

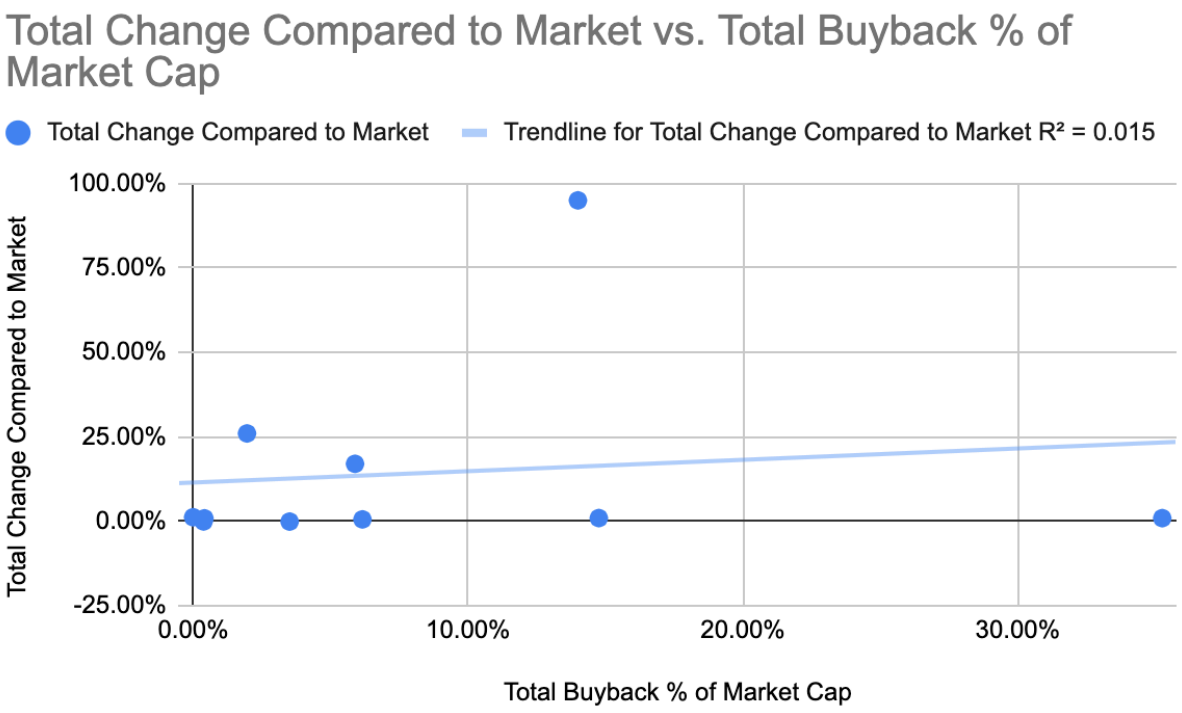
The full data table contains data for all 10 S&P 500 companies. Link

Figure 2:



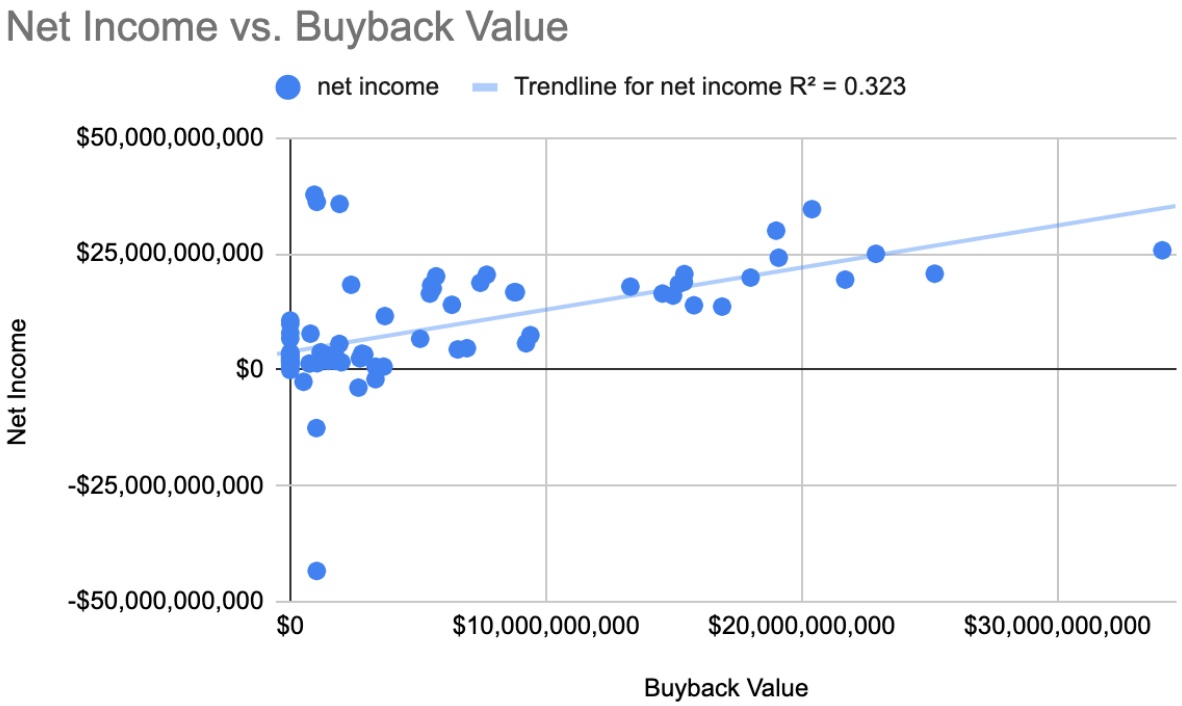
The values presented in this chart are derived from the columns "Change Compared to Market," "Buyback Value," and "Market Cap." The "Change Compared to Market" values are calculated by subtracting the percentage change in the S&P 500 index from the percentage change in a company's stock price during the same quarter. The "Buyback Value as a % of Market Cap" is calculated by dividing the buyback value for each quarter by the market capitalization from the previous quarter, as we are interested in the company's size before any stock repurchases took place. This chart illustrates the potential relationship between a company's stock performance and its buyback activity within the same quarter. As shown, the graph reveals no apparent association ($R^2 = 0$), indicating that, among large-cap companies, there is no discernible trend between stock performance and buyback value within a single quarter. This lack of correlation is expected, as companies typically initiate buybacks only when they are in a strong financial position, and one quarter's performance, whether strong or weak, is unlikely to significantly affect their ability to repurchase stock. A clearer picture of this relationship is shown in **Figure 4**, which examines the effect of performance and buybacks over a longer time frame.

Figure 3:



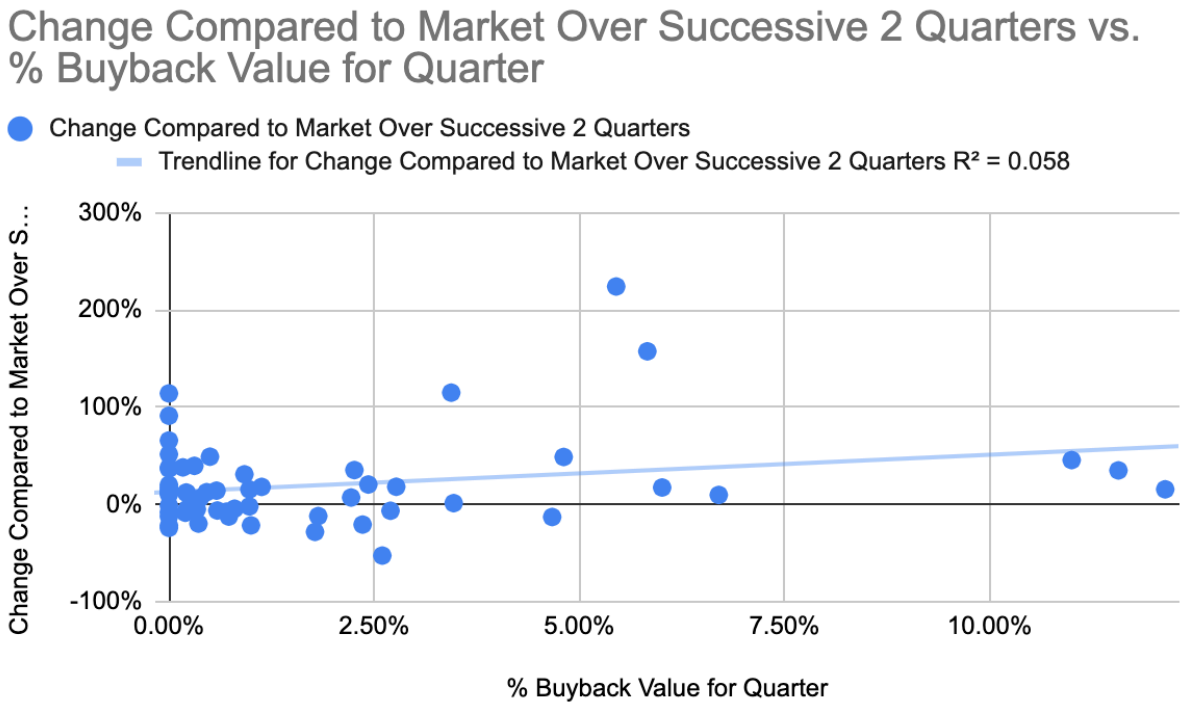
In the chart above, each point represents a selected company from the S&P 500 over the entire two-year period. The X-axis shows the total buyback percentage of market capitalization, calculated by summing the buyback values each quarter and dividing by the market cap at the start of Q1 2022. While this method does not provide a perfect measure of the total buybacks over the two years, it offers a reasonable visualization that allows for easy comparison across companies of different sizes, as buyback values can vary significantly depending on company scale. The Y-axis represents the total change in stock value compared to the market, showing the percentage difference in growth between each company and the broader market over the same two-year period. As with previous analyses, the R^2 value here is low ($R^2 = 0.015$), indicating no discernible pattern between buyback percentage and performance. However, some trends are still observable. The three companies that repurchased less than 1% of their stock relative to market cap experienced minimal growth compared to the market. In contrast, among companies that repurchased more than 1%, three showed significant growth, while four grew at a rate similar to the overall market. Interestingly, among the four companies that grew similarly to the market, those with larger buybacks tended to show slightly more positive growth, though the difference is marginal.

Figure 4:



In this chart, the buyback value for each quarter is compared with the net income for the same quarter. Since both metrics are value amounts for the same company, there's no need to convert the values into percentages of market capitalization. The goal of this analysis is to determine whether there is a relationship between buybacks and net income, as this would suggest that buybacks can be used as a predictor of a company's financial health and its ability to repurchase stock. When examining the S&P 500 data, a clear central trend emerges: companies with zero net income tend to buy back no stock, and as net income increases, buybacks also grow. While there are a few potential outliers at both ends of the net income spectrum, companies that deviate significantly from this trend, which may weaken the overall association, the general pattern still holds. This suggests that, on the whole, net income and buyback values are positively correlated. The trend indicates that companies with stronger financial performance are more likely to repurchase stock, and conversely, companies that repurchase more stock tend to have higher net income. Based on this relationship, it can be argued that companies engaging in larger buyback programs are generally more financially secure, which could suggest better future performance.

Figure 5:



In the graph above, the percentage buyback value for a specific quarter of a company is compared with its performance over the following two quarters (i.e., if a company bought stock in Q1, its performance in Q2-Q3 is tracked). The percent buyback value is calculated by dividing the buyback value by the market cap. Meanwhile, the change compared to the market over two successive quarters was determined by multiplying the change compared to the market percentages for each quarter, including the principal (meaning it reflects a ratio rather than just a percentage increase or decrease). As shown in the chart, most of the data is clustered around the origin. The data appears fairly random, with no strong correlation, as indicated by an R^2 value of only 0.058. Many companies reported buyback values of less than 1% of their market cap per quarter, and their performance over the following two quarters remained relatively average. However, companies that repurchased more than 1% of their market cap in a single quarter exhibited a wider range of performance outcomes, with returns as high as over 200% and losses as steep as approximately -60%. In this range, the data appears less clustered, and while no clear trend emerges, companies that performed the worst tend to be on the lower end of the buyback value percentages.

The following data is for the Russell 2000 portion of the experiment:

Figure 6:

Date	Quarter	Industry	Company	Ticker	Common Shares	Closing Sha
Q1 22	Q1 FY2022	S&P500		S&P500		$4,545.86
Q2 22	Q2 FY2022	S&P500		S&P500		$3,825.33
Q3 22	Q3 FY2022	S&P500		S&P500		$3,585.62
Q4 22	Q4 FY2022	S&P500		S&P500		$3,849.50
Q1 23	Q1 FY2023	S&P500		S&P500		$4,109.31
Q2 23	Q2 FY2023	S&P500		S&P500		$4,450.38
Q3 23	Q3 FY2023	S&P500		S&P500		$4,288.05
Q4 23	Q4 FY2023	S&P500		S&P500		$4,769.83
1/1/22 - 3/31/22	Q1 2022	Technology	Super Micro Computer	SMCI	51906873	$3.81
4/1/22 - 6/30/22	Q2 2022	Technology	Super Micro Computer	SMCI	52347039	$4.03
6/30/22 - 9/30/22	Q3 2022	Technology	Super Micro Computer	SMCI	52922886	$5.51
10/1/22 - 12/31/22	Q4 2022	Technology	Super Micro Computer	SMCI	53637158	$8.21
1/1/23 - 3/31/23	Q1 2023	Technology	Super Micro Computer	SMCI	52488494	$10.65
4/1/23 - 6/30/23	Q2 2023	Technology	Super Micro Computer	SMCI	52905947	$24.92
7/1/2023 - 9/30/2023	Q3 2023	Technology	Super Micro Computer	SMCI	53313542	$27.42
10/1/2023 -12/31/2023	Q4 2023	Technology	Super Micro Computer	SMCI	55933330	$28.43

Market Cap	Net Income (3 n	Short term liabilitie	Long term liabilit	Total Liabilities	Shares repurchased
$197,765,186	$76,972,000	$1,496,155,000	$301,103,000	$1,797,258,000	0
$210,958,567	$140,822,000	$1,470,024,000	-$290,694,000	$1,179,330,000	0
$291,605,102	$184,416,000	$1,353,355,000	$322,725,000	$1,676,080,000	0
$440,361,067	$176,167,000	$916,940,000	$339,060,000	$1,256,000,000	0
$559,002,461	$85,846,000	$1,092,380,000	$331,651,000	$1,424,031,000	146256
$1,318,416,199	$193,569,000	$1,374,652,000	$327,907,000	$1,702,559,000	0
$1,461,857,322	$156,995,000	$1,604,821,000	$325,604,000	$1,930,425,000	0
$1,590,184,572	$295,968,000	$1,992,089,000	$335,837,000	$2,327,926,000	0

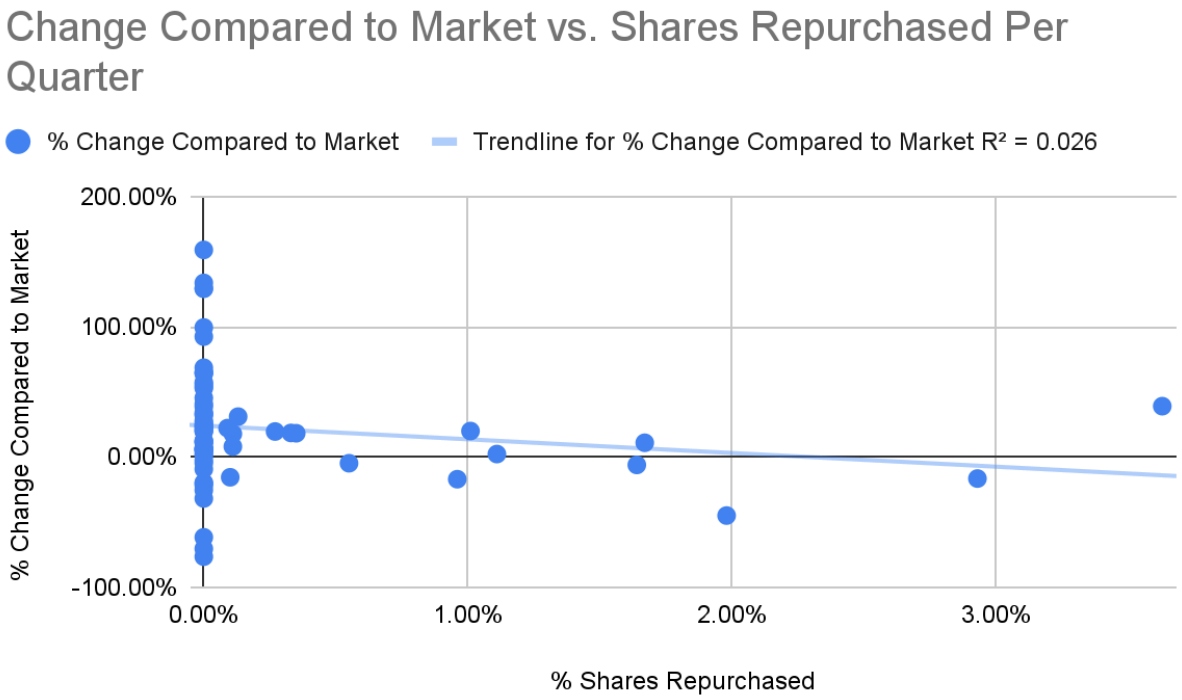
~Buyback value	% Shares Repurchased	Change in Market cap	% Change in Market Cap	% impact	Change compa
			-4.62%		
			-15.85%		
			-6.27%		
			7.36%		
			6.75%		
			8.30%		
			-3.65%		
			11.24%		
$0.00					
$0.00	0.00%	$13,193,381	6.67%	0.00%	11.29%
$0.00	0.00%	$80,646,535	38.23%	0.00%	54.08%
$0.00	0.00%	$148,755,965	51.01%	0.00%	57.28%
$1,557,626.40	0.27%	$118,641,394	26.94%	1.31%	19.58%
$0.00	0.00%	$759,413,738	135.85%	0.00%	129.10%
$0.00	0.00%	$143,441,122	10.88%	0.00%	2.58%
$0.00	0.00%	$128,327,250	8.78%	0.00%	12.43%

This figure presents data for one company (SuperMicro Computer) alongside the control group (S&P 500), using the same control group as the S&P 500. In Image One, columns 1 through 6 provide basic company information. While this data is not directly used in the analysis, it offers insight into the types of companies engaging in stock buybacks. The date column was crucial in ensuring accurate quarter-to-quarter comparisons, as some companies' fiscal years do not align with the standard calendar year. The "Common Shares Outstanding" column, though not useful for direct data comparisons, plays a key role in calculating other financial metrics such as market capitalization and certain buyback percentages. The closing share price, when multiplied by shares outstanding, yields the market cap, which is shown in the next two columns. The closing share price was also used to track company performance. Additionally, the liabilities and net income columns provide insight into a company's financial state at the time of buybacks. This allows us to analyze not only whether buybacks impact performance but also the financial condition of the companies engaging in them. Of course, the stock buyback data is the most critical component of the table and will be used in every chart we create. For Russell 2000 companies, buyback values were recorded in share amounts. The "~Buyback Value" and "% Shares Repurchased" columns are derived from the number of shares repurchased.

- Approximate Buyback Value was calculated by multiplying the number of shares repurchased by the closing share price.
- % Shares Repurchased was found by dividing the number of shares bought back by the total shares outstanding.
- % Impact was determined by dividing the buyback value per quarter by the change in market cap.

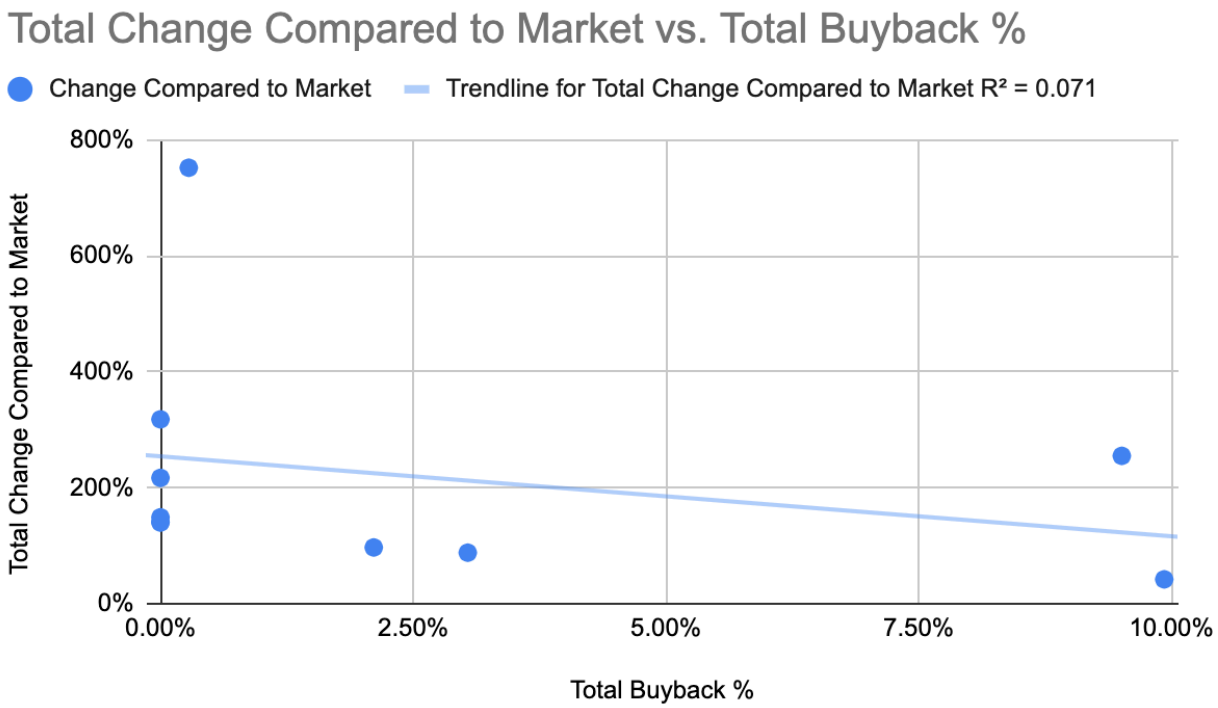
The full data table contains data for all 10 Russell 2000 companies. Link

Figure 7:



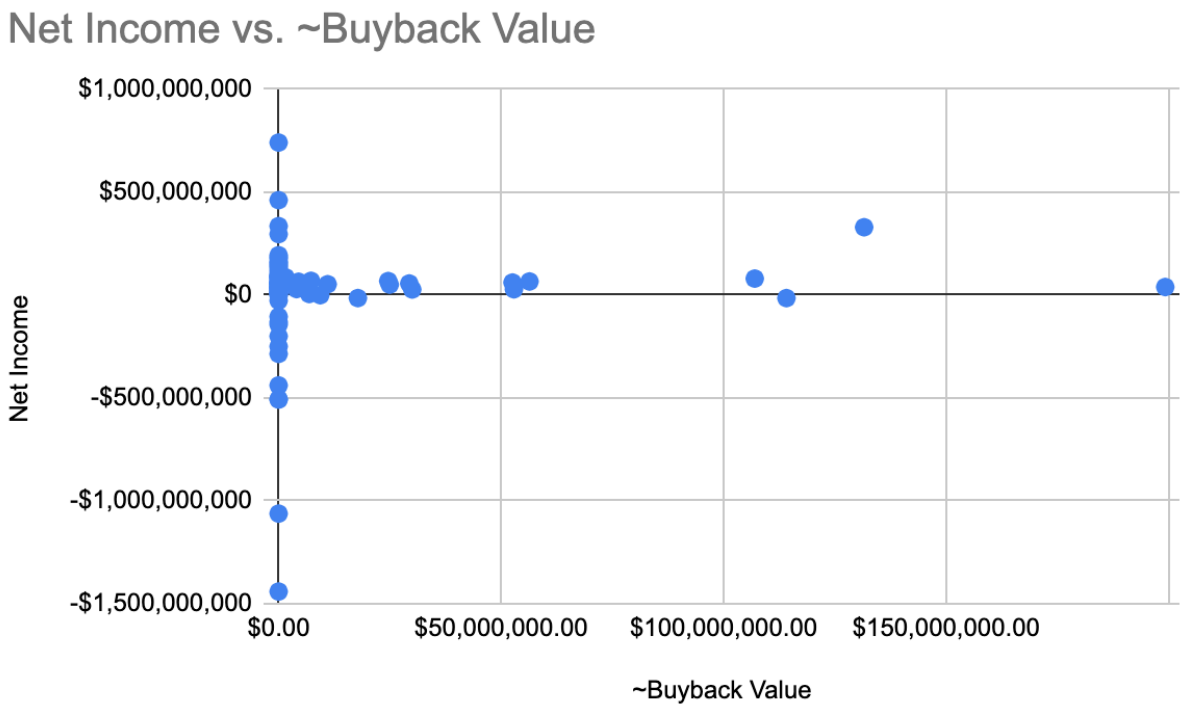
Similar to **Figure 3**, the graph above plots the change in a company's stock compared to the market against the percentage of shares repurchased, this time for Russell 2000 companies. The percentage change compared to the market is calculated by determining the percentage change in a company's market capitalization and subtracting the percentage change for the S&P 500 during the same quarter. Since the buyback values for these companies are provided in terms of shares rather than market cap, the percentage of shares repurchased is calculated by dividing the number of shares repurchased by the number of shares outstanding in the previous quarter (to account for the stock count before any repurchases). One notable observation is that most companies looked at repurchased 0% of their shares, suggesting that smaller-cap companies don't engage in buybacks as frequently. For those companies that did not repurchase shares, the spread of their percent change compared to the market is wide, with many showing a change of ±10% for that quarter. This indicates that smaller-cap companies with larger fluctuations in stock performance are less likely to repurchase stock, which makes sense, companies tend to repurchase shares when they are more financially stable or expect an increase in value. When excluding the companies that repurchased 0% of their shares, nearly all but six companies showed positive changes compared to the market. While we cannot conclusively say that higher percentages of shares repurchased lead to greater performance relative to the market, it appears that companies that engage in stock buybacks are more likely to experience positive growth compared to the broader market. However, as with the previous analysis, the time period in this chart may not be long enough to reveal a definitive trend.

Figure 8:



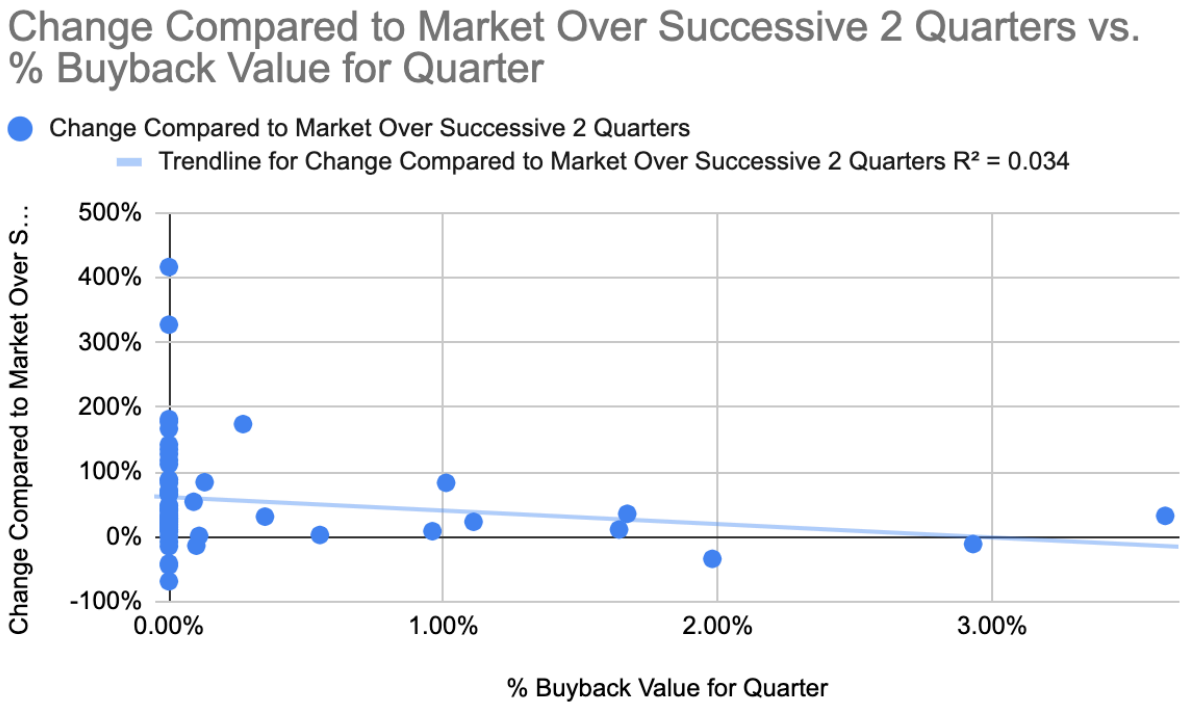
Just like with **Figure 4**, the buyback value over two years for each company is compared with the total change compared to the market over those same two years, this time with several Russell 2000 companies. However, instead of the buyback values shown as a percent of the market cap, they are found by finding the percent of stock repurchased relative to the shares outstanding, which was done this way because repurchase values were given in terms of amount of stock. The change compared to the market was found the same way as in **Figure 4**, explained in the caption. Notice that all of the companies expressed tremendous growth compared to the market. With these smaller-cap Russell 2000 companies most of them didn't buy back any stock at all. Notice how way fewer companies in the Russell 2000 bought back stock compared to the chosen S&P 500 companies.

Figure 9:



In this figure, the approximate buyback value is observed and compared to net income, both measured per quarter. Since buyback values were provided in share amounts, the buyback value in dollars was estimated by multiplying the shares repurchased by the closing share price. In the chart, most companies hover just above $0 in net income, a stark contrast to the S&P 500, which reports significantly larger sums. The companies that engage in the most stock buybacks tend to fall within the -$50,000,000 to $100,000,000 net income range, excluding one outlier. Notably, these are the only companies actively repurchasing shares. Although data points outside this range are limited, this trend supports the idea that financially stable companies are more likely to buy back stock, whereas companies experiencing either a dramatic surge in net income or extremely low earnings are less inclined to do so. This data highlights a noticeable relationship between stock buybacks and net income.

Figure 10:



This chart is similar to **Figure 5**, but this time it focuses on the Russell 2000. Along the x-axis, the "percent buyback value for quarter" shows the percentage of a company's market cap that was repurchased in a given quarter. Since the companies vary in market cap, this allows for easier comparison on the chart. The "change compared to the market over successive two quarters" reflects how much a company's performance changed compared to the market over the following two quarters. The goal of this chart was to assess whether stock buybacks had a longer-term effect on stock performance. However, the chart doesn't provide clear conclusions. Most companies in the Russell 2000 reported no buybacks for many of their quarters. This makes sense, as these smaller-cap companies are going through periods of change and have not yet reached the financial stability of S&P 500 companies. For the quarters in which buybacks did occur, there is little to no impact on stock performance. This suggests that smaller-cap companies are not repurchasing stock as frequently, and when they do, their performance tends to mirror the broader market.

ANALYSIS

To test our hypothesis that there is an association between buyback value and stock performance, we first aimed to establish a clear relationship between stock repurchases and stock performance. Our data visualizations initially suggested a random scatter across most charts, which made it difficult to discern any definitive trends. However, upon closer inspection, certain patterns began to emerge. While some data points appear to be randomly distributed, various external factors could explain this randomness, such as market conditions, economic cycles, and company-specific variables. Given the complexity of these factors and the inherent variability in stock buyback data, our findings do not yet provide conclusive evidence to confidently support our hypothesis. Nevertheless, despite the seemingly weak correlations, we can still break down the data into smaller segments and perform further analyses to uncover subtler trends.

In the following two sections, we focus specifically on the S&P 500 companies and their stock repurchase behaviors. While the overall dataset for the S&P 500 appears unremarkable at first glance, closer analysis reveals underlying factors that may help explain the apparent randomness. One significant factor is the time period during which the data was collected. Additionally, by dividing the data into smaller, more specific categories based on the magnitude of stock repurchases, we can observe more meaningful trends that might otherwise be hidden. The two figures we examine below, Figures 3 and 4, help illustrate these points.

Stock Repurchases and Performance in the S&P 500

Figure 2: The relationship between buyback values and stock performance over a single quarter shows a weak association. Most data points are clustered near the origin, with a gradual dispersion as the buyback values increase. This pattern does not lend strong support to our hypothesis, but it is not entirely unexpected. Stock buyback programs typically span several years, and the performance of a company is not defined by a single quarter of data. Therefore, using only quarterly data may not capture the full impact of buyback programs on stock performance. To better understand the influence of stock repurchases, we turn to a longer time horizon, specifically a two-year period, as depicted in **Figure 3**.

Figure 3: By extending the analysis to a two-year period, we gain a more comprehensive understanding of the relationship between stock buybacks and performance. Although the data does not show a strong, overarching association, we can break it down into more specific categories to observe trends within subgroups of companies.

1. **Stock Repurchases of Less Than 2%**:
   In Figure 3, we see that four companies repurchased less than 1% of their stock relative to their initial market capitalization. Over the two-year period, the stock performance of

these companies did not notably differ from the broader market. This suggests that minimal buybacks, particularly those below 2%, are unlikely to have a significant impact on stock performance.

2. **Stock Repurchases of Greater Than 2%**:
   Among the companies that repurchased more than 2% of their stock, a clearer pattern begins to emerge. Of the seven companies in this group, three showed remarkable growth compared to the broader S&P 500 index, while four demonstrated performance roughly in line with the market. Interestingly, within this group of companies that performed similarly to the S&P 500, those that repurchased a larger percentage of their stock showed marginally better performance than those that repurchased slightly less. This finding indicates that, at the very least, stock buybacks do not appear to have a negative effect on stock performance. In fact, the data suggests that companies that repurchased larger portions of their stock may have experienced a slight advantage over their peers in terms of growth.

Figure 5: After analyzing the relationship between stock repurchases and stock performance over both one quarter and two years, we found the gap to be too large. Figure 5 looks at stock performance over the next two quarters after a company buys back stock. This provides more time for any potential effects of the buybacks, while avoiding a time period too long that could introduce other factors. The chart shows that most of the data points are above the x-axis, suggesting that most companies performed well, regardless of whether they repurchased stock. However, it is worth noting that the data appears to become more varied in performance as repurchase values increase, though it still does not show negative stock performance. Another interesting observation is that the proportion of companies underperforming the S&P 500 compared to those outperforming it decreases as repurchase values grow. This suggests that there is little risk in investing in companies that repurchase stock, though extraordinary profit should not be expected.

The most striking takeaway from the analysis is that, in all the figures above, as the scale of stock repurchases increases, the proportion of companies demonstrating exceptional growth relative to the S&P 500 also increases. This suggests that, while stock buybacks may not guarantee superior stock performance, they do appear to correlate with better-than-average outcomes for a certain subset of companies.

Stock Repurchases and Other Performance Measures in the S&P 500

Looking at **Figure 4**, the comparison between stock repurchases and performance shows a strong association. This chart doesn't directly reveal the impact of stock repurchases on share price performance, which is the strongest indicator of a company’s performance and the most important from an investment perspective. However, it provides insight into when a company might repurchase stock, and net income also serves as a measure of performance. Net income

reflects a company's financial state. A company with low or negative net income is either underperforming or spending a significant portion of its gross income elsewhere, which often leads to more volatile share price results. On the other hand, a company with high net income is financially stable and has cash on hand that can be reinvested back into the business. These companies tend to show more stable changes in share price.

Therefore, the data in this chart is relevant, especially since it shows the strongest association among all the charts, allowing us to infer several things. The upward association in the data indicates when a company might repurchase stock. If an investor knows a company's net income, they can reasonably predict whether that company will repurchase stock, and vice versa. Additionally, investors can infer that companies repurchasing stock are more likely to be financially stable. This chart explains the impact buybacks have on financial performance, though not directly on stock price (Măciucă*)*.[4]

Strong upward association: As the repurchase value increases along the x-axis, net income also rises along the y-axis. This suggests that companies with higher net incomes tend to repurchase more stock than those with lower net incomes.

Comparison with Russell 2000: The net income values in this chart are generally positive, unlike those in **Figure 9**, which shows data for companies from the Russell 2000. In **Figure 9**, the data points are mostly clustered around the center, highlighting the differences in financial stability between small-cap and large-cap companies.

When comparing company liabilities with stock repurchases, no discernible trend was found, either in the short or long term. The chart is not included, as the data does not contribute to the hypothesis, positively or negatively. The chart showed randomness, and one is unable to infer much from it. Short and long-term liabilities do not fully reflect a company's current financial health or performance as much as net income, because liabilities are built up over time, and aren't necessarily a bad thing.

For more diversity amongst the chosen companies, we look to the Russell 2000. Analyzing data from the Russell 2000 gives us a deeper insight into the impact of stock buybacks on smaller companies.

Stock Repurchases and Performance in the Russell 2000

Figure 7: One noticeable difference between the S&P 500 (Figure 2) and the Russell 2000 charts is the distribution of the data. A much larger portion of the companies in the Russell 2000 did not buy back shares on a quarterly basis. The data in this chart can be split into two groups: quarters when stock was repurchased and quarters when it wasn't.

1. **Quarters when buybacks didn't occur**:
   During the quarters in which buybacks did not occur, stock performance varied significantly. Stock price growth ranged from -76% to 158%, and these extremes were not far from the majority of the data points for quarters without buybacks. The data is spread fairly evenly along the y-axis. This suggests that companies not repurchasing stock may be experiencing periods of dramatic growth or decline, meaning they're not in a financial position to repurchase. However, the majority of these companies still showed strong results.
2. **Quarters when buybacks did occur**:
   When companies repurchased stock in a quarter, their performance was generally in line with the market. They performed within roughly ±40% of the S&P 500's performance. Companies that bought back stock showed both positive and negative results. From this, we can infer that when a Russell 2000 company buys back stock, it tends to report average stock performance, in contrast to the larger movements seen with the S&P 500.

Short-term data on stock repurchases are more impactful for smaller-cap companies, as these companies tend to experience quicker and more dramatic changes compared to larger-cap companies. This is why we focused more on quarterly results for the Russell 2000 than for the S&P 500.

Figure 8: Notice that half of the 10 companies in the Russell 2000 repurchased shares over the 2-year period. This is a significant contrast to the 9 out of 10 companies in the S&P 500 that repurchased shares. There's no clear association or pattern here, although all of the companies performed well. In fact, companies that bought back stock performed well, but not as well as those that didn't. It seems the 2-year time period did not provide enough data to draw any strong conclusions on trends.

Figure 9: The relationship between net income and buyback value reveals the financial state of companies when buying back stock and can be used to predict when companies are likely to repurchase based on their net income. Unlike the S&P 500, there is no clear trend between the two for the Russell 2000. Most companies did not repurchase stock during most quarters. Companies that didn't repurchase often had very high or very low net incomes, with many showing negative net income, indicating a period of change. The chart suggests that companies going through changes tend to repurchase less frequently. Many companies that did repurchase stock had net incomes slightly above zero, with only a few going negative. This trend aligns with the S&P 500, where companies with steady net income are more likely to repurchase stock, while those without steady income repurchase far less frequently.

Figure 10: Similar to Figure 5, this chart aims to identify the strongest associations or trends based on the time period after stock repurchases. The chart is quite similar to Figure 7, and the

same inferences can be made. Notice that the performance of companies becomes increasingly aligned with the S&P 500 control group as repurchase values grow.

Perhaps the most significant takeaway from the data is its comparison with the S&P 500. For instance, when comparing stock repurchases and performance in the S&P 500, it is evident that most companies that repurchased little or nothing performed similarly, and the performance range widened as repurchase values increased. On the other hand, companies in the Russell 2000 that did not repurchase stock showed large performance variance. As repurchase values increased, however, their performance began to align more closely with market averages. Additionally, the Russell 2000 shows much lower repurchase amounts in proportion to the S&P 500 and exhibits much more performance variance.

NEXT STEPS

If given more time, there are several key directions in which I would expand this research to strengthen the validity and depth of the analysis.

1. Expand the Dataset:
The most immediate improvement would be to broaden the sample size. Currently, the limited number of companies analyzed—especially over a longer time frame—resulted in too few data points to draw definitive conclusions. Expanding the scope to include the top 20–30 companies in the S&P 500, as well as a broader subset of the Russell 2000, would provide a richer dataset. This would improve the statistical power of the analysis and allow for more robust trend identification.

2. Increase and Refine Control Groups:
With a more comprehensive dataset, I would also create better-balanced control groups. By ensuring an even distribution of companies that engaged in stock buybacks versus those that did not, we could more accurately isolate the impact of repurchases. Further, evaluating these dynamics within both the S&P 500 and Russell 2000 would clarify whether trends differ based on company size or market capitalization.

3. Explore Additional Variables:
While buyback volume was the primary focus of this study, preliminary results showed a noteworthy connection between net income and stock performance. A deeper analysis of this relationship—and other potential contributors such as revenue growth, debt levels, or R&D investment—could reveal more reliable predictors of stock performance than buybacks alone.

CONCLUSION

This research set out to examine whether there is a clear correlation between stock buybacks and subsequent stock performance. While no definitive causal relationship was established, the findings suggest important patterns worth noting.

The most notable insight is that, across all figures, companies that engaged in larger-scale stock buybacks tended to outperform the S&P 500 more consistently. This pattern, while not universal, indicates that stock repurchases may serve as a signal of confidence or stability for a certain subset of firms. Conversely, companies with minimal or no buybacks generally exhibited more average or widely variable performance—particularly evident in the Russell 2000, where repurchase activity was lower and stock performance less predictable.

Another compelling observation is the strong association between net income and stock performance. This suggests that profitability—not just capital allocation decisions like buybacks—plays a critical role in driving returns. As such, future investment strategies may benefit more from emphasizing fundamentals such as earnings growth, rather than relying solely on repurchase data.

Finally, even though stock buybacks are not guaranteed indicators of superior performance, they are predictable and transparent actions. This means there is relatively little downside in incorporating them into a broader investment strategy. At the very least, buybacks could serve as one of several filters to identify companies worth closer evaluation.

In sum, while stock repurchases alone may not ensure outperformance, their presence—particularly when paired with strong fundamentals—can offer useful insights for investors seeking to build more resilient and data-informed portfolios.

BIBLIOGRAPHY

1. Segal, Troy. Why would a company buy back its own shares? Investopedia [Internet]. 2015 Apr 20 [cited 2025 Feb 8]; Available from: https://www.investopedia.com/ask/answers/042015/why-would-company-buyback-its-own-shares.asp

2. S&P Dow Jones Indices. S&P 500®. S&P Dow Jones Indices [Internet]. [cited 2025 Feb 8]; Available from: https://www.spglobal.com/spdji/en/indices/equity/sp-500/.

3. Bonifacio R. Shiftbase. Net income. Shiftbase [Internet]. [cited 2025 Feb 8]; Available from:

https://www.shiftbase.com/glossary/net-income#:~:text=In%20conclusion%2C%20net%20income%20is,of%20a%20company's%20financial%20performance.

4. Măciucă G, Măciucă A. Is total comprehensive income or net income better for the evaluation of companies' financial performance? [Internet]. 2015 [cited 2025 Feb 8]. Available from: https://www.researchgate.net/publication/281240858_Is_total_comprehensive_income_or_net_income_better_for_the_evaluation_of_companies%27_financial_performance