Empirical Analysis of Leading Economic Variables to Predict Future Stock Market Performance

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Abstract

This paper uses leading economic variables in order to determine if they can predict the performance of the S&P 500 3 months in advance. Nine leading economic variables are used within the regression to determine which had strong predictability against the index. Consumer expectations resulted in being the strongest predictor, with New Private Housing Permits and Initial Claims for Unemployment also having strong results.

INTRODUCTION AND STATEMENT OF PURPOSE

The ability to predict the future movements of the stock market is something investors have attempted to accomplish for at least a hundred years. Academic research and accumulation have suggested that applications of techniques such as "momentum, mean reversion, martingales and the search for value" all are ways of investors attempting to identify the health of the stock market (Yates). Many of these methods tend to use past stock performance in order to help predict future performance of the market, through the use of the efficient market hypothesis. This paper attempts to find a more appropriate method to measure the stock market and its future performance. Many researchers have attempted to find correlations between the aggregate economy's health and the future prices of the overall market. Economists and investors alike are constantly attempting to find new models and theories to predict the state of the economy and the health of the stock market.

The regression to be ran will attempt to find correlations and significant evidence that leading economic variables can determine the future direction of the stock market, with results of the study helping investment managers and advisors adjust their portfolios in anticipation of a correction or bear market, or if the economy is expanding with a bull market. The textbook *Forecasting Business Trends* by the American Institute for Economic Research (AIER) compiles a list of leading variables by both the AIER and The Conference Board, where a combination of nine variables will be utilized as the focus of the study. A twenty-year period from 1990-2017 of economic and stock market data will be utilized as the sample size for this regression. The time period is ideal because it consists of two recessionary periods that were induced by stock market crashes, the 2000-2001 dotcom bubble crash and 2008-2009 financial crisis recession and stock market crash. Bull markets are also contained within this period of data that proceeded the 2001

and 2009 crashes and will help determine if the regression is able to predict large upswings in the market, downswings, both or neither. The analysis of leading economic variables will see if they could have anticipated these stock market trends and assist investors and managers in altering their investment strategy in expectancy. Both of the stock market crashes involved are ideal for this analysis as both were the effects of bubbles within the economy, and this study could be indicative of whether bubbles can be detected through analysis of certain economic variables. Through these nine variables, a regression analysis will determine if these variables are good predictors of future direction of the stock market.

HISTORY AND BACKGROUND

This paper hopes to use leading economic variables to help determine if the following stock market crashes to be analyzed had any substantial evidence that these crashes could have been predicted so that investors could have properly prepared their assets. If these variables are in fact able to suggest a correlation between their movements and the future movements of the S&P 500, then investors and wealth managers can utilize these variables to help diversify their portfolio and evaluate their positions so that they are strategically ready for any sort of economic and stock market downturn, such as the crashes in 2000-2001 and 2008-2009. Investment managers are constantly monitoring the state of the economy to see where it is headed and how it will affect their portfolios. The variables used have strong indication that they can help identify certain problems in the economy, and signal that the stock market may be headed for a bull or bear market within the next three months.

The 2000 and 2001 stock market crash was caused highly from the burst of the dotcom bubble. The NASDAQ index was hit the hardest, losing 78% of its value, from its highest point of 5046.86 points all the way down to 1114.11 when the crash had hit its trough (Beattie).

During the crash, GDP went from growing at 4.09% in 2000, to just .98% in 2001, with only a slight recovery in 2002 of 1.79% (worldbank.org). The crash resulted in a downturn of almost $5 trillion dollars lost over the time period, as hundreds of Internet companies that went public over the course of the late 1990s ended up closing their doors.

The cause of the crash points mainly due to the substantial publicity that the brand new "Internet" had caused, resulting in many entrepreneurs developing a quick business plan and company together to present in front of potential investors and take them public. In 1996 alone, there were 677 IPOs, many of these companies doubling their stock price on the first day, despite reports that, "many reported huge losses and some folded outright within months of their offering" (Beattie). However, this did not stop the feeding frenzy of the dot.com bubble. Wall Street continued to see massive amounts of IPOs for tech companies even heading into the 21st century, with 381 companies going public that year. And by the height of the bubble, it was estimated that there were between, "7000 and 10000 Internet companies" (Clarke). However, by the end of 2001, only 79 companies had gone public that year, and investors were beginning to become aware of the number of risky business models and companies that they had dumped billions into financing.

Many of the dot.com bubble companies that had no significant sources of cash flows or revenue streams to effectively continue their operations, and by March of 2003, "Internet destination companies", or e-commerce providers saw, "1,483 acquisitions and a whopping additional 608 failures in the three-year period (Q1 of 2000 – Q1 of 2003)" (Clarke). These bankruptcies and acquisitions were accelerated following the terrorist attacks on September 11, 2001, where the Dow and S&P 500 lost 14% and 11.6% in the week, respectively, following the reopening of the markets. This resulted in massive drops in share prices for these companies, the

propped-up stock prices a main reason why these companies had cash to burn to run their ill-fated businesses anyways. Once the capital via common stock offerings began to fell, many eventually ran their course and were either acquired by surviving companies such as Microsoft or Google, or filed for bankruptcy all together and shut down their operations. The dot.com bubble proved that business models and ideas would only carry a company for so long, and that eventually they would have to show some sort of positive growth and cash flow in order to keep investors confident that they will eventually see a return on their investment. The bubble scared much of Wall Street in the proceeding years, leading to a lack of Internet companies offering an IPO. The dotcom bubble and stock market crash had one leading cause that did not have much to do with macro-economic variables. With that said, with the array of variables to be used within this regression, there is a clear possibility that certain variables such as manufacturers' new orders for consumer goods and materials could have predicted the slowing demand for internet products and services, and the eventual downturn of many of these financially-strained companies.

In 2007, the housing market began showing signs of a bubble, after housing prices had rapidly climbed faster than ever before, and banks began to realize that many of their housing loans and assets were in trouble of defaulting. These were known as mortgage-backed securities, or bundles of home loans based off subprime mortgage loans that were sold as underlying asset for an investment. With lack regulations, and banks handing out risky and dicey mortgages to millions of Americans who clearly could not afford them, these mortgage-backed securities were soon to default and become worthless, resulting in hundreds of millions, if not billions of dollars of losses to almost every banking institution in the US. The market began to grasp the seriousness of these losses, and a wide wholesale of the many major financial institutions in the

country began in early 2008 after Bank of America bought out Bear Stearns for a meager $3.00 a share. This was followed by the eventual realization that longtime investment bank Lehman Brothers would soon follow the fatal steps of Bear Stearns, as it was in dire help for capital and debt relief. However, that relief never came. In late September, Congress voted to not bail out Lehman Brothers and let the company fail into bankruptcy. This was the tipping point for the market, as the Dow soon plummeted to its lowest price of the recession soon after on March 5, 2009, signaling a drop of more than 50% in its value from its high in the fall of 2007 of 14,164 points, to 6,594.44 that day. During this time, GDP took an additional nosedive as well, as GDP was a low 1.78% in 2007, that eventually led to a contraction of GDP growth of -.29% in 2008 and an alarming -2.78% in 2009. The biggest problem with the entire financial crisis is the fact that a majority of banks and investors alike believed that the housing market would never crash as hard, or as fast as it did. If those in charge were able to predict the market accurately, they would have seen the many clear signals that some intuitive investors actually caught onto during the year or two prior to the crash. There were clear signs that signaled towards a slowing housing market and economy, yet almost no bank took the threats seriously, and many paid the ultimate price because of it.

LITERATUEW REVIEW

The article from the International Journal of Forecasting titled, "Macro Variables and International Stock Return Predictability," follows the use of economic variables attempting to predict international stock market returns. The paper asserts its usage, "of 'standard' macro variables, including the inflation rate, money stocks, interest rates, term spread, industrial production, and unemployment rate" (Rangvid, 5). This study initially differs from this paper, as they used mainly roughly coincident economic variables such as inflation and interest rates, or

even a lagging variable like unemployment rate. Therefore, these variables tend to change at approximately the same time as GDP, or in the case of the unemployment rate, even after the GDP change. This is important because the textbook *Forecasting Business Trends* currently lists stock indexes as a leading economic variable of the economy, so in order to predict the future changes of a variable that tends to move before the economy, leading variables should be favored for analysis rather than "standard" economic variables. The paper discovers in the research that, "interest rates are helpful in predicting stock returns in a number of countries" (Rangvid, 22). Inflation rates were also shown to be a significant variable for potential prediction of stock market returns. The article concludes later though, that in general, most of the economic variables lead to limited prediction ability for the stock market. Although this paper differed in its methods, in addition to the type of variables used for analysis, the paper is useful in terms of the appropriate regression model to apply to the variables. It also suggests that since there is some evidence of predictability measure with a limited number of roughly coincident and lagging variables, that the implementation and evaluation of leading variables may result in a significant regression and assumption that the variables are good predictors of future stock market prices.

The article, "Predicting U.S. Recessions: Financial Variables as Leading Indicators" in the journal Review of Economics and Statistics researches and studies financial variables such as the stock market in order to test its ability to predict future US recessions. The study concluded that two variables, "the yield curve spread and stock prices are encouraging and suggest that these measures can play a useful role in macroeconomic prediction" (Estrella, 55). The paper is a contrasting research, as this paper is attempting to use economic variables in order to predict the stock market, while the analysis by Estrella instead uses the stock market as a leading variable

for the aggregate economy. The significance of the yield curve spread could suggest that it is a good predictor of future performance, and potentially could help predict the health of the stock market. In addition, the paper asserted that these variables were able to predict the stock market in a one to three quarter timeline, and would be very sufficient if the same results for this paper were experienced. Lastly, the research in the journal introduces some potential questions or concerns for this paper such as whether multiple financial variables such as different treasury securities should be utilized. Yield spreads could differ for each individual security, like T-Bills and T-Bonds, and may have different significance when attempting to predict the overall stock market. Additionally, since there are also multiple money aggregates and calculations, does the use of M1, M2, or the monetary base, or potentially a weighted average of them, best suffice as the appropriate predictor for the y-variable?

An additional article used for potential analysis on for this paper was research published in the International Business Research journal, titled "Impact of Macroeconomic Policies on the Ghana Stock Exchange: A Cointegration Analysis." The purpose of this research was to determine the impact, and how severe an impact, certain fiscal and monetary policy decisions had on the performance of the stock market in Ghana. He begins by explaining the importance of the IS-LM model and how its, "framework suggest analysis of stock market activities cannot be completely independent of such policy influences" (Antwi, 100). This is due to the fact that the IS-LM analyses increases in GDP in comparison to the rise and fall of interest rates. The paper goes deeper into explaining that in economic literature, "the effect of monetary policy on stock market returns is analyzed from two main channels… money supply or the interest rate" (101). This is evident and widely known throughout economics, however, the real world impact and gravity that economic policies have on the stock market are still debated. The paper uses a lag

structure and cointegration regression model in order to determine this impact, and concludes that major policy decisions such as government spending, taxes, money supply and interest rate changes have effects on the stock market, forcing investors to assess their positions. This is expected, mainly because most fiscal policy decisions have impacts on interest rates, whether it is the fed directly pumping more funds into the money in order to lower interest rates, or the federal government borrowing more, which indirectly raises interest rates through crowding out. The end result is investors constantly having to decide whether stocks or fixed income holdings provide a better and safer investment based on the present state of interest rates. For example, the stock market has experienced an incredible bull run that has lasted nearly a decade. Although the performance of many companies and their stock prices have indulged investors to pump money into the stock market, the unattractive state of interest rates have also played a large part. With the prime rate hovering around a quarter percent for almost 8 years, investors almost had no choice but to put their money in the stock market, in order to achieve any kind of substantial returns on their investment.

The final article that was found to help analyze this study's research and purpose was an article from The Journal of Behavioral Finance titled, "The Time Varying Relation Between Consumer Confidence and Equities." The study tests to show how potential changes in consumer confidence could predict future moves in the stock market. He uses Cointegration tests and frequency domain regressions in order to conclude that in a short-term view, "changes in consumer confidence is followed by positive returns" however that result is contradictory when looking at the medium term outlook (Ciner, 317). Furthermore, the long-term analysis suggests that, "trend shocks to consumer confidence have a positive impact on small company stock returns" (Ciner, 317). He later concludes that it opens opportunities to explore further other

relations between economic and financial variables, something this paper intends to analyze fully to see if leading variables are also able to predict stock market returns. This paper looks at large-cap stock indexes and small-cap indexes as well, which suggests that maybe multiple regressions should be ran, with more focus on the large and small cap stocks and indexes separately, rather than the entire market as a whole.

PROCEDURES

A total of nine variables will be applied to the regression to attempt to predict the future prices of the S&P 500. Five of these variables are listed both on the AIER and The Conference Board, while three appear only on the AIER. The 5 that are listed on both include the Yield Curve Index, Average Weekly Initial Claims for Unemployment, Average Workweek in Manufacturing, Manufacturers' New Orders for Consumer Goods and Materials and New Private Housing Permits. Additionally, the three variables that are only included within the AIER are Manufacturers' New Orders for Core Capital Goods, Rate of Change in Consumer Debt and M1 Money Supply. There is one leading variable, Index of Consumer Expectations, which appears only on The Conference Board. All indicators were tested for the six characteristics that are essential for indicators to have to be deemed reliable by the Conference Board and AIER. These include economic significance, statistical adequacy, timing, conformity, smoothness and currency. All six are crucial to ensure statistical accuracy for economic reporting. If a large number of these characteristics are missing within a variable, then it is possible that it is not a desired variable to use.

ECONOMIC LEADING INDICATORS –INDEPENDENT VARIABLES
Yield Curve Index
Average Weekly Initial Claims for Unemployment
Average Workweek in Manufacturing
Manufacturers' New Orders for Consumer Goods and Materials
New Private Housing Permits
Manufacturers' New Orders for Core Capital Goods, Non-Defense
Rate of Change in Consumer Debt
M1 Money Supply
Index of Consumer Expectations

The Yield Curve Index is the "cumulative total of the monthly spread between the 10-year Treasury note and the effective federal funds rate" (AIER, 53). The variable is calculated through the difference between the 10-year Treasury note and that effective federal funds rate at that time. The yield curve presents two types of curves, the normal, inverted, and flat yield curves. The normal curve states that as the maturity date gets longer, the interest rate on the return gets higher as well. The curve eventually flattens out the longer the time period is set. These curves are exhibited during an economic expansion. As the economy grows, interest rates tend to grow as well, resulting in investors avoiding longer-term investments in fear of receiving a lower real rate of return. Consequently, the inverted curve represents longer-term yields and interest rates are lower than in the short-term, which correspond in times of an economic recession and downturn. Lastly, the flat yield curve is seen usually during times of economic transition from a recession to an expansion or vice versa.

Average weekly initial claims for unemployment insurance is the second leading variable to be used in the regression and is calculated through the US Department of Labor. This indicator is crucial because it is the earliest indicator for the unemployment rate. Unlike the unemployment rate, which is a roughly coincident economic variable, initial claims for unemployment is a leading indicator to give investors a first glance at how strong or weak the

job market is at that time. People are able to see how many people are currently being laid off and filing for unemployment claims now. The variable is seasonally adjusted in order to minimize the effects of seasonal unemployment claims. In addition, in order to keep consistency with all variables within the regression, this will be calculated as a monthly statistic, aggregated at the end of each period (monthly). The consistency and uniformity is a crucial aspect of the regression for accuracy and to minimize chances Type I or Type II errors.

The third independent variable within the regression is the Average Workweek of production and nonsupervisory workers. This statistic is calculated through the US Department of Labor, Bureau of Labor Statistics and is the, "total of paid labor-hours of manufacturing production workers divided by the number of workers during the payroll period" (AIER, 55). The significance of this statistic is that companies tend to lean towards minimizing hours for their employees during cyclical contractions rather than actually laying off workers, due to the costs of retraining new employees in the long run. Therefore, if companies begin cutting hours due to decreases in demand it may indicate that the economy has begun to slow down and that it may be headed towards a recessionary period.

Manufacturers new orders for consumer goods and materials and its statistic are the new orders for all goods, "less capital goods, food products and petroleum products" (AIER, 54). Most goods not included within this variable are due to them being non-cyclically driven, and are able to sell regardless of where the country is in the business cycle. This variable allows one to analyze the quantity on orders of goods that tend to significantly change when on the verge of recession. For example, clothing companies will tend to have lower orders on products when on the verge of a recession due to the fact that people begin to have hours cut or workers begin to

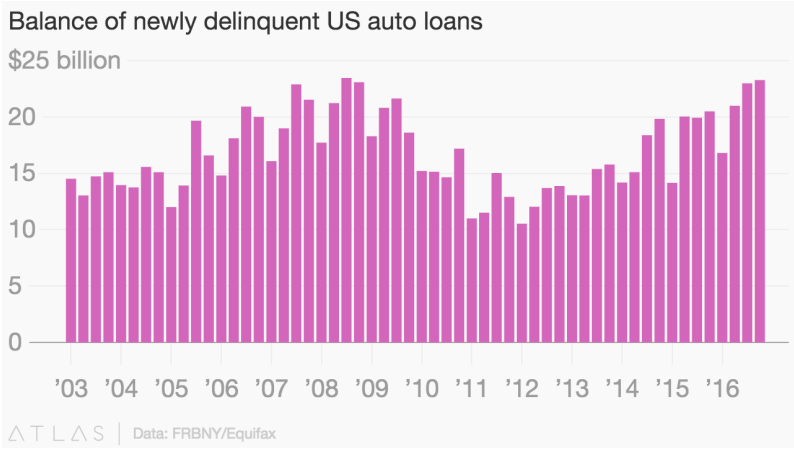
get laid off. Therefore, these people will receive less disposable income, which results in not consuming products that are not essential to one's lifestyle and health.

The next variable within the regression analyzed is new private housing units authorized by local building permits, collected by the US Department of Commerce and is described as the, "month-to-month changes in the number of housing units authorized… The data relate only to the issuance of permits and not to the start of actual construction" (AIER, 54). The housing market bubble and crash in 2008 will lead to volatile changes in this variable in the analysis, particularly because it is the only leading variable that has direct correlation to the housing market. The housing market is a very cyclical industry, and is seen often as one of the most indicative signs of where the overall US economy stands. When housing prices are rising, the economy tends to be expanding and performing, while the opposite usually stands true as well. Due to the cyclicality, construction is one that tends to operate very slowly when there is a recession, people stop buying homes and companies do not build new factories or expand their business, often proving detrimental to businesses in times of economic downturns. However, when the economy begins to pick up again, construction also tends to be a first mover as well. The regression will attempt to see if that holds true between the stock market as well and if it is a good predictor of how the market will perform in the future as well.

The value of manufacturers' new orders for core capital goods, excluding defense and aircraft capital goods, is a vital leading indicator to the health of the economy. This is due to the fact that these new orders will tend to gradually become smaller as the economy begins to show signs of weakening. This includes declining demand for products, and this will result in less new orders for core capital goods. Therefore, this variable should have begun to change trajectory

before the recession takes place, and become a valuable variable for analyzing future performance of the stock market.

The percent change from three months prior in consumer debt outstanding covers, "most short- and intermediate-term credit extended to individuals. It includes automobile debt, credit card and department store card debt, educational loans… and vacation loans" (AIER, 54). This variable does not include home mortgages or home equity loans, but is still important in terms of US population's consumption patterns throughout the business cycle. When the economy is performing well, individuals will be more apt to take on additional debt to buy certain luxuries such as a car, RV or take a vacation. This is because the mindset of the consumer knows that they are earning enough disposable income in order to live comfortably and pay that loan off in a reasonable time. The 08-09 recession saw a substantial increase in repossessions by banks, including cars, boats, RVs etc. As illustrated in the figure to the right, the balance of delinquent auto loans in the US began rising steadily starting in 2005 until reaching the 25 billion dollar mark during the peak of the Financial Crisis in 2009. This was the result of people losing jobs and having to decide to spending their money towards food and their mortgage than paying for a loan for a car or other luxury item. Therefore, this variable could be indicative of a few things within the US economy. First, if this variable is high, it could suggest that US consumers are confident about the economy's current state and



Source: Gwynn Guilford, *"Balance of Newly Delinquent US auto loans "*

that it is stable to take on any kind of short or medium term loan. Secondly, these loans could result in greater wealth for the individual in the future, such as taking out a student loan to receive a higher-level education.

M1 money supply, in constant dollars, is managed by the Federal Reserve and its data is collected through the US Department of Commerce and Bureau of Economic Analysis. The data itself is still an estimate, but it determines the current money balance within the country for money stock. It includes, "(1) currency held outside the vaults of depository institutions; (2) travelers checks; and (3) demand deposits and other checkable deposits issued by financial institutions" (AIER, 53). M1 has a close relationship with GDP growth, and it is determined that the growth between the two can be indicative of certain economic activity, such as increases in inflation. This occurs when M1 rises sharply, while demand for goods and services remain stable during that time. With increased inflation, there may be pressure to reverse the inflation, which must be done through retractionary fiscal and monetary policy, which in the end also results in lower GDP as well. Therefore, the Federal Reserve keeps a close eye on the M1 money supply in order to keep inflation in their target range of approximately 2% a year. M1's relationship to the markets is that an increase or decrease in the money supply will also have an effect on the current interest rates in the country, which have a major effect on the demand for the stock market and also demand to borrow and lend funds for banks.

The regression could have included either M1 or M2, given the fact that AIER included M1 within their list, while The Conference Board listed M2. M1 was chosen as a more appropriate variable for this regression because it is defined as the actual money in circulation, which is dependent on The Fed's monetary policies at the time. Additionally, The Fed's policies are based largely on the strength of the economy and the performance of the stock market. When

the economy begins to weaken, the stock market likely falls with it, and The Fed must shift their policies by adjusting the money supply, hoping that they can increase investment and consumer spending in the economy.

The last of the nine leading economic variables to be utilized within the regression is index of consumer expectations. It is based off of consumer sentiment, and an index that analyzes, "consumers responses to specific questions about the current and expected economic conditions, both personal and national" (Fuhrer, 32). Fuhrer digs deeper into consumer sentiment and argues that it has small, but important role within the total US macro environment. Consumer sentiment is statistically significant when attempting to predict future consumption levels of US consumers and therefore could be useful for this model as well (Fuhrer, 43). This is due to the fact that many investors will be confident in the markets as long as there is strong consumer confidence within the economy. If that confidence shrinks, investors may assume that spending levels will begin to decline, and could be indicative of a recession and market downturn in the near future.

There were a couple variables left off of the regression in order to limit a degrees of freedom problem. Because the sample time period includes only a twenty seven year time period, it is crucial that the regression limited the number of variables to a point where degrees of freedom would stay large enough for conducting significance tests. Therefore, Vendor Performance and Manufacturers' Supply Prices were both left off the regression lists, even though both variables are on the AIER and Conference Board list of leading economic variables. These two variables were left off due to the assumption that any significance these variables may have with the S&P 500 would more than likely be captured within the two variables of New

Orders for Consumer Goods and Materials and New Orders for Consumer Goods and Materials, Non-Defense Goods.

Table 1

	MIn	Max	SD	Med	Mean
Yield Curve Index	-1.16	3.85	1.234	1.82	1.68
Initial Claims for Unemployment	220500	659250	72128.3	344250	358501
Avg. Workweek in Manufacturing	39.3	42.2	.604315	41.3	41.14
Orders for Consumer Goods & Materials	63069	182439	36943.97	113746	182439
Private Housing Permits	513	1287	427.236	1287	1313
Orders for Core Capital Goods	35981	130741	13111.67	63068	63038
Rate of Change in Consumer Debt	-3.2359	4.6920	.535913	0.4671	0.4715
M1 Money Supply	795.5	3632	758.359	1304.9	1606
Consumer Expectations	55.3	112	12.4526	89	86.87
Inflation Rate	0.600	5.60	0.9197	2.20	2.423
Federal Funds Rate	0.070	8.290	2.4335	3.00	2.965
Saving Rate of Population	1.90	11.00	1.6566	5.60	5.496
S&P 500 Closing price	304	2674	546.046	1152	1158

METHODOLOGY AND EMPIRICAL STRATEGY

The null hypothesis of the study states: This paper will attempt to predict the future prices of the S&P 500 three months out through the leading economic indicators previously listed. The regression will be as followed:

Equation 1

$$\ln(\Delta S\&P\ 500 \text{ in } 3 \text{ months}) = \alpha + \beta_0 \ln(\Delta M1) + \beta_1 \ln(\Delta \text{Yield Curve Index}) + \beta_2 \ln(\Delta \text{Value new orders for consumer goods \& materials}) + \beta_3 \ln(\Delta \text{Value new orders core capital goods}) + \beta_4 \ln(\Delta \text{New housing units authorized}) + \beta_5 \ln(\Delta \text{avg. work week production}) + \beta_6 \ln(\Delta \text{Weekly initial claims for unemployment}) + \beta_7 \ln(\%\Delta \text{ consumer debt outstanding}) + B_8 \ln(\Delta \text{ Index of Consumer Expectations}) \beta_9 (S\&P\ 500 \text{ Lag}) + \beta_{10} (\text{Time Trend}) + \varepsilon.$$

All variables will be calculated as a change from month to month; therefore, an Ln. model will be utilized as demonstrated within the regression. For example, the change in M1 money supply will be calculated as the percentage change of the variable from January 1 to February 1. The model's data period will include a 27-year period from 1990-2017, in order to capture the effects of general up and down swings within the market, and analyze whether the regression can successfully determine future general stock market trends. The leading variables will be attempting to predict the S&P 500 three months in advance. For instance, the change in the leading variable from January to February will predict the change in the S&P from March to April. In addition to the original regression, another 8 regressions will be ran as well to see if smaller combinations of these variables together can help predict the Y-variable in question. The combinations were chosen based off similarities of the two variables together in order to find more accurate trends. They include:

Yield Curve Index and M1 Money Supply
Manufacturers New Orders for Core Capital Goods and Consumer Goods and Materials
New Private Housing Permits and Index of Consumer Expectations
Rate and of Change in Consumer Debt and Index of Consumer Expectations
Average Workweek in Manufacturing and Average Weekly Initial Claims for Unemployment
Average Workweek in Manufacturing & Average Manufacturers New Orders Core Capital Goods
Index of Consumer Expectations and Average Weekly Initial Claims for Unemployment
Index of Consumer Expectations and Yield Curve Index

These regressions will include the same procedures and robustness that the original regression will be subject to.

Four additional variables will be added as types of robustness checks within the regression in order to further enhance the accuracy of this paper and to minimize statistical analysis issues such as data mining or selection bias. The additional variables include a variable for the savings rate of the population, the interest rates, the inflation rate and a lag on the S&P

500. The savings rate of the population will include what percentage of people are putting their savings into investments and retirement accounts (i.e. 401Ks, IRAs), which is calculated as a percentage of disposable personal income as to what degree they are saving their annual income. As the percentage goes higher, it should assert that more money is being invested into mutual funds and stocks. This variable has its downfalls however, as it does not take into account how household income generally grows throughout the years, and that the savings rate percentage may be an outcome of people just earning more money rather them investing more heavily in the stock market. The interest rate variable will incorporate the Federal Funds Rate. This is incorporated due to the fact that the Yield Curve Index variable that is currently in the regression is simply the difference between the 10-year Treasury yield and the Fed Funds Rate. So, by adding a stand-alone variable for the Federal Funds Rate, we are able to analyze monetary policy decisions from the Fed, as their decisions usually have medium to large effects on the market. The next variable to be used as a robustness check involves the inflation rate. Very high or very low inflation can have a large effect on the economy, specifically consumer confidence but also having an effect on the interest rate that investors make on a variety of investments including savings accounts, bonds and the stock market.

RESULTS

Table 2

Coefficients	**Estimate**	**Std. Error**	**t-value**	**p-value**
Regression A				
Intercept	1.737e-02	1.050e-02	1.654	0.099192
Yield Curve	-2.337e-04	1.463e-03	-0.160	0.873226
Change in consumer debt	3.705e-01	7.606e-03	0.461	0.645389
AVG. Workweek production	3.705e-01	7.844e-03	0.472	0.637002
Consumer Expectations	3.791e-01	8.162e-02	4.645	5.11e-06 ***
M1	-1.114e+00	4.448e-01	-2.505	0.012793 *
New Housing Permits	3.023e-01	8.635e-02	3.501	0.000535 ***
Orders Core Capital Goods	5.584e-02	4.758e-02	1.173	0.241530
Orders Consumer Goods	8.376e-02	8.720e-02	0.961	0.337511

Coefficients	**Estimate**	**Std. Error**	**t value**	**p value**
Initial Unemployment Claims	-2.477e-01	9.693e-02	-2.525	0.012085 *
Time Trend	1.203e-06	4.500e-05	0.267	0.789341
Regression B				
Intercept	5.006e-03	7.683e-03	0.651	0.5152
Yield Curve	-1.304e-04	1.065e-03	-0.122	0.9026
Change in Consumer Debt	1.342e-03	5.582e-03	0.240	0.9102
Workweek Production	-8.152e-01	5.741e-01	-1.420	0.1567
Consumer Expectations	2.684e-01	5.972e-02	4.494	1.01e-05 ***
M1	-4.992e-01	3.347e-01	-1.471	0.1425
New Housing Permits	1.552e-01	6.494e-02	2.391	0.0174 *
Orders Core Capital Goods	7.479e-03	3.482e-02	0.215	0.8301
Orders Consumer Goods	2.597e-02	6.402e-02	0.406	0.6853
Initial Unemployment Claims	-1.097e-01	7.172e-02	-1.530	0.1271
Saving Rate	1.232e-02	2.098e-02	0.587	0.5576
Inflation Rate	-7.457e-02	4.262e-02	-1.750	0.0812 .
Federal Funds Rate	3.337e-02	2.390e-02	1.396	0.1637
S&P 500 Lag	6.474e-01	4.195e-02	15.433	<2.0e-16 ***
Time Trend	1.154e-05	3.280e-05	0.352	0.7252
Regression C				
Intercept	2.519e-02	8.210e-03	3.068	0.00233 **
Yield Curve	8.209e-04	1.548e-03	0.530	0.59621
M1	-1.012e+00	4.662e-01	-2.171	0.03063 *
Time Trend	-1.220e-06	4.249e-05	-0.287	0.77414
Regression D				
Intercept	2.076e-02	9.371e-03	2.216	0.0274 *
Orders Core Capital Goods	8.559e-02	5.049e-02	1.695	0.0911 .
Orders Consumer Goods	1.235e-01	9.247e-02	1.335	0.1828
Time Trend	-1.915e-05	4.625e-05	-0.414	0.6791
Regression E				
Intercept	2.414e-02	7.614e-03	3.171	0.00166 **
New Housing Permits	3.668e-01	7.848e-02	4.673	4.33e-06 ***
Consumer Expectations	4.209e-01	7.489e-02	5.621	4.06e-08 ***
Time Trend	3.362e-05	3.899e-05	-0.862	0.38917
Regression F				
Intercept	1.917e-02	8.885e-03	2.157	0.0317 *
Change in Consumer Debt	8.404e-03	7.240e-03	1.161	0.2465
Consumer Expectations	4.341e-01	7.714e-02	5.627	3.92e-08 ***
Time Trend	-2.752e-05	4.041e-05	-0.681	0.4963
Regression G				
Intercept	2.442e-02	7.989e-03	3.057	0.00242 **
Initial Unemployment Claims	-4.066e-01	9.606e-02	-4.233	2.99e-05 ***
AVG. Workweek Production	5.694e-01	8.063e-01	0.796	0.48055
Time Trend	-3.746e-05	4.094e-05	-0.915	0.36075

Coefficients	**Estimate**	**Std. Error**	**t value**	**p value**
Regression H				
Intercept	2.125e-02	9.356e-03	2.271	0.0239 *
Orders Core Capital Goods	8.192e-02	5.050e-02	1.622	0.1058
AVG. Workweek Production	1.181e+00	8.118e-01	1.455	0.1467
Time Trend	-2.029e-05	4.622e-06	-0.439	0.6610
Regression I				
Intercept	2.489e-02	7.692e-03	3.235	0.00134 **
Initial Unemployment Claims	-3.547e-01	9.156e-02	-3.874	0.00013 ***
Consumer Expectations	3.919e-01	7.633e-02	5.135	4.84e-07***
Time Trend	-3.996e-05	3.942e-06	-1.014	0.31147
Regression J				
Intercept	2.400e-02	7.862e-03	3.053	0.00245 **
Yield Curve	3.326e-04	1.489e-03	0.223	0.82339
Consumer Expectations	4.324e-01	7.734e-02	5.590	4.77e-08***
Date	-3.254e-05	4.026e-05	-0.808	0.41944

α = 0.05 '.' = 0.1 '*' = 0.05 '**' = 0.01 '***' = 0
n = 337

Regression	A	B	C	D	E	F	G	H	I	J
R-Squared	0.1754	0.5716	0.0160	0.0155	0.1451	0.0921	0.0597	0.0166	0.1282	0.08851
Adjusted R Squared	0.1478	0.5513	0.0071	0.0059	0.1373	0.0838	0.5113	0.0069	0.1202	0.0802
Residual SE	0.0675	0.0489	0.0734	0.0729	0.0684	0.0705	0.0717	0.0728	0.0691	0.07061
F-Statistic	6.358	18.12	1.787	1.61	18.62	11.12	6.963	.1.723	16.12	10.65
DF	130and 299	14 and 295	3 and 329	3 and 306	3 and 329	3 and 329	3 and 329	3 and 306	3 and 329	3 and 329
P-Value	7.254e-09	<2.2e-16	0.1494	.187	3.529e-11	5.671e-07	.00014	.1623	8.441e-10	1.054e-06

The results of the regressions were favorable for this paper's analysis and assumption that leading economic variables are capable of predicting the change in the S&P 500 three months later. Regression A consisted of all leading economic variables included in the study, but consisted of none of the robustness variables. The total regression was highly significant even at the .01 alpha level. This stayed true throughout most of the regressions ran, except for three,

which had no significance in total. The regressions not yielding significant results were Regressions C, D and H. Individual variables within the regression A that received significant results were Consumer Expectations, New Housing Permits, M1 and Initial Claims for Unemployment, with all receiving p-values significance at least at the .05 level. However, once the robustness checks of the Federal Funds Rate, Inflation Rate, Savings Rate and the lag on the S&P 500 were introduced into regression B, only Consumer Expectations, New Housing Permits and the lag on S&P variables yielded p-value significance at the .05 level. This suggests promising results for these two variables as being able to withstand the robustness checks and assert strong evidence that they could be very useful in predicting the stock market 3 months out. In order to determine the influence and importance of this variable, magnitude checks were conducted, multiplying the beta coefficient of these two variables by their standard error. When calculating this for Consumer Expectations and New Housing Permits, .461% and .389% was produced as the magnitude of both variables' beta estimates. This suggests that at the high ends of their deviation, a 1% change in Consumer Expectations will result in a .461% increase in the S&P 500 3 months later, while a 1% change in New Housing Permits predicts a .389% change in the S&P 500. These favorable calculations allow for the assumption that larger changes in these any of these variables separately could affect the S&P by potentially even more than 1% itself.

The significance of New Housing Permits within the regressions, however, may be due to the timetable of the study, which includes the 2008-2009 financial crisis that was led by the crash of the housing market. Within the data, it was evident that the market was slowing down, as the variable peaked back in late 2006 and proceeded to decline heavily through the midst of the market crash. The results of the regression make sense then as the high significance of the variable could be skewed highly because of the crash. But additionally, the positive coefficient

indicates that when the variable goes up, the change in S&P in three months is also predicted to be positive. This makes economic logic, as many signs of a healthy economy is largely based off how well the housing market is fairing in the country.

In furtherance, the remaining variables' beta estimates followed the application of pro or counter-cyclical economic theory. For example, Initial Claims for Unemployment, M1 and the Yield Curve all had negative beta estimates, asserting that increases in those variables resulted in negative change for the market three months in advance. Once again, the economic logic for this is in tact, as unemployment rises when the economy begins to contract, as the economy begins to attract, so does the stock market.

The preceding 8 other regressions consisted of the combinations of variables that were discussed earlier in the paper. Of those regressions, five of them were significant at the 5% level. These included the regression with the variable combination of the Yield Curve and Consumer Expectations, Initial Claims for Unemployment and Consumer Expectations, Initial Unemployment Claims and Average Workweek Production, Change in Consumer Debt and Consumer Expectations, and New Housing Permits and Consumer Expectations. This provides explicit insight on the significance of the Consumer Expectations variable on the change in the S&P 500, based on the fact that four of the five regressions that had significant results included that variable. It may put in question if the significance of the regressions may be skewed due to how highly correlated the two are to each other. Nevertheless, the regressions still posted very favorable adjusted R-squared numbers, especially due to the fact that these regressions only consisted of two variables. For instance The Yield Curve and Consumer Expectations posted a .1202 adjusted R-squared, demonstrating that 12.02% of the variation in the S&P 500 three months later can be explained by the changes in these two variables alone.

LIMITATIONS

Statistical issues such as auto-correlation could mean that some of the x-variables are correlated with themselves, and assert that the variables are correlated with itself. Based off the results, there are no issues with this issue that can arise through regression analysis. None of the R-Squared of the regressions was over .6, indicating that none of the R statistics were over .8, which tends to be regarded as the threshold for auto-correlation. Due to time constraints, a Dick-Fuller test was unable to be ran to fully rule out any auto-correlation issue, but there is enough evidence to make a rough assertion that it does not. However, when analyzing the lag variable on the S&P 500, it is apparent by how much the R-squared increases in the regression that the S&P lag is highly correlated with the 3-month lag on the S&P 500. This is an important affirmation, as the efficient market hypothesis would suggest that the best predictor of future stock performance are past prices, simply because the long run stock market trend is always going up. So it presents the potential limitation of the overall effectiveness of the regression. Are the leading variables themselves strong enough to provide more information about the S&P than the past S&P prices, contrary to what the efficient market hypothesis would state.

Other limitations of the study are the fact that the variables were very specific in nature. Not only do the regressions assume that economic variables were the primary leading factors of the movements of the S&P 500, but the usage of only leading variables may make the regression very one-sided in its analysis. This is initially due to economic variables coming in leading, lagging and roughly coincident forms, and using only leading may limit how much of the economy the regression is able to cover. In terms of only using economic variables as well, this may have decreased the overall effectiveness of the regression, especially since major stock market movements can typically involve other outside factors. This includes things such as

political instability or news that may shake the market, being either domestically or foreign. For example, Trump's political victory for President initially brought fears and instability to the markets, but it was quickly subsided by the idea of lower taxes and pro-business economic policy that would bring a significant boost to the overall US economy. The first year of his presidency and the markets were almost entirely decided on his ability to pursue and pass a sweeping tax reform policy that lowered both individual and corporate tax rates in the US, and leading investors to believe that the lower taxes would result in higher consumption among consumers, motivate companies to invest heavily in their business (especially with interest rates still at record low levels) and increase wages for their employees. In addition, global economic events such as Brexit, China or other events that affect the global economy can have a large impact on the ensuing markets. Brexit installed fears within the markets of the fall of the Eurozone and resulted in a two-day free sell among the markets until reality settled and the markets rebounded quickly after that. This create the potential limitation that these leading variables are not necessarily the causes of stock market crashes, but that outside factors are the prominent factors that lead to stock market crashes or heavy bull market runs, leaving the regression as inefficient when attempting to account for those types of elements.

The last limitation of the study includes not producing additional regression results within a different time frame. Being able to run the same regressions with a different time sample may have increased the accuracy of the data, particularly due to the fact that the current sample size included the Financial Crisis and Dot.com bubble, both stock market crashes that could have spiked the variables in one way or another, and skewed the regression, evident in what the regression showed with the New Private Housing Permits variable. With the elimination of the stock market crashes, the regression results may have developed much different results.

However, it would be almost impossible to receive a large data set of this nature without the inclusion of at least one or two recessions or stock market crashes.

CONCLUSION AND RECOMMENDATIONS

The following ten regressions clearly showed that Consumer Expectations had the largest effect on the market. This can be seen through the fact that investors tend to look to the patterns of consumers and their amount of consumption as evidence that the economy is strong and that demand is still high for goods and services. As a result this study is highly convinced that along with Consumer Expectations, Initial Claims for Unemployment, New Private Housing Permits and M1 are the four leading economic variables that are highly correlated with the index and that are very good indicators as to what the S&P 500 will do within the next three months. These four variables and the robustness checks previously used would be an appropriate starting point for the regression if the study were to be added on to or repeated. For example, an F-test should be conducted in order to determine if these variables beta coefficients have a combined effect on the S&P 500, meaning that if all four variables change one percent, that the S&P will move according to all three beta estimates.

Some variables that deemed not appropriate for the regression included Manufacturers' new orders for consumer goods and materials or orders for core capital goods. They were not significant in any capacity. In addition, the yield curve, change in consumer debt and average workweek production also all resulted in having no significant evidence that they can predict the change in the S&P 500 in three months.

The regressions in all saw variables that had both positive impacts and inverse relationships on the market. A majority of variables had positive beta estimates, asserting a percentage change increase in the variable resulted in a predicted upward percentage change in

the index as well. M1 had two regressions that resulted in in being significant against the S&P 500. This should not surprise, due to the fact that much of M1 is determined through monetary policy and that actions of the Federal Reserve. It is often assumed that the Fed's actions move the markets, up or down, and the change in M1 indicates in what capacity and what direction their actions have on the market. Consumer expectations should clearly be focused on more intensely based off the results of the regressions that contained the variable. In furtherance, many of the regressions in all should be analyzed further and rerun again with a longer time lag on the S&P 500 in order to determine exactly how far out these leading variables can predict the future performance of the index. This would include potentially six months to even a year, to see how far out variables like Consumer Expectations, New Private Housing Permits, Initial Claims for Unemployment and M1 can produce significant results against future S&P 500 performance.

The initial purpose of this study was to determine whether or not these leading economic variables could provide crucial evidence as to if major swings in the market are in the future. Based off the coefficients of the variables and the high significance of the variable, it is possible to assert that the regressions would have been able to alert investors of both the dot.com bubble stock market crash and the 2008-2009 Financial Market crash. This simply may be due to the variables that were chosen and that some did indeed have a close relationship to the causes of those crashes (such as the New Housing Permits' relationship with the housing market crash). With a decent number of variables, it is possible to assume that the cause of the next stock market crash or next major bull market to occur could be found within the variables that are presented within the regression. In final, this study has proven as a possible powerful tool to know what the outlook of both the US economy and US stock market looks like in a three month horizon, and could help shape the investment decisions of managers and advisors of how they

should invest their clients' money. If the regression predicts a large negative change within the S&P 500, then they have at least a 3-month's notice to convert to alternative investment strategies such as fixed investments or cash. The regressions presented in this paper will ultimately not be perfect indicators of how the market will react in the future, but it is the first step to giving any investor an extra leg up on the market, simply by understanding what is occurring within the economy around them.

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APPENDIX

```
Senior_Project_data_sheet=read.csv("/Users/Ryan/Desktop/Econ senior project /Senior Project
Data Sheet.csv", header=TRUE)
library(lubridate)
Senior_Project_data_sheet<- slide(Senior_Project_data_sheet, Var = "Close", NewVar = "LagClose",
slideBy= -1)
vector(Senior_Project_data_sheet) = (order(Senior_Project_data_sheet$Date1))
Senior_Project_data_sheet<-slide(Senior_Project_data_sheet, Var = "Close", slideBy = -1)
library(readr)
library(lubridate)

Senior_Project_data_sheet$Year2=as_date(Senior_Project_data_sheet$DATE, "ymd")
# come back to to order the dates correctly                    #

Senior_Project_data_sheet$Year101=as_date(Senior_Project_data_sheet$Date100, "%m/%d/%Y")

#Creating lag variable through slideBy#

Senior_Project_data_sheet$Year100=as.Date(Senior_Project_data_sheet$Date100, format =
'%m%d%Y')

library(DataCombine)
Slide_example=slide(data = Senior_Project_data_sheet, Var = 'Close', NewVar = 'Close_lag_1', slideBy
= -1)
Slide_example1=slide(data = Slide_example, Var = 'FEDFUNDS', NewVar = 'FedFunds_lag', slideBy =
-1)
Slide_example2=slide(data = Slide_example1, Var = 'Inlfation.rate', NewVar = 'inflation.rate_lag',
slideBy = -1)
Slide_example3=slide(data = Slide_example2, Var = 'Percent.change.consumer.debt', NewVar =
'consumer_debt_lag', slideBy = -1)
Slide_example4=slide(data = Slide_example3, Var = 'Avg..Workweek.production', NewVar =
'Workweek_prdouction_lag', slideBy = -1)
Slide_example5=slide(data = Slide_example4, Var = 'Index.of.consumer.expectations', NewVar =
'Consumer_Expectations_Lag', slideBy = -1)
Slide_example6=slide(data = Slide_example5, Var = 'M1', NewVar = 'M1_Lag', slideBy = -1)
Slide_example7=slide(data = Slide_example6, Var = 'PERMIT', NewVar = 'Permit_Lag', slideBy = -1)
Slide_example8=slide(data = Slide_example7, Var = 'value.of.manu.orders...core.capital.goods',
NewVar = 'Orders_Core_Capital_Goods_Lag', slideBy = -1)
Slide_example9=slide(data = Slide_example8, Var = 'value.of.manu.new.orders...consumer.goods',
NewVar = 'Orders_Consumer_Goods_Lag', slideBy = -1)
```

```
Slide_example10=slide(data = Slide_example9, Var = 'initial.claims.for.unemployment', NewVar =
'Unemployment_Claims_Lag', slideBy = -1)
Slide_example11=slide(data = Slide_example10, Var = 'Yield.Curve.Index', NewVar =
'Yield_Curve_Lag', slideBy = -1)
Slide_example12=slide(data = Slide_example11, Var = 'Saving.Rate.of.Population', NewVar =
'Saving_Rate_Lag', slideBy = -1)
Slide_example13=slide(data = Slide_example12, Var = 'Close', NewVar = 'Close_lag_2', slideBy = -3)
Slide_example001=slide(data = Slide_example00, Var = 'Three_Month_Change_SP500', NewVar =
'Three_Month_Change_SP500_lag', slideBy = -1)

# Turning Variables into Percent Changes #

#AAPL$In=log(AAPL$CS/Price)#
Slide_example13$ln_Close=log(Slide_example12$Close/Slide_example12$Close_lag_1)
Slide_example13$ln_Inlfation.rate=log(Slide_example13$Inlfation.rate/Slide_example13$inflation.r
ate_lag)
Slide_example13$ln_Fed_Funds_Rate=log(Slide_example13$FEDFUNDS/Slide_example13$FedFund
s_lag)
Slide_example13$ln_Workweek_production=log(Slide_example13$Avg..Workweek.production/Slid
e_example13$Workweek_prdouction_lag)

Slide_example13$ln_Index.of.consumer.expectations=log(Slide_example13$Index.of.consumer.expe
ctations/Slide_example13$Consumer_Expectations_Lag)
Slide_example13$ln_M1=log(Slide_example13$M1/Slide_example13$M1_Lag)
Slide_example13$ln_Permit=log(Slide_example13$PERMIT/Slide_example13$Permit_Lag)
Slide_example13$ln_Orders_Core_Capital_Goods=log(Slide_example13$value.of.manu.orders...core.
capital.goods/Slide_example13$Orders_Core_Capital_Goods_Lag)
Slide_example13$ln_Orders_Consumer_Goods=log(Slide_example13$value.of.manu.new.orders...co
nsumer.goods/Slide_example13$Orders_Consumer_Goods_Lag)
Slide_example13$ln_Unemployment_Claims=log(Slide_example13$initial.claims.for.unemployment
/Slide_example13$Unemployment_Claims_Lag)
Slide_example13$ln_Saving_Rate=log(Slide_example13$Saving.Rate.of.Population/Slide_example13
$Saving_Rate_Lag)
Slide_example13$Three_Month_Change_SP500=log(Slide_example13$Close/Slide_example13$Clos
e_lag_2)


summary(Slide_example13$Yield.Curve.Index)
# Min = -1.16, Med = 1.68, Max = 3.85  #
# Adding constant into Yield Curve     #
Slide_example13$Yield_Curve_Constant=Slide_example13$Yield.Curve.Index+1.16+.000000000000
001
Slide_example00=slide(data = Slide_example13, Var = 'Yield_Curve_Constant', NewVar =
'Yield_Curve_Lag1')
Slide_example00$ln_Yield_Curve1=log(Slide_example00$Yield_Curve_Constant/Slide_example00$Y
ield_Curve_Lag1)

# Running the Regressions    #
library(lubridate)
```

```
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example00$ln_Yield_Curve1+Sl
ide_example00$Percent.change.consumer.debt+Slide_example13$ln_Workweek_production+Slide_
example13$ln_Index.of.consumer.expectations+Slide_example13$ln_M1+Slide_example13$ln_Perm
it+Slide_example13$ln_Orders_Core_Capital_Goods+Slide_example13$ln_Orders_Consumer_Goods+
Slide_example13$ln_Unemployment_Claims+Slide_example13$ln_Saving_Rate+Slide_example13$ln
_Inlfation.rate+Slide_example13$ln_Fed_Funds_Rate+Slide_example001$Three_Month_Change_SP5
00_lag+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example00$ln_Yield_Curve1+Sl
ide_example00$Percent.change.consumer.debt+Slide_example13$ln_Workweek_production+Slide_
example13$ln_Index.of.consumer.expectations+Slide_example13$ln_M1+Slide_example13$ln_Perm
it+Slide_example13$ln_Orders_Core_Capital_Goods+Slide_example13$ln_Orders_Consumer_Goods+
Slide_example13$ln_Unemployment_Claims+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example00$ln_Yield_Curve1+Sl
ide_example13$ln_M1+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example13$ln_Orders_Core_Ca
pital_Goods+Slide_example13$ln_Orders_Consumer_Goods+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example13$ln_Permit+Slide_ex
ample13$ln_Index.of.consumer.expectations+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example13$Percent.change.co
nsumer.debt+Slide_example13$ln_Index.of.consumer.expectations+Slide_example001$Time.Trend)
)
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example13$ln_Unemployment_
Claims+Slide_example13$ln_Workweek_production+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example13$ln_Orders_Core_Ca
pital_Goods+Slide_example13$ln_Workweek_production+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example13$ln_Unemployment_
Claims+Slide_example13$ln_Index.of.consumer.expectations+Slide_example001$Time.Trend))
summary(lm(Slide_example00$Three_Month_Change_SP500~Slide_example00$ln_Yield_Curve1+Sl
ide_example13$ln_Index.of.consumer.expectations+Slide_example001$Time.Trend))

summary(Slide_example13)
sd(Slide_example001$Percent.change.consumer.debt, na.rm = TRUE)
sd(Slide_example001$Avg..Workweek.production, na.rm = TRUE)
sd(Slide_example001$Index.of.consumer.expectations, na.rm = TRUE)
sd(Slide_example001$M1, na.rm = TRUE)
sd(Slide_example001$PERMIT, na.rm = TRUE)
sd(Slide_example001$value.of.manu.orders...core.capital.goods, na.rm = TRUE)
sd(Slide_example001$value.of.manu.new.orders...consumer.goods, na.rm = TRUE)
sd(Slide_example001$initial.claims.for.unemployment, na.rm = TRUE)
sd(Slide_example001$Yield.Curve.Index, na.rm = TRUE)
sd(Slide_example001$Inlfation.rate, na.rm = TRUE)
sd(Slide_example00$FEDFUNDS, na.rm = TRUE)
sd(Slide_example001$Saving.Rate.of.Population, na.rm = TRUE)
sd(Slide_example001$Close, na.rm = TRUE)

# Stupid time trend #
library(lubridate)
Slide_example001$Day=day(Slide_example001$Year2)

Senior_Project_data_sheet$Date2=gsub("/","-", Senior_Project_data_sheet$Date100)
```

```
library(lubridate)
Senior_Project_data_sheet$Year01=as_date(Senior_Project_data_sheet$Date2, "mdy")

library(stringr)
Senior_Project_data_sheet$Date3=str_trim(Senior_Project_data_sheet$DATE)

Senior_Project_data_sheet$Date100=as.character(Senior_Project_data_sheet$DATE)
```

DATE	Close	Percent change consumer debt	Avg. Workweek production
1/1/1990	329.08	0.39047	40.5
2/1/1990	331.89	0.13267	40.6
3/1/1990	339.94	-0.00314	40.6
4/1/1990	330.80	-0.00014	40.5
5/1/1990	361.23	0.1257	40.6
6/1/1990	358.02	0.39283	40.7
7/1/1990	356.15	0.49755	40.6
8/1/1990	322.56	0.23189	40.5
9/1/1990	306.05	0.20743	40.5
10/1/1990	304.00	0.27379	40.4
11/1/1990	322.22	0.12399	40.2
12/1/1990	330.22	-0.66761	40.3
1/1/1991	343.93	-0.20169	40.2
2/1/1991	367.07	0.0533	40.1
3/1/1991	375.22	0.16374	40
4/1/1991	375.34	-0.06591	40.1
5/1/1991	389.83	0.00163	40.2
6/1/1991	371.16	-0.22746	40.5
7/1/1991	387.81	-0.24406	40.5
8/1/1991	395.43	-0.24946	40.6
9/1/1991	387.86	-0.14122	40.6
10/1/1991	392.45	-0.28372	40.6
11/1/1991	375.22	-0.04282	40.7
12/1/1991	417.09	-0.03082	40.7
1/1/1992	408.78	0.11951	40.6
2/1/1992	412.70	0.08232	40.7
3/1/1992	403.69	-0.0248	40.7
4/1/1992	414.95	-0.22316	40.9
5/1/1992	415.35	0.00123	40.9
6/1/1992	408.14	-0.04909	40.8
7/1/1992	424.21	0.09933	40.8

8/1/1992	414.03	0.21998	40.8
9/1/1992	417.80	0.0469	40.7
10/1/1992	418.68	-0.08034	40.8
11/1/1992	431.35	0.39297	40.9
12/1/1992	435.71	0.42615	40.9
1/1/1993	438.78	0.3978	41.1
2/1/1993	443.38	0.58487	41.1
3/1/1993	451.67	-0.04946	40.8
4/1/1993	440.19	0.74978	41.4
5/1/1993	450.19	0.00027	41
6/1/1993	450.53	0.49438	40.9
7/1/1993	448.13	0.69274	41.1
8/1/1993	463.56	0.56862	41.1
9/1/1993	458.93	0.76327	41.3
10/1/1993	467.83	0.83435	41.3
11/1/1993	461.79	1.05081	41.3
12/1/1993	466.45	1.06561	41.4
1/1/1994	481.61	0.736	41.4
2/1/1994	467.14	0.95538	40.9
3/1/1994	445.77	1.24726	41.7
4/1/1994	450.91	1.08335	41.8
5/1/1994	456.50	1.31791	41.8
6/1/1994	444.27	1.24359	41.8
7/1/1994	458.26	0.7486	41.8
8/1/1994	475.49	1.46794	41.7
9/1/1994	462.71	1.33069	41.6
10/1/1994	472.35	1.1587	41.8
11/1/1994	453.69	1.33793	41.7
12/1/1994	459.27	1.61761	41.8
1/1/1995	470.42	1.31287	41.8
2/1/1995	487.39	0.80801	41.7
3/1/1995	500.71	1.47984	41.5
4/1/1995	514.71	0.97357	41
5/1/1995	533.40	1.31989	41.1
6/1/1995	544.75	1.126	41.2
7/1/1995	562.06	0.78168	41.1
8/1/1995	561.88	1.10093	41.2
9/1/1995	584.41	1.56118	41.2
10/1/1995	581.50	0.62495	41.2
11/1/1995	605.37	1.67321	41.3
12/1/1995	615.93	0.75821	40.9
1/1/1996	636.02	1.09805	39.7
2/1/1996	640.43	0.8518	41.3

3/1/1996	645.50	0.73859	41.1
4/1/1996	654.17	0.7868	41.2
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4/1/1997	801.34	0.78639	41.8
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6/1/1997	885.14	0.32691	41.6
7/1/1997	954.31	0.46174	41.6
8/1/1997	899.47	0.42189	41.7
9/1/1997	947.28	0.57299	41.7
10/1/1997	914.62	0.59574	41.8
11/1/1997	955.40	0.23429	41.8
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7/1/1998	1120.67	0.49337	41.4
8/1/1998	957.28	0.43062	41.4
9/1/1998	1017.01	0.7661	41.3
10/1/1998	1098.67	0.58019	41.4
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1/1/1999	1279.64	0.72066	41.3
2/1/1999	1238.33	0.70413	41.4
3/1/1999	1286.37	0.66357	41.3
4/1/1999	1335.18	0.46812	41.3
5/1/1999	1301.84	0.71868	41.4
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7/1/1999	1328.72	0.883	41.4
8/1/1999	1320.41	0.72696	41.5
9/1/1999	1282.71	0.52106	41.4

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11/1/1999	1388.91	0.53073	41.4
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2/1/2000	1366.42	0.69321	41.5
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4/1/2000	1452.43	0.58132	41.6
5/1/2000	1420.60	0.82649	41.2
6/1/2000	1454.60	1.64446	41.3
7/1/2000	1430.83	1.25522	41.5
8/1/2000	1517.68	1.34155	41
9/1/2000	1436.51	1.05263	41.1
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5/1/2002	1067.14	0.55968	40.6
6/1/2002	989.82	0.65637	40.7
7/1/2002	911.62	0.62425	40.4
8/1/2002	916.07	0.42743	40.5
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4/1/2003	916.92	0.64419	40.1

5/1/2003	963.59	0.66544	40.2
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3/1/2004	1126.21	0.68628	40.9
4/1/2004	1107.30	0.142	40.7
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12/1/2006	1418.30	0.65417	41.1
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8/1/2007	1473.99	0.75382	41.3
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4/1/2008	1385.59	0.35704	41.1
5/1/2008	1400.38	0.12739	41
6/1/2008	1280.00	0.13276	41
7/1/2008	1267.38	0.09287	41
8/1/2008	1282.83	-0.16653	40.9
9/1/2008	1166.36	-0.17634	40.5
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12/1/2008	903.25	-0.24383	39.8
1/1/2009	825.88	0.18436	39.7
2/1/2009	735.09	-0.38897	39.6
3/1/2009	797.87	-0.62436	39.3
4/1/2009	872.81	-0.30292	39.5
5/1/2009	919.14	-0.22747	39.3
6/1/2009	919.32	-0.68372	39.6
7/1/2009	987.48	-0.12081	39.9
8/1/2009	1020.62	-0.36175	40
9/1/2009	1057.08	-0.21803	40
10/1/2009	1036.19	-0.54223	40.2
11/1/2009	1095.63	-0.35345	40.5
12/1/2009	1115.10	0.23319	40.6
1/1/2010	1073.87	-0.54896	40.8
2/1/2010	1104.49	-0.4236	40.5
3/1/2010	1169.43	0.25976	41
4/1/2010	1186.69	-0.22877	41.1
5/1/2010	1089.41	-0.30973	41.4
6/1/2010	1030.71	-0.14177	41

7/1/2010	1101.60	-0.07119	41.1
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9/1/2010	1141.20	0.03788	41.4
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2/1/2011	1327.22	0.35482	41.4
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5/1/2011	1345.20	0.26181	41.5
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8/1/2011	1218.89	-0.29232	41.3
9/1/2011	1131.42	0.39571	41.3
10/1/2011	1253.30	0.31349	41.5
11/1/2011	1246.96	0.66909	41.5
12/1/2011	1257.60	0.42215	41.6
1/1/2012	1312.41	0.39532	41.8
2/1/2012	1365.68	0.33505	41.7
3/1/2012	1408.47	0.50307	41.6
4/1/2012	1397.91	0.47112	41.7
5/1/2012	1310.33	0.69885	41.6
6/1/2012	1362.16	0.42933	41.7
7/1/2012	1379.32	0.29838	41.7
8/1/2012	1406.58	0.61006	41.5
9/1/2012	1440.67	0.34254	41.5
10/1/2012	1412.16	0.61615	41.5
11/1/2012	1416.18	0.61323	41.5
12/1/2012	1426.19	0.40703	41.7
1/1/2013	1498.11	0.55318	41.7
2/1/2013	1514.68	0.71946	41.8
3/1/2013	1569.19	0.35237	41.9
4/1/2013	1597.57	0.34312	41.8
5/1/2013	1630.74	0.50675	41.8
6/1/2013	1606.28	0.36867	41.8
7/1/2013	1685.73	0.48335	41.7
8/1/2013	1632.97	0.50797	41.9
9/1/2013	1681.55	0.57519	41.9
10/1/2013	1756.54	0.57695	41.9
11/1/2013	1805.81	0.40919	41.9
12/1/2013	1848.36	0.46695	41.9
1/1/2014	1782.59	0.60768	41.6

2/1/2014	1859.45	0.58166	41.6
3/1/2014	1872.34	0.59289	42
4/1/2014	1883.95	0.75286	42
5/1/2014	1923.57	0.5907	42.2
6/1/2014	1960.23	0.4923	42.1
7/1/2014	1930.67	0.68629	42
8/1/2014	2003.37	0.4953	42
9/1/2014	1972.29	0.51247	42.2
10/1/2014	2018.05	0.35787	42.1
11/1/2014	2067.56	0.47735	42.2
12/1/2014	2058.90	0.79609	42.1
1/1/2015	1994.99	0.43204	42
2/1/2015	2104.50	0.56131	42
3/1/2015	2067.89	0.67763	41.9
4/1/2015	2085.51	0.62022	41.9
5/1/2015	2107.39	0.53064	41.8
6/1/2015	2063.11	0.72376	41.8
7/1/2015	2103.84	0.52938	41.8
8/1/2015	1972.18	0.38884	41.8
9/1/2015	1920.03	0.78926	41.7
10/1/2015	2079.36	0.46191	41.8
11/1/2015	2080.41	0.55438	41.8
12/1/2015	2043.94	-3.23593	41.7
1/1/2016	1940.24	0.50248	41.8
2/1/2016	1932.23	0.45566	41.8
3/1/2016	2059.74	0.71975	41.8
4/1/2016	2065.30	0.56015	41.8
5/1/2016	2096.95	0.56432	41.8
6/1/2016	2098.86	0.42636	41.8
7/1/2016	2173.60	0.47752	42
8/1/2016	2170.95	0.68371	41.8
9/1/2016	2168.27	0.50209	41.8
10/1/2016	2126.15	0.58549	41.9
11/1/2016	2198.81	0.68394	41.8
12/1/2016	2238.83	0.31794	41.8
1/1/2017	2278.87	0.4111	41.9
2/1/2017	2363.64	0.4983	42
3/1/2017	2362.72	0.37352	41.8
4/1/2017	2384.20	0.35293	41.9
5/1/2017	2411.80	0.48755	41.9
6/1/2017	2423.41	0.30552	42
7/1/2017	2470.30	0.39344	42
8/1/2017	2471.65	0.26507	42

9/1/2017	2519.36		0.24482	41.8
10/1/2017	2575.26		0.60968	42
11/1/2017	2584.84		0.81812	41.9
12/1/2017	2673.61		0.48259	41.7
1/1/2018				41.7

Index of consumer expectations	M1	PERMIT	value of manu orders - core capital goods
93	795.5	1748	
89.5	797.4	1329	
91.3	800.9	1246	
93.9	805.5	1136	
90.6	804.3	1067	
88.3	808.1	1108	
88.2	810.5	1078	
76.4	815.4	1069	
72.8	819.6	976	
63.9	820.3	925	
66	823	941	
65.5	823.7	861	
66.8	826.7	786	
70.4	832.2	853	
87.7	836.8	911	
81.8	843.4	916	
78.3	848.8	991	
82.1	854.1	964	
82.9	861.6	973	
82	866.4	944	
83	870	974	
78.3	877.6	991	
69.1	885.6	984	
68.2	896.7	1061	
67.5	909.1	1077	
68.8	923.8	1146	35981
76	935.2	1082	39492
77.2	943.4	1054	39905
79.2	949.5	1056	40883
80.4	954	1057	39395
76.6	962.8	1089	38982

76.1	972.8	1075	37515
75.6	987.3	1114	38806
73.3	1001.8	1132	39461
85.3	1015.2	1118	37558
91	1024.6	1176	40522
89.3	1029.9	1177	37310
86.6	1032.6	1148	41449
85.9	1037.4	1056	38065
85.6	1046	1104	39994
80.3	1064.6	1112	39297
81.5	1074.9	1130	42739
77	1083.6	1174	41031
77.3	1093.2	1230	42415
77.9	1103.6	1251	40238
82.7	1111.1	1287	41835
81.2	1123.3	1357	41711
88.2	1129.8	1461	42306
94.3	1131.2	1390	42651
93.2	1136.3	1269	43144
91.5	1139.7	1342	41545
92.6	1141.4	1392	44784
92.8	1143.1	1396	43802
91.2	1145.4	1357	46475
89	1149.4	1335	45823
91.7	1150.9	1377	46033
91.5	1152.6	1412	46086
92.7	1149.9	1397	46997
91.6	1150.9	1340	48620
95.1	1151.6	1396	46777
97.6	1150.6	1282	47530
95.1	1147.5	1254	49227
90.3	1147.5	1226	48719
92.5	1148	1259	48831
89.8	1146.1	1271	50995
92.7	1144.8	1305	49312
94.4	1144.9	1354	48029
96.2	1145.8	1386	49796
88.9	1143.4	1421	55726
90.2	1136.7	1400	51986
88.2	1135.2	1430	54154
91	1126.6	1442	58004
89.3	1124.7	1387	52120
88.5	1118.2	1420	52255

93.7	1121.4	1437	56387
92.7	1125.4	1463	50728
89.4	1117.2	1457	55165
92.4	1114.2	1429	54476
94.7	1113.7	1450	55301
95.3	1102.9	1413	50906
94.7	1096.4	1392	55893
96.5	1086.2	1358	55625
99.2	1083.8	1412	54534
96.9	1081.4	1411	52363
97.4	1081.8	1382	53933
99.7	1079.3	1445	58023
100	1072.6	1436	56876
101.4	1064	1421	58534
103.2	1063.5	1414	56732
104.5	1066	1402	60619
107.1	1064.9	1440	62368
104.4	1075.5	1449	62531
106	1067.7	1494	62284
105.6	1064.6	1499	63394
107.2	1071.3	1469	73908
102.1	1071.5	1456	58910
106.6	1075	1555	60798
110.4	1076.6	1647	62636
106.5	1077.2	1605	60377
108.7	1076.3	1547	63252
106.5	1079.4	1554	63558
105.6	1076.2	1551	62716
105.2	1074.7	1610	61303
104.4	1076.3	1654	63917
100.9	1079.5	1577	63835
97.4	1085.3	1719	60928
102.7	1094.1	1672	62463
100.5	1093.9	1742	58598
103.9	1099.8	1732	63726
108.1	1097.3	1720	62053
105.7	1096.5	1665	61480
104.6	1100.1	1600	61939
106.8	1104.1	1640	63269
107.3	1100.1	1702	62413
106	1098.2	1682	66309
104.5	1099.3	1671	66476
107.2	1095.8	1551	66827

103.2	1103.1	1649	65730
107.2	1109.5	1672	64522
105.4	1119.8	1683	69654
112	1125.5	1727	69082
111.3	1108.7	1692	62039
107.1	1106	1651	67103
109.2	1118.2	1597	69174
110.7	1105.1	1543	67333
106.4	1101.6	1572	76145
108.3	1104.2	1542	67891
107.3	1100.5	1552	69689
106.8	1099.9	1570	75032
105.8	1098.7	1577	65726
107.6	1093	1614	68968
98.4	1088.4	1543	72194
94.7	1095.1	1699	63251
90.6	1100.6	1656	64748
91.5	1108.1	1659	64218
88.4	1116.3	1666	59075
92	1117.8	1665	59859
92.6	1125.5	1626	59725
92.4	1137.5	1598	55569
91.5	1147.7	1615	57022
81.8	1207.6	1565	52585
82.7	1166.6	1566	50181
83.9	1169.7	1651	52555
88.8	1182.5	1680	52756
93	1190.8	1665	48904
90.7	1190.4	1787	53650
95.7	1194.8	1691	50969
93	1186.9	1669	51711
96.9	1186.9	1716	53809
92.4	1194.5	1758	49987
88.1	1199.4	1738	53106
87.6	1183.8	1695	57357
86.1	1197.1	1803	50470
80.6	1203.5	1799	51359
84.2	1206.4	1771	52357
86.7	1221.2	1896	51150
82.4	1224.2	1808	50902
79.9	1238.3	1854	51160
77.6	1240.2	1757	53334
86	1249.3	1803	51627

92.1	1267.1	1835	53005
89.7	1280	1875	53139
90.9	1286.2	1885	52704
89.3	1298.5	1966	52696
87.7	1295.9	1961	54700
89.6	1294.5	2012	53795
93.7	1303.4	1918	54185
92.6	1303.8	1987	54914
103.8	1304.9	1952	52284
94.4	1320.6	1966	53924
95.8	1327.6	2066	57781
94.2	1328.6	2070	54533
90.2	1336.2	2150	55757
95.6	1342.9	2020	56545
96.7	1338.9	2112	62631
95.9	1353.2	2056	55424
94.2	1361.3	2041	59031
91.7	1364.3	2097	56465
92.8	1371.1	2079	61404
97.1	1374.5	2082	59774
95.5	1369.7	2139	60938
94.1	1371.8	2114	61840
92.6	1372.4	2062	58468
87.7	1358.7	2150	61505
86.9	1365.3	2085	73110
96	1378.8	2178	70034
96.5	1369.8	2203	66029
89.1	1375.6	2219	69037
76.9	1374.3	2263	62974
74.2	1378.5	2170	67038
81.6	1376.5	2218	82095
91.5	1374.6	2120	78226
91.2	1380.6	2212	68047
86.7	1379.8	2141	69616
88.9	1380.8	2118	76977
87.4	1386.6	1998	71737
79.1	1385.8	1905	71676
84.9	1371.2	1867	72083
84.7	1372.3	1763	71064
82	1371.9	1722	67692
85.4	1364.5	1655	87672
93.6	1369.4	1570	76281
92.1	1369.7	1535	76046

91.7	1369.4	1638	79015
96.9	1372.4	1626	70880
91.3	1365.7	1598	75120
88.4	1365.1	1596	83466
87.1	1378.7	1470	82487
88.3	1380.6	1493	76445
85.3	1366.6	1407	82371
90.4	1369.2	1361	85054
83.4	1370.2	1321	75530
83.4	1382.2	1261	78920
80.9	1376.7	1192	76942
76.1	1369.5	1224	82985
75.5	1375.9	1149	84924
78.4	1380	1094	84262
70.8	1380.5	1014	80126
69.5	1391.5	967	79875
62.6	1392	1008	79089
59.8	1391.7	995	80170
56.4	1402.5	1180	76372
61.2	1416.7	921	75594
63	1407.8	858	72832
70.3	1451.8	797	69007
57.6	1466.3	736	64773
55.3	1512	626	62022
60.1	1588.7	554	55029
61.2	1593.4	545	50772
56.3	1570	558	45513
57.3	1577.1	513	45634
65.1	1614.1	521	42926
68.7	1617.4	556	49429
70.8	1649	601	48955
66	1654.4	595	53146
65.7	1661.2	616	50516
73.5	1663.5	609	50319
70.6	1675.3	583	52972
67.4	1682.2	623	51223
72.5	1692.2	664	47746
74.4	1683.3	636	58449
73.6	1697.8	650	59907
73.6	1712.3	687	57328
72.2	1694.5	637	63486
73.6	1712.5	575	60945
76	1729.9	587	63901

67.8	1718.6	579	61795
68.9	1744.6	580	63721
68.2	1763.2	563	68862
67.7	1782.4	558	67861
71.6	1817.5	560	63000
74.5	1834.4	632	59378
74.2	1857.1	576	65876
77.5	1874.8	542	63697
67.5	1892.2	583	71549
69.8	1897	581	67144
74.3	1935.9	618	70438
71.5	1950.5	636	67262
63.7	1983.4	621	70833
55.8	2103.5	647	78575
59.5	2118.3	610	71965
60.8	2143.4	671	71754
63.7	2166.4	706	77162
69.9	2157.8	697	85774
75	2204.9	715	85174
75.3	2211	733	83037
76.2	2225.8	797	78078
76.4	2247.9	747	76531
79.3	2256.9	807	75471
73.2	2272.8	790	75444
72.3	2312.4	840	82143
74.3	2335.2	832	65888
78.3	2395.1	921	76054
82.6	2414.3	895	79028
82.7	2417	930	74073
72.9	2461.9	938	78965
73.8	2475.5	928	76883
77.6	2474.8	971	83745
78.6	2472.7	932	73688
76.4	2515	1015	76732
84.5	2521.3	1016	85128
84.1	2540.6	951	92266
85.1	2541.9	986	74104
82.1	2543.3	947	75727
77.5	2584	1015	82061
73.2	2623.5	1031	75938
75.1	2616.1	1042	87157
82.5	2662.6	1013	85691
81.2	2686.7	1001	77289

81.6	2727.7	1032	74964
80	2756.7	1078	78881
84.1	2778.5	1080	76860
81.9	2789.1	1007	77104
82.5	2829.3	1015	80332
81.8	2838.9	1053	130741
82.5	2803.8	1045	83382
84.6	2853.4	1062	80389
86.9	2858.8	1123	72276
88.8	2889.9	1073	74989
93.6	2931.6	1070	70514
98.1	2932.6	1069	75881
95.4	3005.1	1127	72647
93	3004.9	1079	75911
95.9	3002.9	1178	75232
90.7	2987.5	1255	68725
96.1	3014.2	1363	76598
93.1	3026	1134	74960
91.9	3034.8	1159	75241
87.2	3045.9	1125	67553
90	3007	1166	75671
91.3	3078.9	1267	70308
92.6	3086.1	1218	61519
92	3115.3	1193	73169
91.7	3124	1195	65424
91	3154.9	1115	63136
89	3195.7	1163	72282
94.7	3242.4	1178	70567
93.5	3247.5	1193	61131
90	3245.8	1175	67983
89.8	3303.3	1200	65625
91.2	3322.6	1270	65315
87.2	3340.7	1285	78150
93.8	3350.4	1255	61494
98.2	3341.5	1266	64526
98.5	3384.7	1300	67593
96.3	3384.4	1219	70423
96.9	3428.2	1260	71771
97	3444.2	1228	70041
97.1	3486.3	1168	69976
95	3490.3	1275	84540
93.4	3525.9	1230	67861
96.8	3555.9	1272	70600

95.1	3557.8	1225	75784
100.7	3582	1316	73543
98.5	3599.3	1303	75119
95.9	3615.9	1300	74796
	3632	1377	73644

value of manu new orders - consumer goods	initial claims for unemployment	Yield Curve Index
	361000	-0.02
	358250	0.23
	345200	0.31
	361750	0.53
	355250	0.58
	362400	0.19
	367000	0.32
	384250	0.62
	394000	0.69
	425250	0.61
	446750	0.58
	455000	0.77
	439750	1.18
	484000	1.6
	498600	1.99
	467250	2.13
	447000	2.29
	428600	2.38
	418250	2.45
	431600	2.24
	424500	2.2
	422750	2.32
	445400	2.61
	456750	2.66
63069	439000	3
67035	442200	3.28
69885	429500	3.56
67166	418250	3.75
69758	417400	3.57
75339	418750	3.5
68984	442750	3.59

70759	407200	3.29
77361	417000	3.2
72890	377800	3.49
72618	362250	3.78
70505	339000	3.85
66429	345600	3.58
69598	338250	3.23
73292	351000	2.91
68609	354750	3.01
70310	343600	3.04
74927	342750	2.92
68664	350800	2.75
71799	341000	2.65
76135	339000	2.27
73571	349800	2.34
71140	341000	2.7
68342	323000	2.81
65569	359200	2.7
70064	348500	2.72
73047	335750	3.14
68947	344000	3.41
70858	359000	3.17
75573	340000	2.85
70368	342200	3.04
76196	336250	2.77
78439	330250	2.73
76650	333400	2.98
76271	328000	2.67
75185	323200	2.36
70432	333500	2.25
75144	337750	1.55
77029	340250	1.22
75235	350200	1.01
76840	370250	0.62
80694	366250	0.17
75139	371400	0.43
80453	356250	0.75
83055	362000	0.4
81202	371500	0.28
79393	377000	0.13
77959	365000	0.11
72738	374000	0.09
76075	377250	0.59

79570	386400	0.96
77967	359250	1.29
79652	344500	1.5
81106	342200	1.64
78416	337000	1.47
82772	331800	1.42
84939	342750	1.53
86160	339000	1.29
84272	336400	0.89
80886	353500	1.01
78341	339000	1.33
80559	320750	1.23
82520	319400	1.3
80592	327000	1.38
82612	323800	1.21
84726	325500	0.93
81017	320250	0.7
86032	330200	0.76
87618	315250	0.67
87499	310000	0.53
84929	314600	0.36
81878	313250	0.31
77953	321200	-0.02
80197	319000	0.06
83044	315000	0.16
80086	311000	0.19
80667	311200	0.16
84045	338000	-0.06
78810	333000	-0.08
83561	312600	-0.21
85742	304000	-0.7
83900	310600	-0.54
80881	316000	0
79522	316000	-0.03
75292	326200	0.09
78561	301500	0.24
83392	302750	0.42
80358	308500	0.44
82112	301600	0.8
86741	294000	1.14
81750	298000	0.8
87715	290750	0.87
90567	289500	0.7

89992	290400	0.91
89083	281750	0.61
86619	278500	0.98
82997	288400	1.21
88133	293750	0.79
92634	274750	0.41
89001	271600	-0.03
91940	282250	0.17
95738	291000	-0.43
89872	295000	-0.49
95943	312750	-0.67
97081	300200	-0.72
96815	301000	-0.77
95911	334250	-0.79
93004	346000	-1.16
90407	340000	-0.82
90338	371250	-0.39
93788	387200	-0.42
90890	396750	0.34
96338	394500	1.18
93103	397200	1.31
88748	398000	1.47
98283	398000	1.32
94829	435000	1.66
95402	480750	2.08
91373	447500	2.56
89474	416800	3.27
85692	408500	3.31
84576	399000	3.17
91212	415400	3.55
87832	429250	3.46
91850	409000	3.41
92355	387200	3.18
87858	386000	2.92
94674	393600	2.52
96985	409500	2.12
97918	407500	2.19
93856	392200	2.71
93814	414250	2.79
90734	395000	2.81
91112	411000	2.64
98809	427400	2.56
92225	436250	2.7

95409	424000	2.31
97820	421750	2.11
97362	411500	2.97
101300	400200	3.42
101330	395500	3.26
103318	382000	3.28
97927	363000	3.3
98162	358250	3.29
94787	360200	3.15
95556	360750	3.07
103384	342000	2.83
101570	348250	3.35
106744	336200	3.72
108784	349000	3.7
105978	343000	3.24
112967	340750	2.85
110802	337250	2.52
116463	334000	2.34
114526	328750	2.26
110092	325250	2.07
107586	343400	1.94
107578	311750	1.67
120732	332000	1.87
117602	323200	1.55
122890	327000	1.14
124683	325750	0.96
122400	324400	0.92
133957	315750	0.76
131593	382750	0.58
131831	352200	0.68
127073	317250	0.54
124639	316400	0.31
122305	295750	0.13
116397	290750	0.08
130073	301750	0.13
127370	303600	0.2
138731	332750	0.17
136164	305500	0.12
134879	318800	-0.15
141666	314250	-0.37
127541	316200	-0.53
128752	315500	-0.52
127099	326250	-0.65

127194	324000	-0.68
121646	317250	-0.49
121248	322750	-0.54
134832	309400	-0.7
133308	320250	-0.56
144896	304250	-0.5
143141	315200	-0.15
141486	313250	-0.26
146076	320000	-0.35
142617	313400	-0.42
151290	328250	-0.23
153604	336000	-0.34
150115	348200	-0.14
146370	338750	-0.2
145377	346750	0.76
157037	363400	0.9
164811	359500	1.4
176813	366800	1.9
178978	383250	2.1
181002	398000	2
176163	433000	1.89
160772	464000	1.88
153928	475250	2.84
132116	519800	3.14
123094	564000	2.26
119760	572000	2.37
117626	644000	2.65
124282	659250	2.64
123544	627750	2.78
130260	612000	3.11
138520	598250	3.51
132506	566500	3.4
138393	559200	3.43
136757	547500	3.25
141742	525400	3.27
138090	494000	3.28
139597	485500	3.47
132538	479800	3.62
129339	485750	3.56
147193	470250	3.57
143237	469000	3.65
144845	459400	3.22
145221	460500	3.02

142658	459200	2.83
147838	475000	2.51
145836	453500	2.46
150955	446800	2.35
150948	426250	2.57
154873	420250	3.11
151895	426800	3.22
148571	401500	3.42
172219	406000	3.27
171685	420600	3.36
174684	422500	3.08
174447	418250	2.91
171797	412600	2.93
177611	409500	2.2
172766	417750	1.9
173226	402400	2.08
171988	389250	1.93
168324	377000	1.91
162469	377750	1.89
164613	363250	1.87
176800	366600	2.04
170544	381750	1.91
176964	373500	1.64
166106	379200	1.46
169080	372500	1.37
180149	373250	1.55
174943	381800	1.58
181030	368500	1.59
172137	401250	1.49
168960	359000	1.56
167174	353750	1.77
165383	351500	1.83
175310	351800	1.82
170403	346500	1.61
177841	347250	1.82
171656	344800	2.21
178670	346000	2.49
182439	333200	2.66
176269	316250	2.73
180272	358500	2.53
173249	329200	2.64
174614	347000	2.81
169054	327000	2.79

164609	335750	2.64
178197	323200	2.64
179245	323500	2.62
181530	313800	2.47
178616	314250	2.5
175940	301500	2.45
178691	301200	2.33
174541	297500	2.44
173045	287250	2.21
162711	292600	2.24
155821	284500	2.09
142632	288000	1.77
142205	301250	1.87
155564	286250	1.93
153484	286500	1.82
157342	274000	2.08
158452	275000	2.23
152953	276750	2.19
153082	273800	2.03
151274	272250	2.03
151644	265400	1.95
144404	270000	2.14
142706	271750	2
131554	280400	1.75
132667	267500	1.4
145617	268000	1.53
141186	264600	1.44
148382	274750	1.44
150988	266750	1.26
143480	260000	1.11
151294	261000	1.16
150081	255000	1.23
151886	253800	1.36
149188	249750	1.73
154300	253200	1.95
148254	247000	1.78
144889	239750	1.76
158853	254500	1.69
155849	241400	1.4
162685	239750	1.39
160161	242250	1.15
157174	243600	1.17
166548	236750	1.05

	163936	273200	1.05
	168116	232500	1.21
	166704	242250	1.19
	165554	240600	1.1

Inlfation rate	FEDFUNDS	Saving Rate of Population
4.4	8.23	7.4
4.6	8.24	8.1
4.9	8.28	7.8
4.8	8.26	8.2
4.8	8.18	8.0
4.9	8.29	7.9
5.0	8.15	8.0
5.5	8.13	7.5
5.5	8.2	7.5
5.3	8.11	7.3
5.3	7.81	7.4
5.2	7.31	8.2
5.6	6.91	8.7
5.6	6.25	8.3
5.2	6.12	7.4
5.1	5.91	8.0
5.1	5.78	7.7
5.0	5.9	8.2
4.8	5.82	7.6
4.6	5.66	7.9
4.5	5.45	8.1
4.4	5.21	8.6
4.5	4.81	8.4
4.4	4.43	9.1
3.9	4.03	8.8
3.8	4.06	9.2
3.9	3.98	9.2
3.9	3.73	9.4
3.8	3.82	9.4
3.8	3.76	9.5

3.7	3.25	9.1
3.5	3.3	9.2
3.3	3.22	8.2
3.5	3.1	7.4
3.4	3.09	7.3
3.3	2.92	9.9
3.5	3.02	8.3
3.6	3.03	8.4
3.4	3.07	8.3
3.5	2.96	8.2
3.4	3	7.7
3.3	3.04	7.2
3.2	3.06	7.0
3.3	3.03	7.1
3.2	3.09	6.3
3.0	2.99	5.6
3.1	3.02	5.6
3.2	2.96	8.4
2.9	3.05	6.4
2.8	3.25	5.9
2.9	3.34	6.2
2.8	3.56	5.8
2.8	4.01	7.1
2.9	4.25	6.3
2.9	4.26	6.4
2.9	4.47	5.9
3.0	4.73	6.2
2.9	4.76	6.5
2.8	5.29	6.4
2.6	5.45	6.5
2.9	5.53	6.9
3.0	5.92	7.3
3.0	5.98	7.0
3.1	6.05	6.3
3.1	6.01	6.5
3.0	6	6.1
3.0	5.85	6.4
2.9	5.74	6.1
2.9	5.8	6.1
3.0	5.76	6.5
3.0	5.8	6.0
3.0	5.6	5.5
3.0	5.56	6.1

2.9	5.22	6.1
2.8	5.31	6.0
2.7	5.22	5.0
2.7	5.24	6.1
2.7	5.27	6.5
2.7	5.4	6.1
2.6	5.22	5.9
2.7	5.3	6.0
2.6	5.24	5.8
2.6	5.31	5.8
2.6	5.29	5.7
2.5	5.25	5.6
2.5	5.19	5.7
2.5	5.39	5.8
2.7	5.51	5.9
2.5	5.5	6.2
2.4	5.56	6.0
2.4	5.52	5.5
2.3	5.54	5.4
2.2	5.54	5.6
2.3	5.5	5.6
2.2	5.52	5.8
2.2	5.5	5.8
2.2	5.56	6.7
2.3	5.51	6.8
2.1	5.49	6.9
2.1	5.45	6.6
2.2	5.49	6.3
2.2	5.56	6.2
2.2	5.54	6.3
2.5	5.55	6.2
2.5	5.51	5.8
2.3	5.07	5.6
2.3	4.83	5.7
2.4	4.68	5.2
2.4	4.63	5.7
2.1	4.76	5.6
2.1	4.81	5.3
2.2	4.74	4.5
2.0	4.74	4.3
2.1	4.76	4.2
2.1	4.99	4.1
1.9	5.07	4.0

2.0	5.22	3.5
2.1	5.2	3.9
2.1	5.42	4.1
1.9	5.3	3.7
2.0	5.45	4.7
2.2	5.73	4.2
2.4	5.85	3.9
2.3	6.02	4.4
2.4	6.27	4.3
2.5	6.53	4.2
2.5	6.54	4.6
2.6	6.5	4.6
2.6	6.52	3.8
2.5	6.51	4.0
2.6	6.51	3.8
2.6	6.4	3.5
2.6	5.98	4.0
2.7	5.49	4.1
2.7	5.31	4.5
2.6	4.8	4.3
2.5	4.21	3.7
2.7	3.97	3.7
2.7	3.77	5.0
2.7	3.65	6.1
2.6	3.07	6.3
2.6	2.49	2.7
2.8	2.09	3.4
2.7	1.82	3.8
2.6	1.73	5.6
2.6	1.74	5.3
2.4	1.73	5.3
2.5	1.75	5.1
2.5	1.75	5.6
2.3	1.75	5.4
2.2	1.73	4.6
2.4	1.74	4.4
2.2	1.75	4.9
2.2	1.75	4.7
2.0	1.34	4.7
1.9	1.24	4.5
1.9	1.24	4.5
1.7	1.26	4.8
1.7	1.25	4.6

1.5	1.26	4.6
1.6	1.26	5.1
1.5	1.22	4.9
1.5	1.01	5.5
1.3	1.03	5.3
1.2	1.01	4.5
1.3	1.01	4.6
1.1	1	4.7
1.1	0.98	4.8
1.1	1	4.5
1.2	1.01	4.5
1.6	1	4.5
1.8	1	4.7
1.7	1	4.7
1.9	1.03	5.0
1.8	1.26	4.6
1.7	1.43	4.6
2.0	1.61	3.9
2.0	1.76	3.8
2.2	1.93	3.5
2.2	2.16	6.3
2.3	2.28	3.2
2.4	2.5	2.9
2.3	2.63	2.9
2.2	2.79	2.2
2.2	3	3.0
2.0	3.04	2.3
2.1	3.26	1.9
2.1	3.5	2.4
2.0	3.62	2.3
2.1	3.78	2.6
2.1	4	2.7
2.2	4.16	2.8
2.1	4.29	3.8
2.1	4.49	3.8
2.1	4.59	3.8
2.3	4.79	3.4
2.4	4.94	3.2
2.6	4.99	3.4
2.7	5.24	2.9
2.8	5.25	3.0
2.9	5.25	3.0
2.7	5.25	3.1

2.6	5.25	3.2
2.6	5.24	3.0
2.7	5.25	3.0
2.7	5.26	3.3
2.5	5.26	3.6
2.3	5.25	3.2
2.2	5.25	3.0
2.2	5.25	2.8
2.2	5.26	2.8
2.1	5.02	2.6
2.1	4.94	2.8
2.2	4.76	2.8
2.3	4.49	2.5
2.4	4.24	3.0
2.5	3.94	3.3
2.3	2.98	3.8
2.4	2.61	3.9
2.3	2.28	3.5
2.3	1.98	7.9
2.4	2	5.5
2.5	2.01	4.4
2.5	2	3.7
2.5	1.81	4.4
2.2	0.97	5.4
2.0	0.39	6.2
1.8	0.16	6.4
1.7	0.15	6.4
1.8	0.22	5.9
1.8	0.18	6.1
1.9	0.15	6.7
1.8	0.18	8.1
1.7	0.21	6.6
1.5	0.16	6.0
1.4	0.16	4.9
1.5	0.15	5.9
1.7	0.12	5.4
1.7	0.12	5.7
1.8	0.12	5.7
1.6	0.11	5.6
1.3	0.13	5.2
1.1	0.16	5.0
0.9	0.2	5.6
0.9	0.2	6.0

0.9	0.18	5.9
0.9	0.18	5.9
0.9	0.19	5.8
0.8	0.19	5.6
0.6	0.19	5.4
0.8	0.19	5.3
0.8	0.18	5.9
1.0	0.17	6.3
1.1	0.16	6.4
1.2	0.14	6.1
1.3	0.1	5.8
1.5	0.09	5.9
1.6	0.09	6.1
1.8	0.07	6.2
2.0	0.1	6.2
2.0	0.08	5.7
2.1	0.07	5.5
2.2	0.08	5.6
2.2	0.07	6.4
2.3	0.08	6.6
2.2	0.1	6.7
2.3	0.13	7.0
2.3	0.14	7.2
2.3	0.16	7.3
2.2	0.16	7.6
2.1	0.16	7.1
1.9	0.13	7.1
2.0	0.14	7.2
2.0	0.16	7.8
1.9	0.16	8.8
1.9	0.16	11.0
1.9	0.14	4.9
2.0	0.15	4.7
1.9	0.14	4.8
1.7	0.15	4.9
1.7	0.11	5.3
1.6	0.09	5.4
1.7	0.09	5.2
1.8	0.08	5.4
1.7	0.08	5.3
1.7	0.09	4.8
1.7	0.08	4.6
1.7	0.09	4.7

1.6	0.07	5.1
1.6	0.07	5.4
1.7	0.08	5.4
1.8	0.09	5.5
2.0	0.09	5.7
1.9	0.1	5.9
1.9	0.09	5.8
1.7	0.09	5.6
1.7	0.09	5.8
1.8	0.09	5.8
1.7	0.09	5.8
1.6	0.12	6.1
1.6	0.11	6.1
1.7	0.11	6.3
1.8	0.11	5.8
1.8	0.12	6.2
1.7	0.12	6.2
1.8	0.13	6.3
1.8	0.13	6.0
1.8	0.14	6.0
1.9	0.14	6.0
1.9	0.12	6.3
2.0	0.12	6.1
2.1	0.24	5.8
2.2	0.34	5.9
2.3	0.38	5.5
2.2	0.36	5.7
2.1	0.37	5.5
2.2	0.37	5.4
2.2	0.38	5.1
2.2	0.39	5.1
2.3	0.4	4.9
2.2	0.4	4.5
2.1	0.4	4.1
2.1	0.41	3.7
2.2	0.54	3.2
2.3	0.65	3.7
2.2	0.66	4.1
2.0	0.79	3.9
1.9	0.9	3.7
1.7	0.91	3.8
1.7	1.04	3.6
1.7	1.15	3.5

1.7	1.16	3.5
1.7	1.15	3.0
1.8	1.15	3.0
1.7	1.16	2.6
1.8	1.3	2.5
1.8	1.41	3.2