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FIN11 Trading and Market Microstructure

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Insider trading in Capitol Hill

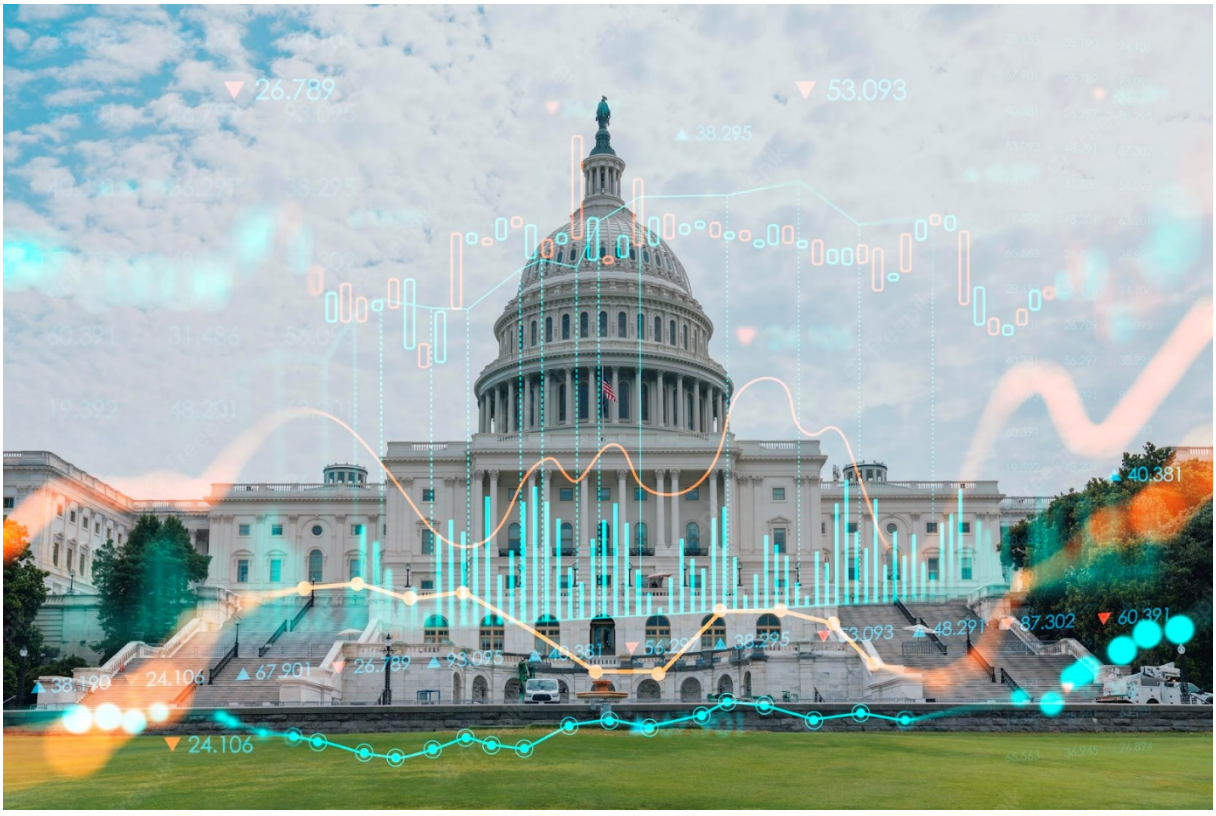
Investigating insider trading among the members of the U.S Congress

FIN11 – Trading and Market Microstructure

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Abstract

In recent years, congressional insider trading has shown to be an essential issue in the confidence and trust towards the Senate and Capitol Hill. Accordingly, as the spotlight is directed towards Capitol Hill, the House Administration Committee have been pressured to draft new versions of a stock trading ban, with (now former) Speaker of the House of Representatives Nancy Pelosi in the front.

In light of this, the thesis will discuss if the U.S. Congress Members exploit their political position by practicing inside trading. The theoretical framework used is based on the US legislations, and contains relevant articles regarding the issue. Regarding the research method, this is based upon a dataset, which contains congress members' trading history. This has been utilized to provide further insight into congress members trading performance. Furthermore, the results have been compared to the chosen benchmark, and processed through performance measures and a financial model. The analysis is based on the Fama French three factor model and sharpe ratio, which have uncovered interesting results. These results provide evidential arguments supporting the idea of congress members indulging in insider trading. However there are many weaknesses in relation to the analysis, which provides uncertainties revolving the results and conclusion.

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1. Introduction

When asked if members of the U.S Congress should be able to trade stocks and financial securities, former Speaker of the House of Representatives Nancy Pelosi, made the infamous comment "We're a free-market economy. They should be able to participate in that" last December (Metzger, 2021). In the wake of Pelosi's *rejection* of the proposed ban, several bills have recently been put forward, such as the Banning Insider Trading in Congress Act (Hawley, 2022).

In light of this, the thesis will examine whether members of Congress outperform the market with their excess return on stocks, using a dataset retrieved from disclosure forms published by the House and Congress. Additionally, the paper will investigate whether members of Congress carry out insider trading based on non-public information and their political position. Accordingly, the research question of the essay is;

To what extent do the members of Congress practice insider trading by exploiting their political position to beat the stock market in the United States?

First, a theoretical framework will be presented, which will help structure the research and analysis of the paper. For instance, it is beneficial to be aware of what insider trading is and the history behind the conflict of interest. Furthermore, the paper will present different assumptions and delimitations that were necessary in order for the thesis to process the data and examine the research question. Thus, different performance measures and a financial model are presented in the methodology section. Accordingly, the most central part of the thesis is the analysis, where the results from the data processing will be presented. Following, weaknesses of the analysis are highlighted based on the dataset. In conclusion, the paper will try to answer the research question at the end.

2. Theoretical framework

2.1 Insider trading and the jurisdiction of insider trading

Insider trading involves trading on material information about the value of a financial instrument that is *not* publicly available (Harris, 2003). Moreover, material nonpublic information is any information that could substantially impact the decision of an investor to buy or sell a security (Ganti, 2022). In most countries, insider trading is illegal and punishable by imprisonment or fines (Harris, 2003), depending on the time and reporting of the trade (Ganti, 2022). In the United States, which is the country and financial market the thesis will be based upon, the government regularly and actively attempts to enforce its insider-trading laws. Yet, as we will elaborate later, insider trading laws and bills are difficult to enforce, especially within the Congress.

The Stock Act, "Stop Trading on Congressional Knowledge Act" or "STOCK Act" (Fernando, 2022b), was introduced in 2012 after the financial crisis of 2008, as an act of Congress to combat insider trading. The act was passed after it had been reported a series of significant stock trades by various members of Congress (Caputo et.al., 2022). Furthermore, the act was passed in an attempt to prohibit members of Congress from buying or selling stock, on the basis of any privileged information they have. For instance, in September 2008 after a closed-door briefing about the state of the economy between the Treasury secretary and the chair of the Federal Reserve and members of Congress, Republican representative Spencer Bauhaus bought options betting the market would fall, which he profited off when the market crashed (Keith, 2011).

After the STOCK Act was passed in 2012, all members of Congress must now publicly file and disclose any financial transactions of stocks, bonds, commodities, and other financial securities within 45 days after the transaction (Hastings, 2022). In relation to the 2020 congressional insider trading scandal, during the covid-19 pandemic, senator Josh Hawley introduced the Banning Insider Trading in Congress Act earlier this year (Levinthal, 2022). The bill suggests prohibition from holding, purchasing or selling certain financial assets among members of Congress or their spouse. However, the bill has not yet been passed (Hawley, 2022). Suggestions towards

congressional trading have also been proposed to be held in qualified blind trusts as well. Yet, none of the two has been passed forward.

Similarly, during the covid-19 pandemic, allegations involving several members of Congress violating the STOCK Act was uncovered in the spring of 2020, in the 2020 congressional insider trading scandal (Kelly, 2020). In January of 2020 the Senate Committees on Health and Foreign Relations held a closed meeting with only senators present, to brief them about how the Covid-19 outbreak would affect the United States. Following the meeting senators like Richard Burr and Dianne Feinstein were accused of selling stocks at the start of the pandemic, just before the stock market crash on the 20th of February. For instance, Dianne Feinstein sold stocks in the biotech company Allogene Therapeutics on the 18th of February, but claimed that the company and trades were unrelated to the covid-19 pandemic (Kelly, 2020).

"When you're elected, you're here to serve the people, not the elite, and [a stock trading ban] I think is a step forward (...)" – Senator Steve Daines (Mui & Wilkie, 2022)

In association with members of Congress, the reporting of trades is often related to the member's spouses and family members. For instance, Nancy Pelosi's husband Paul Pelosi reportedly bought 4,000 shares of Alphabet, Google's parent company, during the summer of 2021 (Matthews, 2022). Pelosi exercised call options one week before the vote of the House of Judiciary Committee voted to curtail the unregulated power of companies like Google and Amazon (Schoffhall, 2022). The call option gave Pelosi the right to buy the stock for $1,200 a piece which was later closed for $2,500 the same day, giving Paul Pelosi a profit of $5.3 million on the investment. In spite of this, none have been convicted of insider trading among members of congress and their spouses. Although there have been several studies revealing potential violations of the STOCK Act by members of Congress, in respect to the reporting period of 45 days (Levinthal, 2022).

"We're a free-market economy. They should be able to participate in that" – Nancy Pelosi

Further, the trader can claim to have acquired his or her information strictly through insightful analysis of publicly available data, which is another argument of why it can be hard to define whether it is inside trading. If the management of a company calculates a decision and result, the speculator can credibly claim to have independently made the same calculations. Thus, members of Congress can also make these claims, which can explain why no one has been charged for insider trading, since the STOCK Act was passed. One can also see through the fines for failing to report trades on time, that the average fine is around $200 (Levinthal, 2022). Perhaps the fine is too low for the members to take the claim vigorously?

3. Assumptions and delimitations

There is a considerable amount of data related to each congress members' trading history and a substantial amount of congress members that can be analyzed from the dataset. Thus, because of the limitations regarding this assignment, such as limited time and restricted access to resources, it was necessary to make several assumptions and delimitations in terms of the analysis. Accordingly, we based our selection of congress members on (1) the volume they traded inside of our given timeline, (2) number of potential conflicts of interest towards their reported trades, and (3) their position within congress.

First, the dataset of trades stretches over eight years, from 2014 to 2022. However, we will only be using the data from 2019 until mid-November 2022. One of the reasons behind this is that most of the trades take place in this time period. As observed in the dataset, the biggest volume of trades reported takes place during this time period. Considering that the STOCK Act was passed in 2012, we assume that the enforcement and requirements of reporting needed time to stabilize and take effect. Hereby, we observe a larger amount of volume traded during recent years.

Second, when choosing congress members to observe, it is relevant to take a closer look at their potential conflicts of interest, uncovered in the New York Times (Parlapiano, Playford & Kelly, 2022). In this article, they revealed how 97 members of congress have reported trades in companies that can be influenced by their vote. Conflict of interest may arise when members of Congress hold and trade stocks in companies they may influence financially by their votes, committee positions or by exploiting other non-public knowledge (Metzger, 2022). Consequently, the analysis is based upon six members of Congress; Nancy Pelosi, Roger Marshall, Debbie Dingle, Dianne Feinstein, Bill Hagerty and John Hoeven.

Thirdly, in relation to both position and potential conflicts of interest it is highly relevant to take a closer look at chosen members of Congress. In *Figure 1*, the paper provides information about each member of Congress, their role in the congress, number of companies traded, and number of potential conflicts of interest. Additionally, it presents examples of stock companies which are seen as potential conflicts of interest in light of their committees. When looking at Nancy Pelosi, there seem to be no potential conflicts, however, this is as a result of Pelosi not being related to any committee because of her role as Speaker for the Congress. This does not mean that she has not taken advantage of her role in the Congress. For instance, it was pointed out in part 2.1 that the spouse of Nancy Pelosi traded options in the summer of 2021 which might have been a conflict of interest.

Companies traded and potential conflicts of interest (2019-2021)

	Chamber	Companies traded	Potential conflicts of interest	Example - potential conflicts of interest	Commitee
Roger Marshall	Senate	17	3	MSFT, INTC	Science, Space & Technology
Debbie Dingell	House	31	14	APPL, VOD	Energy, Commerce & Natural Resources
Dianne Feinstein	Senate	32	7	ALLO, MSFT	Intelligence, Appropriations & Judiciary
Bill Hagerty	Senate	18	4	ENVA, PNFP	Appropriations, Banking, Housing & Urban Affairs
John Hoeven	Senate	29	7	XON, CVX	Agriculture, Nutrition, Forestry, Energy & Natural Resources
Nancy Pelosi	Speaker	24	-	-	-

Figure 1: Potential conflicts of interest (Parlapiano, Playford & Kelly, 2022)

Furthermore, to analyze the congress members' performance, we compared the return of their portfolios with a reasonable benchmark. In this case, the benchmark is S&P500, which consists of

the 500 biggest companies in the US. Accordingly, the S&P500 represents a diversified benchmark, which has the ability to capture the largest movements in the American stock market.

Also, the extracted data series provides simply a range of how much the members of the U.S congress spent on each transaction, not the exact amount. The reason for this, is that the STOCK Act only requires them to report an estimate/range of their trades. For instance, we can only see that a congress member spent somewhere between $15,000 to $50,000 on a stock at a given date. Based on this information, we have decided to use the mid-range to determine the amount each member has spent trading.

Additionally, the trades that consist of exchanges or options are left out of the analysis, because the data set does not include sufficient information about those trades. Lastly, we assumed that short selling is not allowed. As a result, if the first trade of a specific stock is a sell order, we assume the trader held this from the beginning of our data interval. For instance, if a congress member's first trade in the interval is a sell order of Google on the fourteenth of February 2019, our approach would be to calculate the return of Google from the first of January 2019 to the date of the sell order. This also means that if the first trade of a stock is a buy order and there is no connected sell order within the timeline, we assume the shares are held throughout the period (from the buy date until 11/14/22).

4. Methodology

In attempt to examine the research question, the paper will in the following present the performance measures and financial model which form the basis of our analysis. Accordingly, the methodology will initially present descriptive statistics. Second, Sharpe ratio will be presented concisely, which can contribute further to the discussion of the research question. Lastly, the paper will elaborate the financial model, Fama French three factor model to investigate whether the congress members beat the market or not.

4.1 Descriptive statistics

In the following some descriptive statistics of the dataset will be presented. First, the paper will introduce some information about the initial dataset retrieved from disclosure forms published by the House and Congress, and further elaborate on descriptive statistics related to the six chosen members of congress.

The initial data series consists of trades executed by 208 members of the U.S. Congress. The members executed a total of more than 27,000 trades in the period from July 25th of 2014 to September 30th of 2022. Among the +27,000 trades, the members invested in a total of 2,635 stock companies. However, since the paper bases its analysis upon a dataset of the six members of Congress, the paper will in the following elaborate further on descriptive statistics related to the six chosen members.

Firstly, one can observe from *Figure 2* that most of the members have traded somewhere between 20 and 35 trades. However, Dianne Feinstein, in particular stands out compared to the rest, with 83 executed trades in the timeline between January 10th of 2019 to February 18th of 2020. Subsequently, the table below shows the number of trades that were sold and bought, and the number of companies traded in the time period.

Further on, the descriptive statistics shed light on trading values. The purpose of this is to provide information about the sizes of the trades. The paper has calculated average trading value, lowest trading value, highest trading value, median, 1st and 3rd quartile for each member of congress. By adding information about median, 1st and 3rd quartile, a wider understanding of how the trading activity is distributed based on trading value, can be attained.

For instance, one can observe from *Figure 2* that the lowest trading value of Nancy Pelosi's trades is $175,001, the highest is $3,000,001 and the average trading value is $1,075,894. However, this alone does not provide a good representation of how the trades are distributed based on value. When looking at the quartiles one can see that 75% or more of the trades are valued at $500,001, and 25% or more of the trades are valued at $3,000,001.

	Roger Marshall	Debbie Dingell	Dianne Feinstein	Bill Hagerty	John Hoeven	Nancy Pelosi
Number of Trades	34	25	83	21	32	28
Buy	19	7	20	3	27	9
Sell	15	18	63	18	5	19
Number of Companies Traded	11	19	25	14	27	11
Average - Trading Value	$7,765	$32,701	$257,916	$215,881	$86,907	$1,075,894
Max - Trading Value	$8,001	$75,001	$3,000,001	$3,000,001	$175,001	$3,000,001
Min - Trading Value	$4,000	$8,001	$8,001	$8,001	$8,001	$175,001
Median - Trading Value	$8,001	$32,501	$175,001	$32,501	$75,001	$500,001
1st Quartile - Trading Value	$8,001	$32,501	$75,001	$8,001	$75,001	$500,001
3rd Quartile - Trading Value	$8,001	$32,501	$375,001	$75,001	$75,001	$3,000,001
First Trade	10/28/19	1/2/19	1/10/19	1/19/21	1/4/19	8/7/19
Last Trade	9/15/20	8/3/22	2/18/20	4/22/22	1/29/20	9/16/22

Figure 2: Descriptive statistics of Congress members' number trades, trading value and trading interval.

4.2. Data processing

In the following part, we will briefly explain the dataset and how we processed the data. We retrieved data from disclosure forms, published by the House and Congress, of trades executed by the members of the U.S. Congress in the period from June 2014 to mid-November 2022. Furthermore, we limited the dataset only to consist of the six chosen members of congress in the period of 2019-2022, as explained in part 3.

Subsequently, the daily return of each stock traded in the period was calculated for all of the six congress members based on trading information of each stock company retrieved from Yahoo Finance. For instance, if a member of the Congress bought 1,000 shares in AAPL 3/12/19 and sold the shares 5/19/21, we retrieve trading information (from Yahoo Finance) about AAPL in the period of which the stock was held. Further, the daily return was then calculated based on this information. Additionally, we calculated the daily portfolio return of each member. The daily return of each stock-company was weighted based on how much the market value of the shares invested in each company constituted of the total market value of the portfolio, see the equation below. Lastly, the daily returns of the portfolio were aggregated for the whole period.

$$r_{Pt} = r_{At} \times \frac{MV_{At}}{MV_{Pt}} + r_{Bt} \times \frac{MV_{Bt}}{MV_{Pt}}$$

Equation 1: Daily return of the portfolio

Where:

$r_{Pt} = The\ daily\ return\ of\ the\ portfolio\ at\ time\ t$

$r_{At} = The\ daily\ return\ of\ stock\ company\ A\ at\ time\ t$

$MV_{At} = The\ daily\ market\ value\ of\ the\ shares\ invested\ in\ stock\ company\ A\ at\ time\ t$

$r_{Bt} = The\ daily\ return\ of\ stock\ company\ B\ at\ time\ t$

$MV_{Bt} = The\ daily\ market\ value\ of\ the\ shares\ invested\ in\ stock\ company\ B\ at\ time\ t$

$MV_{Pt} = The\ daily\ market\ value\ of\ the\ Portfolio\ at\ time\ t$

The daily returns of each portfolio were used in order to calculate the alpha of each portfolio by using the Fama French three factor model. This was carried out by using a regression analysis in Excel. It is worth mentioning that the real values of SMB and HML used for the Fama French regression analysis have a delay of 1-2 months. This means that we only have values of SMB and HML until October 31st of 2022. As a result of this delay, the thesis was forced to leave out a few observations of each member in November.

4.3 General Performance measure

4.3.1 Sharpe Ratio

William F. Sharpe developed *The Sharpe Ratio,* which he originally called "rewarded-to-variability" (Fernando, 2022a). The model is defined as:

$$S = \frac{(R_p - R_f)}{\sigma_p}$$

Equation 2: Sharpe Ratio Formula

R_p = *return of portfolio*

R_f = *risk-free rate*

σ_P = *standard deviation of portfolio´s excess return*

Sharpe ratio is a measure of risk-adjusted return that compares the expected returns of an investment to the amount of risk taken (Fernando, 2022a). It is calculated by subtracting the risk-free rate from the expected return of an investment and then dividing that number by the standard deviation of the investment's returns. A high Sharpe ratio value indicates a good investment performance (Baldridge & Curry, 2022).

4.4 The Fama French Three Factor model

4.4.1 General Model and Difference to CAPM

The *Fama-French Three Factor model* is an asset pricing model developed in 1992 by Eugene Fama and Kenneth French (Hayes, 2022). It is an extension of the *Capital Asset Pricing Model (CAPM)*, which is a single factor model that estimates the expected return of an investment based on its risk relative to the rest of the market (Hayes, 2022) & (Kenton, 2022). The Fama-French model differs from the CAPM model by adding value risk and size risk into the calculation. These factors are added to the equation as a result of Fama and French`s studies (1992) which show that the CAPM model only explains around 70% (Reed, 2022). By adding *SMB* and *HML* to the equation, Fama-French is able to explain approximately 90% of the return in a diversified stock portfolio compared to the market (Reed, 2022).

4.4.2 Formula and Factors of The Model

$$\boldsymbol{R_{it} - R_{ft} = \alpha_{it} + \beta_1(R_{Mt} - R_{ft}) + \beta_2(SMB_t) + \beta_3 HML_t + \varepsilon_{it}}$$

Equation 3: Fama French three Factor model

Where:

R_{it} = *total return of a stock or portfolio i at time t*

R_{ft} = *risk free rate of return at time t*

R_{Mt} = *total market portfolio return at t*

$(R_{it} - R_{ft})$ = *expected excess return*

$(R_{Mt} - R_{ft})$ = *excess return on the market portfolio (index)*

$\beta_{1,2,3}$ = *factor coefficients*

SMB (small minus big) is a measure of the difference in returns between small stocks and large stocks.
HML (high minus low) is a measure of the spread of returns between the highest and lowest performing stocks in a given portfolio.

Additionally, the equation above contains a variable α_{it} which is a representation of an investment's risk, also referred to as the investment's alpha (Reed, 2022). The alpha of a portfolio measures its ability to beat the market. This means that if $\alpha > 0$, the portfolio beats the market.

5. Analysis of the data

To investigate the research question, the analysis seeks to shed light on the results and key findings from the data research. First, the analysis will present the key findings to give the reader an overall perspective on the results. Then, in the second part of the analysis, data results based on the Fama French Regression will be presented. In relation to the theoretical framework, Dianne Feinstein and Nancy Pelosi, will also be highlighted in the analysis.

5.1 Key findings

5.1.1 Return of portfolios vs. S&P 500

In this analysis, we wanted to compare the returns of the congress members with S&P 500. The graphs bellow, *Figure 3* and *Figure 4,* illustrate the differences between a congress member's return and the benchmark, where the orange line represents the S&P500 and the other remaining lines represent congress members. Specifically, on the x-axis in the graphs, the timeline from 2019 to 2022 is illustrated. For the y-axis, the return of the portfolio is presented.

The initial graph below, *Figure 3,* represents Bill Hagerty (green line), Nancy Pelosi (yellow line), Debbie Dingell (blue line) and S&P 500 (orange line). Accordingly, the analysis found it appropriate to group three and three congress members together in two different graphs. This was done in an attempt to simplify the illustrations and to give the reader a better overview of the results. From the first graph, one can observe that at the start of the period in 2019, all three portfolios have a return relatively close to the S&P 500. Bill Haggerty and Nancy Pelosi are somewhat above the orange line in this period, and Debbie Dingell is below the orange line.

Furthermore, the graph illustrates a downfall in the portfolios in the spring of 2020. Arguably, one can see this as a shift in their portfolios, as all three congress members' portfolios rose above the return of the benchmark after this crash. There is a continuous increase in the return of their portfolios throughout 2021, where Bill Hagerty stands out with the steepest development in return. Moreover, during the period of 2022, the graph shows a minor decline in the return of their portfolios. Nonetheless, one can observe that Bill Hagerty has the steepest decline of the three. Altogether, the three members have a higher return of their portfolios compared to the S&P 500, after the crash in the market during the spring of 2020.

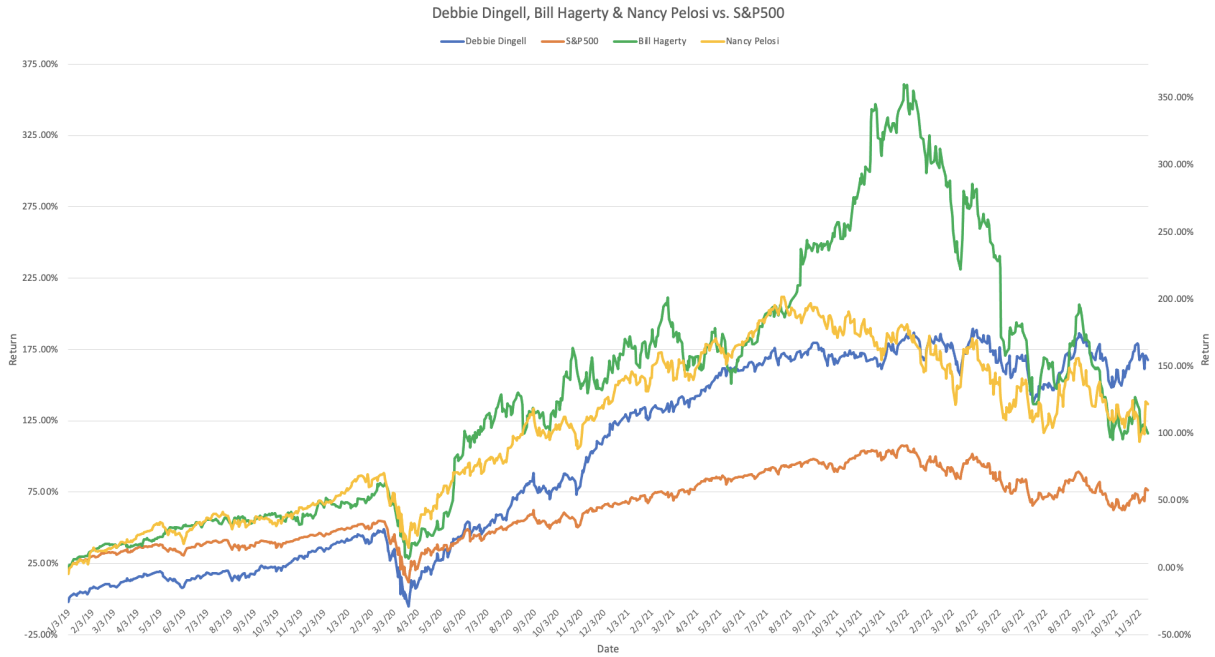


Figure 3: Comparing the return of the portfolio of three of the Congress members with the S&P500

Subsequently, the three remaining congress members, John Hoeven (blue line), Roger Marshall (yellow line) and Dianne Feinstein (green line) are represented in the graph below, *Figure 4*. In the graph the return of John Hoeven's portfolio versus S&P 500 can indicate that there is a positive correlation between the congress member's return and the return of the benchmark. There are also similarities between the movements of the S&P 500 and the return of Roger Marshall's portfolio. At the same time, Marshall's portfolio has a higher return most of the time during 2019, 2020 and 2021. Moreover, the return of the congress member Dianne Feinstein deviates more from the benchmark. This suggests that Dianne Feinstein has a portfolio with higher volatility, as the variations in the graph illustrates. However, this can be explained by the fact that her portfolio consists of simply one stock company from 5/21/20 until the last observation, and no more than three stock companies from 7/29/19, see *Figure 14* for overview of Dianne's holdings of stock companies.

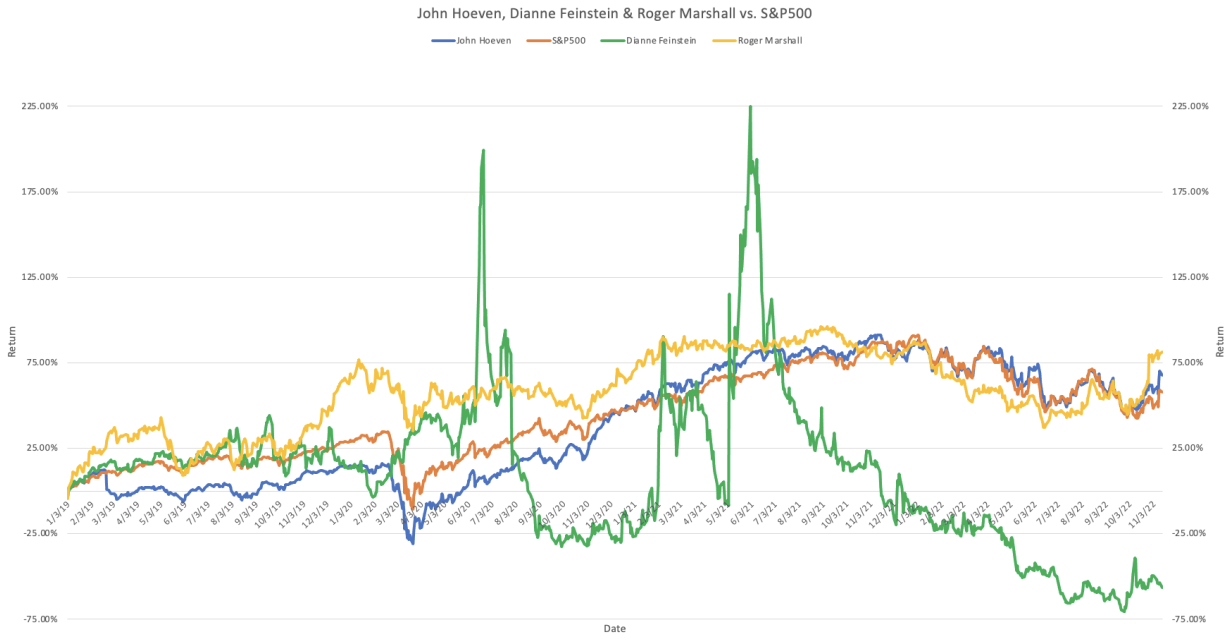


Figure 4:Comparing the return of the portfolio of three of the Congress members with the S&P500

Altogether, the illustrations compare the benchmark's daily rate of return with each congress member's daily rate of return. The wide gap between the return of the S&P 500 and the congress member's return, indicates that Dingell, Hagerty and Pelosi have a higher return than the market.

It is also highly relevant to mention that Dianne Feinstein's portfolio differs in larger degree from the other portfolios' movement in rate of return. Based on the graphs, one can argue that most of the congress members seem to have a higher rate of return than the benchmark. Nevertheless, the graphs alone are not enough to conclude that the congress members beat the market.

5.1.2 Trading activity

In attempt to investigate the research question further, the analysis will in the following look into the trading activity of the congress members. The trading activity is also related to the assumptions, which explains partially why the given congress members were chosen. Furthermore, there is one graph for each congress member, and the paper will try to compare them related to the grouping in the analysis above. On the x-axis, the timeline is illustrated and on the y-axis is the dollar value of each share traded. Moreover, the blue dots represent sell-orders and the orange dots represent buy-orders. The size of the dots symbolizes the number of shares bought and sold.

From the graphs below, one can see that Nancy Pelosi and Debbie Dingell have a high trading activity, where they have traded frequently throughout the timeline. On one hand, the spread between the dates of trading is larger for Pelosi than Dingell. The trading activity of Nancy Pelosi can be related to policy decisions, specifically a trade done June 17th this year, by her husband Paul Pelosi. Paul Pelosi purchased 18,891 shares in Nvidia (NVDA) at a price of $158.80, a top semiconductor company, worth between $1 million and $5 million at (Kaminsky, 2022).

This was done ahead of the vote on a bipartisan competition bill to set aside $52 billion to boost domestic semiconductor manufacturing and give tax credit for production (Zengerle & Shepardson, 2022). Later he sold the 18, 891 shares at a price of $165.33, which means he made a profit of (18,891·$165.33) - (18,891·$158.80) = $123,358.23 from this trade. Bill Hagerty, on the other hand, has traded within a narrow time period around the middle of 2021 and beginning of 2022. This relates to the graph above, of return of his portfolio compared to the benchmark, which can explain why he has such a steep increase of return around that period.

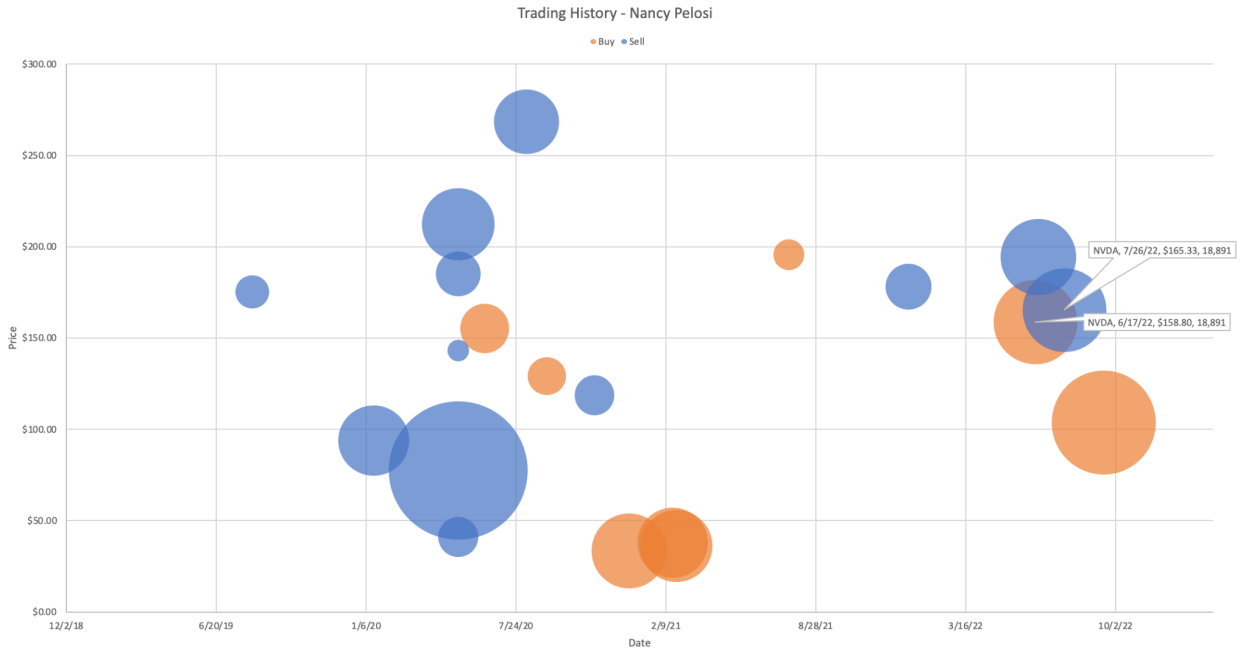


Figure 5: Trading activity of Nancy Pelosi

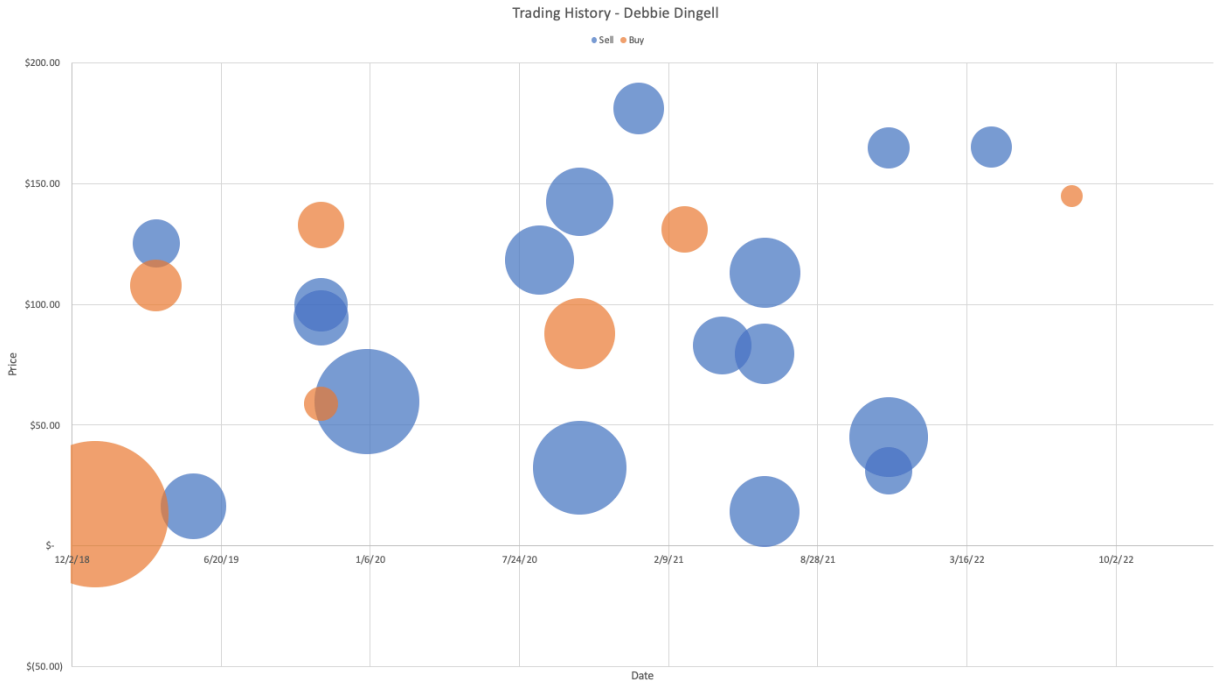


Figure 6: Trading activity of Debbie Dingell

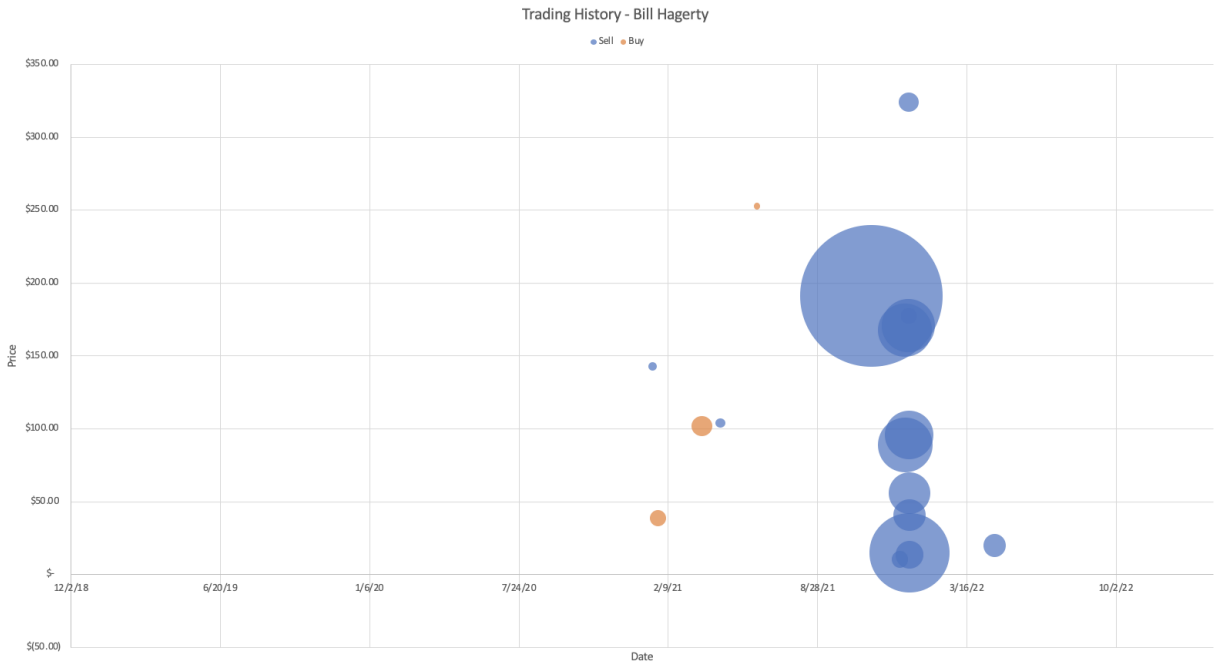


Figure 7: Trading activity of Bill Hagerty

The three remaining members of Congress, Roger Marshall, John Hoeven, and Dianne Feinstein, and their trading activity is illustrated in the graphs below. Overall, one can observe that the spread between trades is much narrower than the other three members shown above. To be more specific, Roger Marshall has mostly traded within the period of 2020, and John Hoeven has traded mostly within 2019 and partly in 2020. Moreover, this illustrates that Marshall and Hoeven traded frequently during 2019 and 2020, but have a lower trading activity in 2021 and 2022.

When looking at Dianne Feinstein and her trading activity, it is interesting to take a closer look at her transactions during 2020, in relation to the congressional insider trading scandal in the wake of the covid-19 pandemic, mentioned in the theoretical framework. From the graph below, it shows that Feinstein has pushed both sell and buy orders for Allogene Therapeutics (ALLO) during the start of 2020. First, she bought 25,150 shares in the spring of 2019 at the price of $29.82. In the wake of covid-19, Feinstein sold the same number of shares on the 31st of January to the price of $24.25. Consequently, she lost money on this transaction, but one can argue that she tried to hedge her stocks against dropping even more in value, related to the covid-19 pandemic. Feinstein gained insight towards the covid-19 situation during the closed-door briefing among senators one week

earlier. Therefore, one can argue that there can be a correlation between the transaction and her inside information.

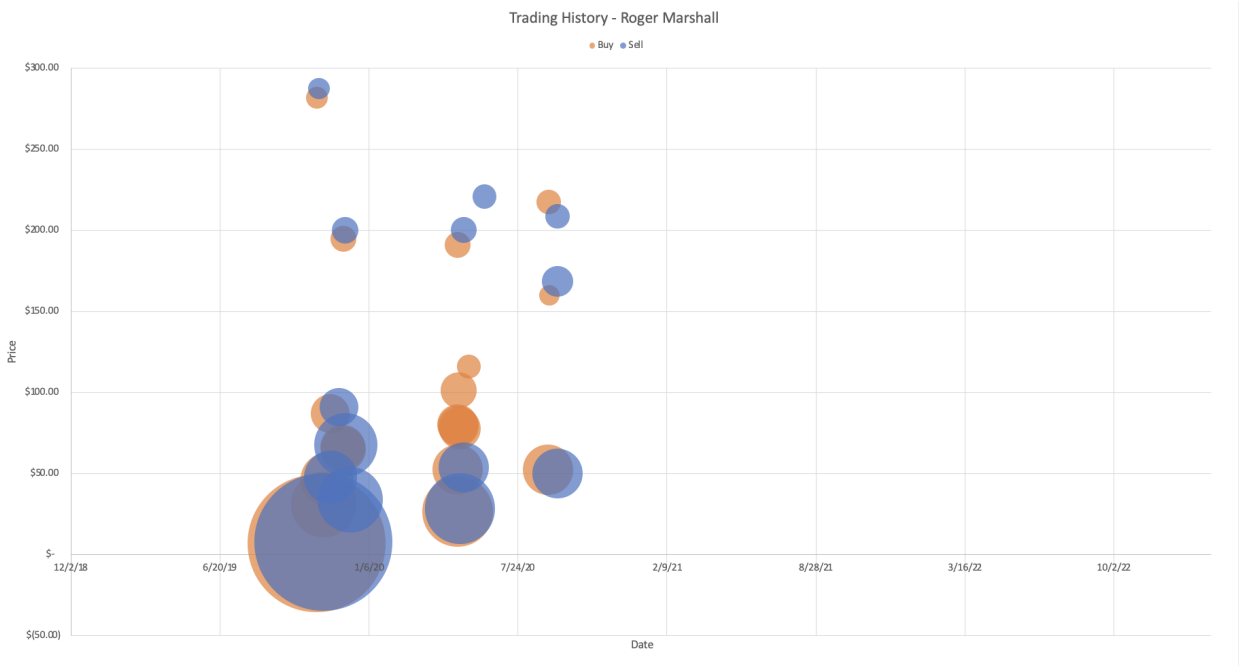


Figure 8: Trading activity of Roger Marshall

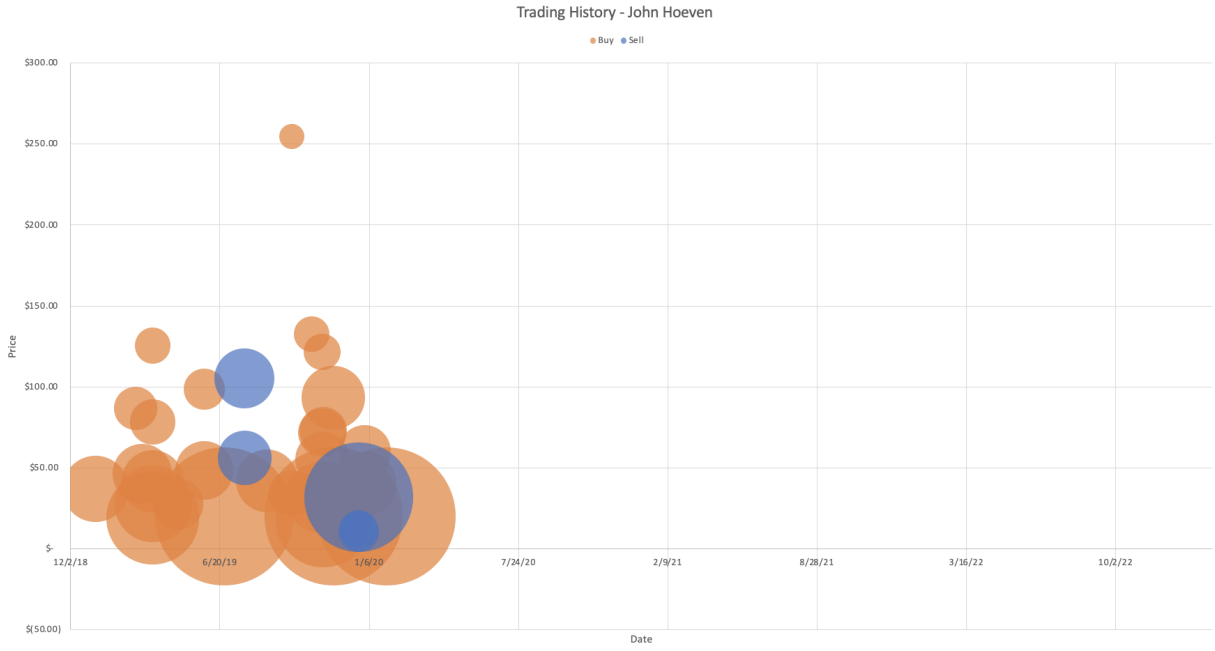


Figure 9: Trading activity of John Hoeven

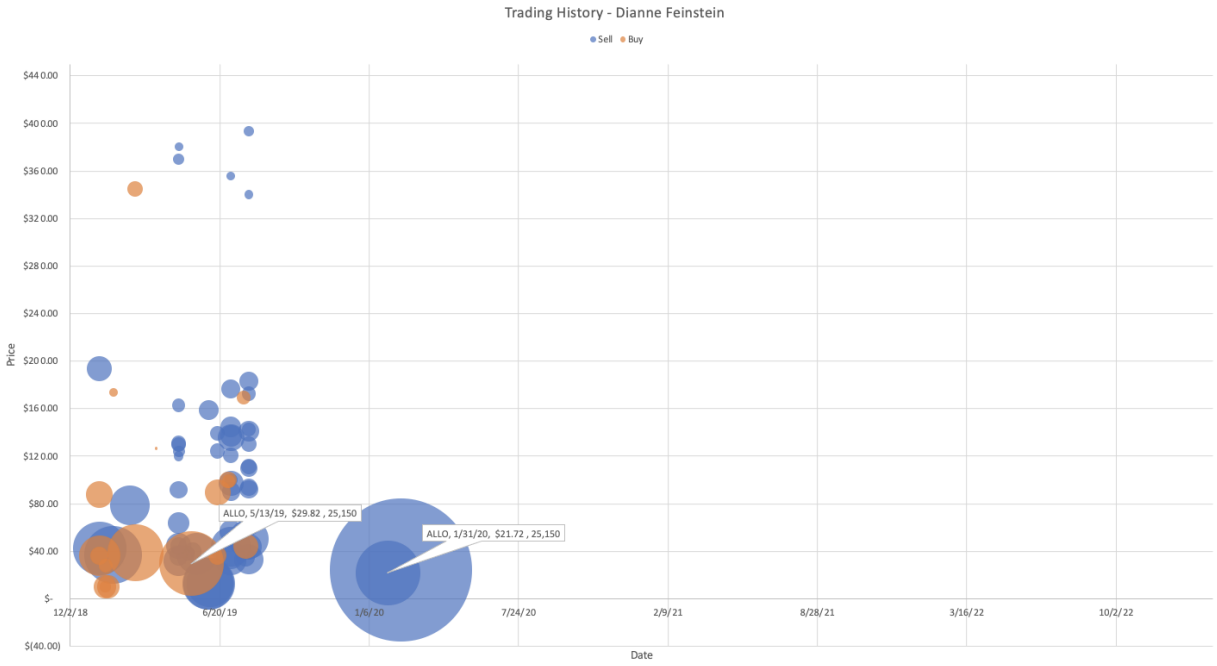


Figure 10: Trading activity of Dianne Feinstein

5.1.3 Sharpe Ratio

In the following, we will compare the Sharpe Ratio of the portfolios with the Sharpe Ratio of the benchmark to gain better insight and attempt to investigate the research question further. The table below shows the Sharpe Ratio of each congress member's portfolio, along with the Sharpe Ratio of the benchmark.

	Roger Marshall	Debbie Dingell	Dianne Feinstein	Bill Hagerty	John Hoeven	Nancy Pelosi	S&P500
Mean of Daily Return	0.074261%	0.112644%	0.089346%	0.093316%	0.066377%	0.100039%	0.057297%
Daily Risk Free Rate	0.003436%	0.003436%	0.003436%	0.003436%	0.003436%	0.003436%	0.003436%
Standard Deviation	1.622710%	1.517752%	6.642526%	2.095655%	1.624631%	1.910489%	1.451840%
Sharpe Ratio	0.043646243	0.071953776	0.012933296	0.04288859	0.038741653	0.050564713	0.03709856

Figure 11: Sharpe ratio of every Congress member's portfolio & S&P500

We observe the same results as when looking at the aggregated return of the portfolios compared to the return of the benchmark. Every portfolio, except the portfolio of Dianne Feinstein, has a greater Sharpe ratio than the market. This means that, even if the risk of the portfolio is taken into

account, most of the congress members still perform better than the benchmark. This coincides with our findings when looking at the returns.

5.2 Data Results from Fama French Regression

In the following we will present the Fama French regression analysis of the congressmember's portfolios to investigate whether the members beat the market or not. The table underneath visualizes summary output of the regression analysis for the portfolio of Nancy Pelosi.

SUMMARY OUTPUT - Nancy Pelosi

Regression Statistics	
Multiple R	0.904766182
R Square	0.818601845
Adjusted R Square	0.818035565
Standard Error	0.00805154
Observations	965

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.281139038	0.09371301	1445.57952	0
Residual	961	0.062299032	6.4827E-05		
Total	964	0.343438071			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000339273	0.000259358	1.30812459	0.19114386	-0.000169701	0.000848246	-0.000169701	0.000848246
Risk Premium	1.146216971	0.018133233	63.2108436	0	1.110631669	1.181802273	1.110631669	1.181802273
SMB	0.081566777	0.034959881	2.33315375	0.01984561	0.012960263	0.150173292	0.012960263	0.150173292
HML	-0.324391373	0.021376002	-15.175493	8.6431E-47	-0.3663404	-0.282442346	-0.3663404	-0.282442346

Figure 12: Summary Output from Fama French three factor model for Nancy Pelosi

As outlined in part 4.3.2, the Fama French regression analysis uses alpha to see whether the portfolio beats the benchmark or not. Looking at the summary output above, our alpha (intercept) is estimated to be 0.00033927, meaning it is larger than 0 and has outperformed the benchmark. However, it is observed from the summary above, that the p-value is estimated to be 0.19114386. The p-value expresses that even though the portfolio beats the market with an alpha value larger than 0, it is not statistically significant different from 0 when applying a 95% significance level.

The table underneath presents the alphas and p-value of the portfolios of the remaining 5 members of the U.S. Congress. Further, when looking at the other members of the U.S. Congress we are

able to observe that every member of the Congress has outperformed the market based on the alpha value in the Fama French model.

	Alpha (Intercept)	P-value	Statistical significant
Roger Marshall	0.000323671	0.420099325	NO
Debbie Dingell	0.000638504	0.000537718	YES
Dianne Feinstein	0.000725038	0.728657605	NO
Bill Hagerty	0.000662673	0.25716351	NO
John Hoeven	5.67485E-05	0.75604296	NO

Figure 13: Summary of results from Fama French for the five remaining members - Alpha and p-values

Based on *table 13* one can observe that all the alphas are positive, meaning all portfolios beat the market. However, only one congress member has a portfolio with an alpha significantly different from 0.

Most of these results coincide with what was observed in part 5.1.1 and part 5.1.3, however, we do observe exceptions. Using the graph with the aggregated return of Dianne Feinstein's portfolio in part 5.1.1, it was difficult to determine whether she beats the market or not. However, the alpha value from the Fama French three factor model indicated that Feinstein beats the market. The p-value on the other hand indicates that it is not statistically significant different from 0, meaning we cannot with certainty conclude that she did beat the market.

If we look at the trading activity in part 5.1.2 and the number of companies held throughout the time line visualized in the graph underneath (*Figure 14)*, one can see that Dianne Feinstein sold all of her shares in the majority of the stocks in her portfolio 7/29/19. This led the portfolio to go from well diversified to less diversified. A problem with this, is that the Fama French three factor model takes the risk premium, SMB and HML into account, which are based on a diversified

portfolio of stocks. Therefore, using the Fama French three factor model for Feinstein's portfolio might not provide a suitable representation of her performance.

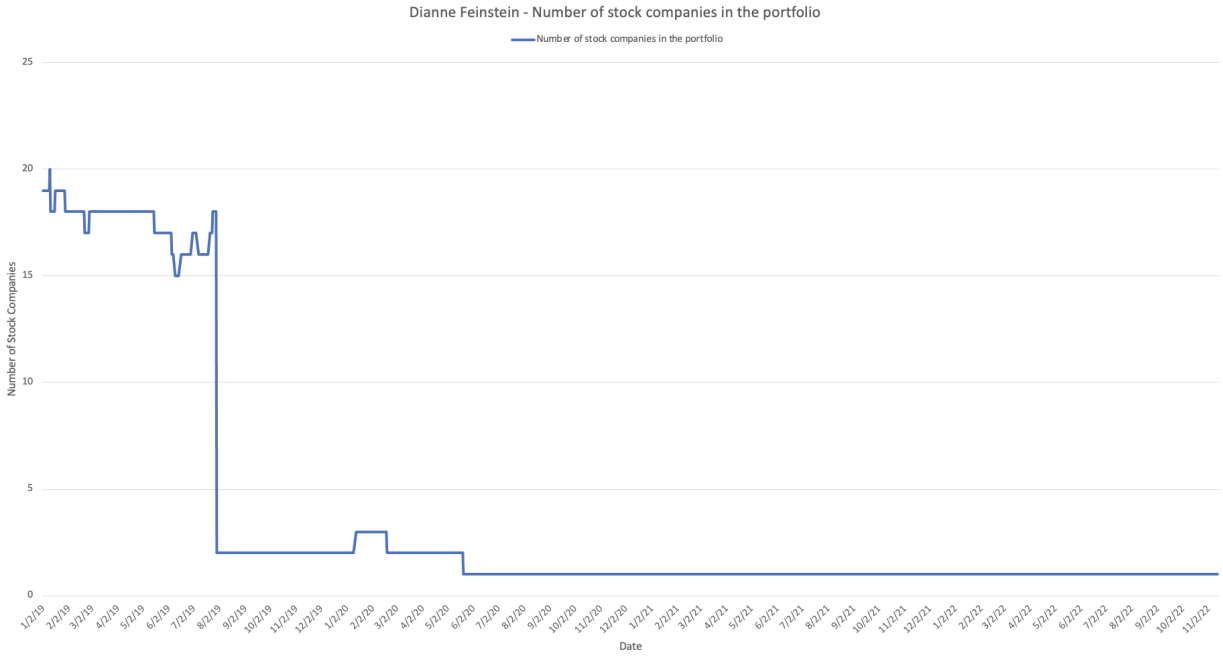


Figure 14: Number of stock companies in the portfolio of Dianne Feinstein during the course of time

The same goes for some of the other members of Congress. For instance, Bill Hagerty sold a lot of his position in stock companies in late December of 2021, which would also mean his portfolio became less diversified. The same goes for Roger Marshall, which in the entire timeline rarely was invested in more than 5 companies. Because of this weakness it is difficult to rely on the Fama French model alone when the portfolios at times are less diversified.

6. Weaknesses

Based upon the assumptions presented earlier, our analysis of the dataset reflects a restricted version of the real world of insider trading. This is because of the limited dataset used for our analysis, and all the following assumptions. The following weaknesses, related to the dataset are three-parted: 1) reported trades, 2) the size of the selected congress members and 3) midrange.

First, in relation to reported trades we had to limit our timeline, which excludes some of the data. This can be acknowledged as a weakness because it gives us a limited number of observations,

which can give a restricted image of the trading done by members of Congress. Additionally, the applied dataset can be incomplete due to any lack of reporting by Congress members. Considering if the possible expected excess return of congressional trading on inside information is larger than the fee of $200, it could be reasonable to assume that the congress member would act on the inside information without reporting the trade. Given the condition that every congress member is a rational human being and prioritizes their self-interest by maximizing their return (Chen, 2021).

However, the moral perspective of reporting trades and their respect towards the laws and jurisdiction of insider trading, can influence the members to report their trades correspondingly. In other words, according to the lack of incentives towards reporting of congressional trading, there could be trades executed that are not included in the dataset.

Second, the applied dataset in the analysis also consists of fewer observations because of the limited number of congress members. However, if we had included a higher number of congress members in the research, the results would possibly differ from the ones presented in the analysis. Concisely, based on basic statistical theory, a higher number of statistical samples would increase the significance of the results (James, 2021). In view of this, the limited size of the selected congress members is a weakness we possibly could have avoided by including more members, if we had the time and capacity.

Third, considering that the STOCK Act only requires members to report a range of the money spent on the transactions, we decided to use a mid-range as the arithmetic mean of the largest and the smallest values in each transaction. Using the mid-range as an estimate affects the weighting of the stock company when calculating returns. Consequently, the effect of the mid-range can contribute to a distorted image of the reality of the portfolio and its return.

7. Further Research

According to part 3 of the thesis, the research was limited to observe 6 members of the Congress rather than all of the 208 members of Congress in the initial dataset. However, if we were to do

further research, we could include more members of the Congress in order to strengthen the results and the discussion whether members of the Congress beat the market by exploiting their political position. Because we only observed members with potential conflicts of interest, it would be interesting to compare with members of the Congress who are not accused of potential conflicts of interest.

Barras, Scalliet & Wermers (2006) posted for the first time in 2005 the article "*False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas".* According to the article, standard methods of calculating the alpha value of funds do not account for the presence of luck (Barras, Scalliet & Wermers, 2006). They argue that funds that beat the market based on luck, have a significant estimated alpha, however, their true alpha is equal to zero. As a result, Barras, Scalliet & Wermers (2006) developed a model in order to measure the number and the proportion of funds with truly positive and negative performance. By applying this model to our research, we could detect whether the members of Congress beat the market based on the fact that they exploit their political position, or if it is just luck.

8. Conclusion

In the following, the thesis will try to answer the research question: *To what extent do the members of Congress practice insider trading by exploiting their political position to beat the stock market in the United States?*

In attempt to answer the research question, we have looked into the key findings from the dataset. Firstly, the results of comparing aggregated returns of the congress members' portfolio to the benchmark and calculating the Sharpe Ratio, could imply that the portfolio of the selected members of Congress beat the market. In particular, we saw that Nancy Pelosi's portfolio had a higher return and a higher Sharpe ratio than the benchmark in the key findings. Pelosi's portfolio also had an alpha value larger than zero calculated in Fama French. On the other hand, Dianne Feinstein had a Sharpe ratio value lower than the benchmark, yet her portfolio had a positive alpha.

The portfolios of Hagerty, Dingell, Hoeven and Marshall, had Sharpe ratio values higher than the benchmark, and positive alpha values, which indicates that they beat the market. Nevertheless, the Fama French model produced p-values larger than 5% for all these congress members, which means that the results are not significant with a significance level of 95%. However, the large p-value could be related to the size of the statistical sample and does not alone necessarily mean that there is no correlation. Therefore, based on all our findings of the Sharpe ratio values, the alpha values and comparing their portfolio return to the benchmark, we consider it to be reasonable to assume that the selected congress members did beat the market. Despite this, it is essential to mention that our conclusion is based upon the research of a narrow selection of congress members, with a substantial number of assumptions and limitations.

Lastly, when investigating if the members of Congress participate in insider trading we could observe certain trades which could be connected to non-public information given at meetings at the Congress. However, the thesis did only shed light on two events such like this, which alone is not enough to conclude that the members of congress do in fact participate in insider trading. However, if we were to look into lucky performances, see part 7, one could investigate whether the members of Congress beat the market based on luck, or if it might be because of the access to non-public information that causes their portfolios to outperform the market.

Sources

Baldridge, R. & Curry, B. (2022). *Understanding The Sharpe Ratio.* Retrieved from: https://www.forbes.com/advisor/investing/sharpe-ratio/ 08.12.2022

Barras, L., Scalliet, O. & Wermers, O. (2006). *False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas.* Retrieved from: https://web.mit.edu/econometrics/fdr2version.pdf 10.12.2022

Caputo, D., Marsco, D., Payne, K. (2022). *The Stock Act: The Failed Effort to Stop Insider Trading in Congress.* Retrieved from: https://campaignlegal.org/update/stock-act-failed-effort-stop-insider-trading-congress 29.11.2022

Chen, J. (2021). *What Is Homo Economicus? Definition, Meaning, and Origins.* Retrieved from: https://www.investopedia.com/terms/h/homoeconomicus.asp 09.12.22

Fernando, J. (2022a). *Sharp Ratio Formula and Definition With Examples.* Retrieved from: https://www.investopedia.com/terms/s/sharperatio.asp 08.12.2022

Fernando, J. (2022b). *STOCK Act.* Retrieved from: https://www.investopedia.com/terms/s/stop-trading-on-congressional-knowledge-act.asp 29.11.2022

Ganti, A. (2022). *What Is Insider Trading, and When Is It Legal?* Retrieved from: https://www.investopedia.com/terms/i/insidertrading.asp 10.12.2022

Hastings, D. (2022). *Should members of Congress Be Banned from Trading Stocks?* Retrieved from: https://www.closeup.org/should-members-of-congress-be-banned-from-trading-stocks/ 29.11.2022

Harris, L. (2003). *Trading and Exchanges Market Microstructure for Practitioners.*

Hayes, A. (2022). *Fama and French Three Factor Model Definition: Formula and Interpretation.* Retrieved from: https://www.investopedia.com/terms/f/famaandfrenchthreefactormodel.asp

Hawley, 2022. *Hawley Introduces Bill Banning Insider Trading in Congress*. Retrieved from: https://www.hawley.senate.gov/hawley-introduces-bill-banning-insider-trading-congress 8.12.2022

James, M. (2021) *Statistical Significance Definition: Types and How It's Calculated.* Retrieved from: https://www.investopedia.com/terms/s/statistical-significance.asp 09.12.2022

Kaminsky, G. (2022). *Nancy Pelosi's Husband Buys Millions In Chip Stocks Right Before Vote On Massive Chip Subsidy. Retrieved from:* https://dailycaller.com/2022/07/15/pelosis-husband-massive-amount-in-chips-stock-before-expected-senate-vote-subsidies/?utm_medium=email&pnespid=77o.D3QbLaAD1vvbu2SsFp_T4xOoUIcrKu2.xvJx9xhmQQmSb.fEfTq5LhkgJ2UYOGO7LQmEBQ 09.12.2022

Keith, T. (2011). *Congressional Stock Trades Get Scrutiny*. Retrieved from: https://www.npr.org/2011/11/17/142472051/rep-bachus-defends-trades 02.12.2022

Kenton, Will. (2022). *Capital Asset Pricing Model (CAPM) and Assumptions Explained.* Retrieved from: https://www.investopedia.com/terms/c/capm.asp 02.12.2022

Kelly, J. (2020). *Senators Accused Of Insider Trading, Dumping Stocks After Coronavirus Briefing.* Retrieved from: https://www.forbes.com/sites/jackkelly/2020/03/20/senators-accused-of-insider-trading-dumping-stocks-after-coronavirus-briefings/?sh=5cec438a4a45

Levinthal, D. (2022). *75 members of Congress have violated a law designed to prevent insider trading and stop conflicts-of-interest.* Retrieved from: https://www.businessinsider.com/congress-stock-act-violations-senate-house-trading-2021-9?r=US&IR=T 29.11.2022

Matthews, C. (2022). *Pelosi's husband bought Google, Disney call options that would pay off if bull market continues.* Retrieved from: https://www.marketwatch.com/story/pelosis-husband-bought-google-disney-call-options-that-would-pay-off-if-bull-market-continues-11640894240 17.11.2022

Metzger, B. (2021). *Pelosi Rejects Stock-Trading Ban for Members of Congress.* Retrieved from: https://www.businessinsider.com/we-are-free-market-economy-pelosi-rejects-stock-ban-congress-2021-12?r=US&IR=T

Metzger, B. (2022). *The effort to ban members of Congress from trading stocks is mostly dead — at least for now*. Retrieved from: https://www.businessinsider.com/lawmakers-unlikely-banned-trading-stocks-for-now-2022-12?r=US&IR=T 08.12.2022

Mui, Y., Wilkie, C. (2022). *Congress moves to ban members from trading stocks as Pelosi drops opposition*. Retrieved from: https://www.cnbc.com/2022/02/09/congress-moves-towards-banning-members-from-trading-stocks.html 10.12.22

Parlapiano, A., Playford, A. and Kelly, K. (2022). *These 97 Members of Congress Reported Trades in Companies Influenced by Their Committees.* Retrieved from: https://www.nytimes.com/interactive/2022/09/13/us/politics/congress-members-stock-trading-list.html 02.12.2022

Reed, E. (2022). *How does the Fama French 3 Factor Model Work?* Retrieved from: https://smartasset.com/investing/fama-french-3-factor-model 02.12.2022

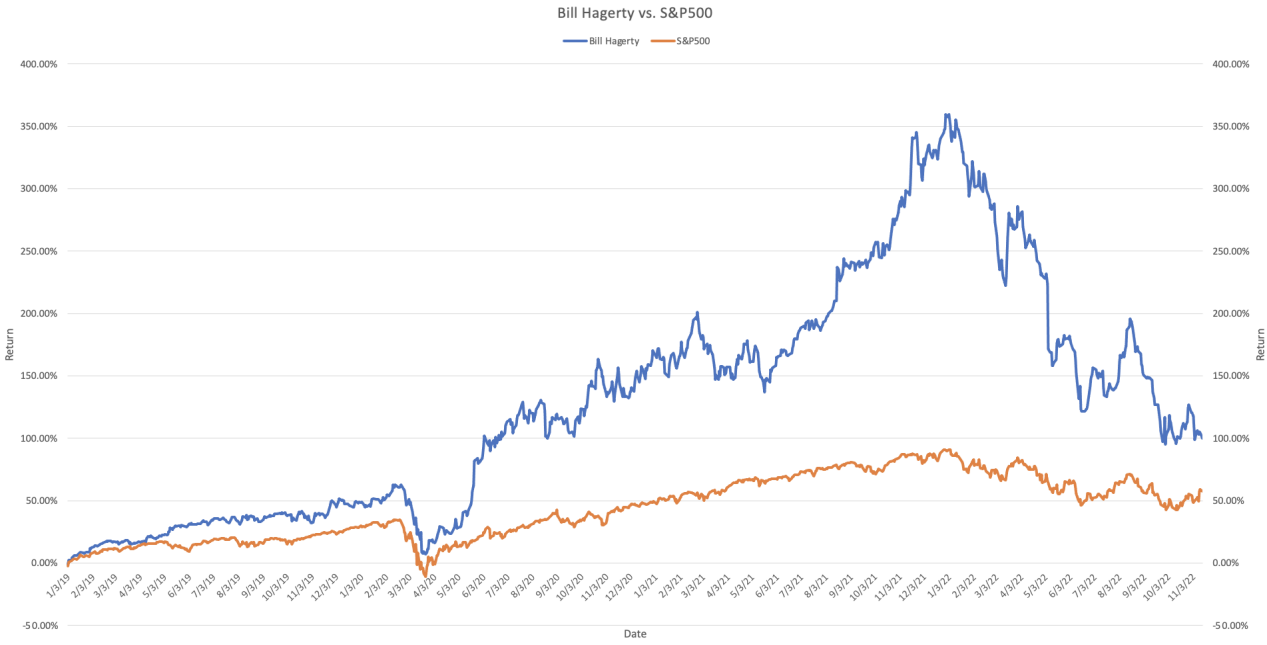
Schoffhall, J. (2022). *Nancy Pelosi's husband has stirred scrutiny for years over his stock purchases.* Retrieved from: https://www.foxbusiness.com/politics/nancy-pelosis-husband-stirred-scrutiny-years-over-stock-purchases 29.11.2022

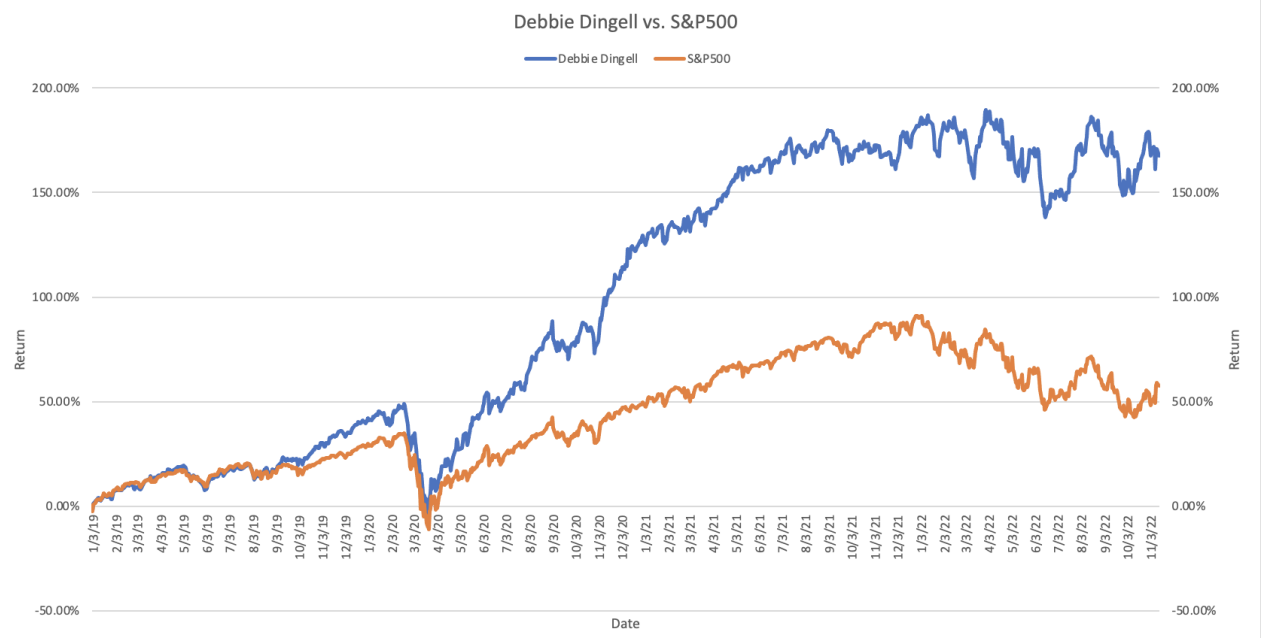
Zengerle, P., Shepardson, D. (2022). *U.S. Senate to vote as soon as Tuesday on slimmed-down China chip bill*. Retrieved from: https://www.reuters.com/technology/us-senate-eyes-vote-soon-tuesday-china-chip-competition-bill-source-2022-07-14/ 09.12.2022

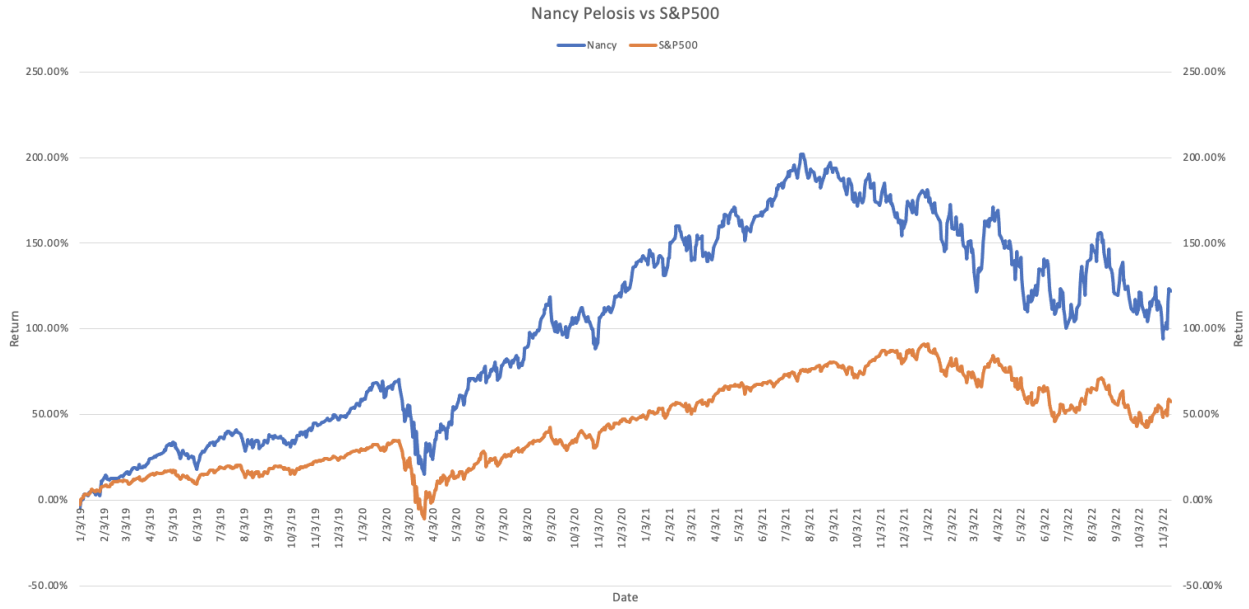
Appendix

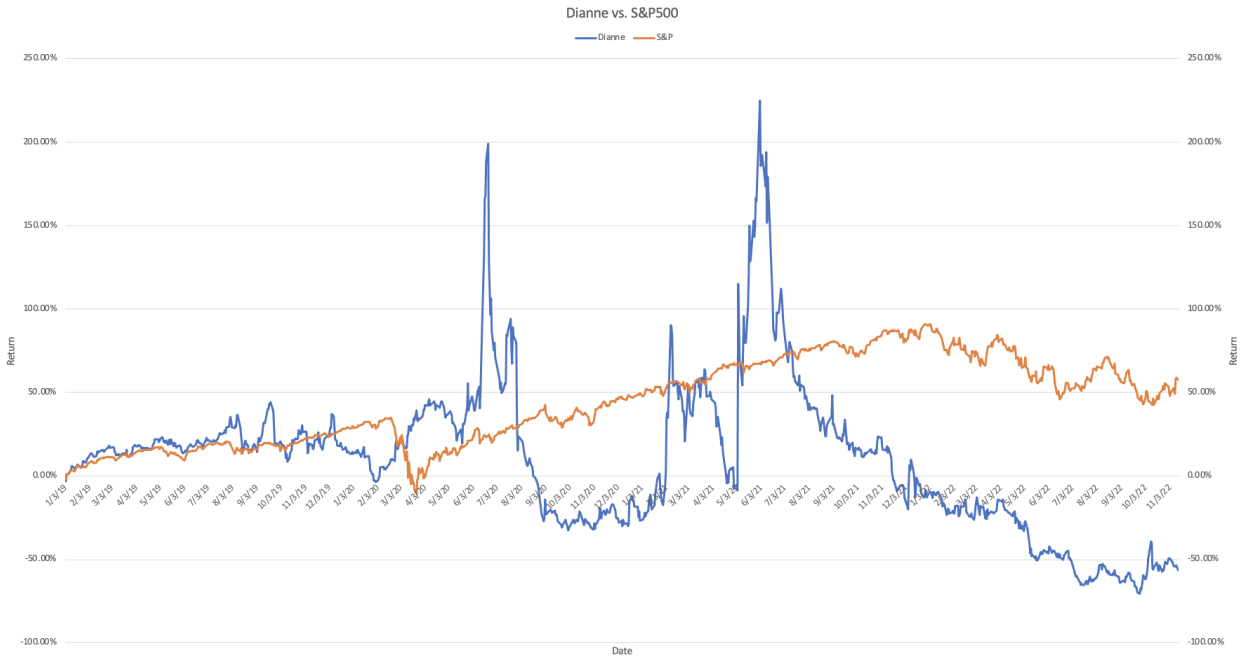
5. Analysis

Portfolio return

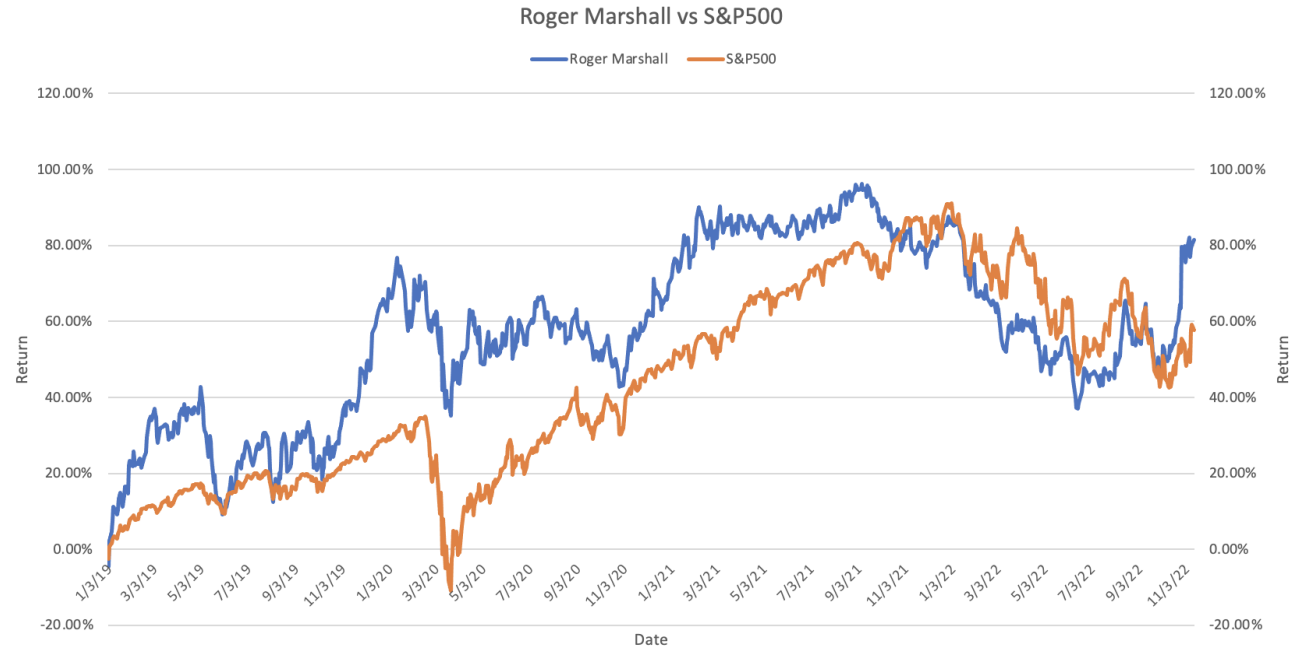





Nancy Pelosis vs S&P500
Nancy
S&P500
250.00%
200.00%
150.00%
100.00%
50.00%
0.00%
-50.00%
Return
Date


Dianne vs. S&P500
Dianne
S&P
250.00%
200.00%
150.00%
100.00%
50.00%
0.00%
-50.00%
-100.00%
Return
Date


John Hoeven vs. S&P500
John Hoeven
S&P500
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
-20.00%
-40.00%
Return
Date


Roger Marshall vs S&P500
Roger Marshall
S&P500
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
-20.00%
Return
Date

Trading activity

Nancy Pelosi's reported trades by her husband Paul Pelosi on June 17th 2022 in Nvidia Tech Company (Retrieved from New York Times, 2022).

Filing ID #20021374

PERIODIC TRANSACTION REPORT

Clerk of the House of Representatives • Legislative Resource Center • 135 Cannon Building • Washington, DC 20515

FILER INFORMATION

Name: Hon. Nancy Pelosi
Status: Member
State/District: CA12

TRANSACTIONS

ID	Owner	Asset	Transaction Type	Date	Notification Date	Amount	Cap. Gains > $200?
	SP	Apple Inc. (AAPL) [OP]	S (partial)	06/17/2022	06/17/2022	$100,001 - $250,000	☐
		FILING STATUS: New DESCRIPTION: Sold 50 call options with a strike price of $100 and an expiration date of 6/17/22.					
	SP	NVIDIA Corporation (NVDA) [ST]	P	06/17/2022	06/17/2022	$1,000,001 - $5,000,000	☐
		FILING STATUS: New DESCRIPTION: Exercised 200 call options (20,000 shares) expiring 6/17/22 at a strike price of $100.					
	SP	Visa Inc. (V) [ST]	S (partial)	06/21/2022	06/21/2022	$1,000,001 - $5,000,000	☑
		FILING STATUS: New DESCRIPTION: Sold 10,000 shares.					

* For the complete list of asset type abbreviations, please visit https://fd.house.gov/reference/asset-type-codes.aspx.

INITIAL PUBLIC OFFERINGS

○ Yes ◉ No

CERTIFICATION AND SIGNATURE

☑ I CERTIFY that the statements I have made on the attached Periodic Transaction Report are true, complete, and correct to the best of my knowledge and belief. Further, I CERTIFY that I have disclosed all transactions as required by the STOCK Act.

Digitally Signed: Hon. Nancy Pelosi , 07/14/2022

Fama French output

SUMMARY OUTPUT - John Hoeven

Regression Statistics	
Multiple R	0.936586715
R Square	0.877194675
Adjusted R Square	0.876811307
Standard Error	0.005668843
Observations	965

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.22059266	0.07353089	2288.13118	0
Residual	961	0.030882487	3.2136E-05		
Total	964	0.251475147			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	5.67485E-05	0.000182606	0.31076988	0.75604296	-0.000301604	0.0004151	-0.0003016	0.0004151
Risk Premium	1.006608718	0.012767055	78.844237	0	0.981554195	1.03166324	0.98155419	1.03166324
SMB	0.245798113	0.024614183	9.98603573	2.0743E-22	0.197494364	0.29410186	0.19749436	0.29410186
HML	0.223174483	0.015050189	14.8286827	5.9635E-45	0.193639456	0.25270951	0.19363946	0.25270951

SUMMARY OUTPUT - Bill Hagerty

Regression Statistics	
Multiple R	0.49312846
R Square	0.243175678
Adjusted R Square	0.240813063
Standard Error	0.018144454
Observations	965

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.101656755	0.03388558	102.9264957	8.8132E-58
Residual	961	0.316381578	0.00032922		
Total	964	0.418038333			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000662673	0.000584473	1.13379451	0.25716351	-0.000484319	0.001809664	-0.000484319	0.001809664
Risk Premium	0.627458483	0.040863936	15.3548226	9.45704E-48	0.547265641	0.707651324	0.547265641	0.707651324
SMB	0.49193311	0.07878343	6.24411894	6.38835E-10	0.337325702	0.646540518	0.337325702	0.646540518
HML	0.086944802	0.048171639	1.80489606	0.071403868	-0.007588937	0.18147854	-0.007588937	0.18147854

SUMMARY OUTPUT - Debbie Dingell

Regression Statistics	
Multiple R	0.926426667
R Square	0.85826637
Adjusted R Square	0.857823913
Standard Error	0.00570748
Observations	965

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.189566412	0.063188804	1939.774826	0
Residual	961	0.031304892	3.25753E-05		
Total	964	0.220871303			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000638504	0.000183851	3.472950679	0.000537718	0.000277709	0.0009993	0.000277709	0.0009993
Risk Premium	0.962603363	0.012854071	74.88704187	0	0.937378076	0.98782865	0.937378076	0.98782865
SMB	0.039272035	0.024781945	1.584703475	0.113362715	-0.009360937	0.087905006	-0.009360937	0.087905006
HML	0.132053363	0.015152767	8.714802223	1.25881E-17	0.102317035	0.161789692	0.102317035	0.161789692

SUMMARY OUTPUT - Dianne Feinstein

Regression Statistics	
Multiple R	0.173263105
R Square	0.030020104
Adjusted R Square	0.026992071
Standard Error	0.065757152
Observations	965

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.12860529	0.04286843	9.914060991	1.93082E-06
Residual	961	4.155366942	0.004324003		
Total	964	4.283972232			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000735038	0.002118185	0.347012897	0.728657605	-0.003421764	0.004891839	-0.003421764	0.004891839
Risk Premium	0.328586788	0.148094622	2.218762464	0.026735867	0.037960632	0.619212944	0.037960632	0.619212944
SMB	1.2859232	0.285518323	4.503820239	7.49378E-06	0.725611882	1.846234517	0.725611882	1.846234517
HML	0.199907237	0.174578404	1.145085716	0.252458746	-0.142691637	0.542506111	-0.142691637	0.542506111

SUMMARY OUTPUT - Roger Marshall

Regression Statistics	
Multiple R	0.643362163
R Square	0.413914873
Adjusted R Square	0.412085263
Standard Error	0.012457384
Observations	965

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.105324012	0.035108004	226.2311823	5.1033E-111
Residual	961	0.149134135	0.000155186		
Total	964	0.254458147			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000323671	0.00040128	0.806595163	0.420099325	-0.000463816	0.001111157	-0.000463816	0.001111157
Risk Premium	0.715843502	0.02805583	25.51496402	4.62E-110	0.660785742	0.770901262	0.660785742	0.770901262
SMB	0.100834446	0.054090105	1.864193954	0.062599202	-0.0053139	0.206982793	-0.0053139	0.206982793
HML	0.002511483	0.033073059	0.075937441	0.939484674	-0.062392264	0.067415231	-0.062392264	0.067415231