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Analysis of GDP using Linear Regression

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Abstract

Title:

Analysis of GDP using Linear Regression

Finance and Economics are central to all business functions including management of money/wealth, business management, production, and consumption. Business and corporate operations are predicated on accurate comprehension of these key aspects, both to predict changes in the economy, and understand the constant changes in their environment. This study showed how well correlated the overall S&P 500 is with the economy, as well as each individual sector; are some sectors better indicators than others? Identifying the best correlation to use as a prediction model will allow policy makers, businessmen, and investors to use this information to make more educated business decisions such as predicting future sources of tax revenue, whether to purchase assets with cash or debt, or the deciding to invest in equities or fixed income markets. This model can also help with deciding how far in advance these changes should be made. Historical S&P 500 and GDP data was collected for comparison. Statistical analyses utilized regression models that revealed a moderate positive correlation between them. The model was used to track the economy and the stock market to see how well and how far in advance the prediction holds true, if at all. The hope is that the model will be able to correctly make predictions a couple of quarters in advance, and describe why the changes are occurring. This study will be unique because rather than focusing on when to invest it is focusing on how policy makers, businessmen, and investors can use the model.

Literature Review

The current trend for predicting economic growth or decline combines finance and economics to help lessen the inevitable uncertainty. There are prediction models and indicators of many sorts, some successful and some not. None however, are able to consistently predict the changes every time. The idea is to combine a few indicators and models that are able to complement each other. Where one model lacks consistency is where another is strongest. This way the likelihood of predicting economic changes grows.

Analyses that exist right now for creating GDP models have proven that percent changes in GDP can help to predict equity increases [10]. The common assumption made in these current models is that the financial structure of an economic market is either bank (fixed income) or market-based (equity) [6]. In general, these analyses take the historical changes in GDP and compare that to what happens in the equity market to form trends and trend lines. These analyses can be broken down by industry and are overlaid on current market graphs to help predict what will happen. This has proven to be a useful model; however, it too has a weakness. This analysis reacts to what GDP is doing rather than predicting what it is going to do. This is important because the model is always reacting rather than being a step ahead. To help decrease this uncertainty, the equity market can be used as a predictor of GDP. Doing this helps to strengthen the previous GDP model by offering consistency in an area that the previous models do not. With a similar concept in mind, I compared the equity market to GDP using regression to tell me how well correlated the two variables are. This gives meaning to the trend

lines that have previously been used in the past by verifying how well certain industries do in predicting GDP. Using this GDP model will help businessmen of small and large businesses, investors and policy makers alike [4].

In support of the GDP model I created, there have been studies that have proven, through correlation, that financial markets are leading indicators of the macroeconomy. A study done by Heiberger in 2018 showed that the S&P 500 demonstrates the overall growth of the economy with high correlational numbers [6]. Heiberger used a naïve Bayes classifier as a tool to predict economic development. The model that Heiberger created, correctly predicted all recessions and almost all prosperity periods over the last 28 years [6]. This study proves that it is possible to create a model that uses financial markets as leading indicators of the macroeconomy. Heiberger did a great job in covering different economic states throughout the study, he used the naïve Bayes classifier to test: posterity, growth, and recession. Testing on all three economic states helped to strengthen the model. At the end of his research, Heiberger noticed that by utilizing all the available features, he created an overfitted model [6]. To overcome this, he extracted the most predictive features of the macroeconomy and thusly maximized the fit of his model.

Another study, done by Chiarella in 2009, uses Keynes theory to focus on how in the short run, economic output is strongly influenced by demand [2]. Consumer demand is one of the most important underlying factors to economic growth and decline. Changes in the macroeconomy can often be attributed to changes in demand. The study also shows how the financial instability and its spillover into the financial markets have added challenging problems to the previous macroeconomic theories. Chiarella's

study had similar results to the study done by Heiberger in that economic markets can be leading indicators of the macroeconomy. However, Keynesian theory relies strongly on Government intervention to stabilize the economy. Knowing the Government's policy on how to deal with recession will make it easy to predict changes that are going to occur. In times of prosperity, where there is less Government intervention. During these periods Chiarelli's model will not be as accurate in predicting changes in the macroeconomy because it does not have the regulation to base predictions on.

Keynesian theory ties directly into a study done by Selmier in 2013. Selmier's study discusses how banking regulation can cause counterproductive economic dynamics. In this study, Selmier finds that as economic regulation imposed by banks or the Government increases, so does the S&P 500 [9]. The regulation helps to keep the macroeconomy from crashing also plays a role in its predictability. Similar to Chiarelli's findings, many of the prediction models that are used are based on bank and Government regulation; in times of prosperity it is harder to make predictions.

To add on to studies such as this one, I am going to further explain why the financial markets are leading indicators as well as how this type of information can be used. I will be running linear regression rather than a naïve Bayes model or a Keynes theory to find the correlation between financial markets and the macroeconomy. Rather than using the whole financial market, I will be studying the S&P 500 and comparing it to GDP. Regression will tell me whether or not the S&P 500 is a leading or lagging indicator to GDP. From there I will study the correlation between each individual sector of the S&P 500 and GDP as well as study gross national income per sector. This will

give a better understanding as to why the changes in GDP are occurring as well as why some sectors are stronger correlated than others.

Methods

Data was compiled from Yahoo Finance, a data site where information is stored in one location, BEA.gov which is another website that has years of data stored and sorted, and the Bloomberg Terminal which is an up to date portal that has current changes as well as historical data. Secondary data is all that was needed to create the GDP model. The raw monthly data was put into Excel and sorted into quarterly data so that there were more meaningful data points. It was decided the data would be more useful in quarterly format because there were larger differences in those data points when compared to the monthly data.

Using the quarterly data points, the percent change between each quarter was recorded. The percent change by quarter showed that GDP (adjusted for inflation) has only gone down a total of ten quarters since 1957. Four of them in response to the housing bubble crash in 2008, only three being consecutive (Yahoo Finance, 2017). This created a problem with the research because the majority of the comparisons were now required to be done on increases rather than being compared to both increases and decreases alike. In order for the prediction model to be accountable it has to predict both increases and decreases in GDP. If it is only able to predict increases it would not be a useful model. However, the size of the increases can still be compared and still be useful. Further details about how a GDP model that can be used to predict increases in GDP will be further explained later on.

Inferential statics was used to run regression analysis on the percent change from quarter to quarter between the S&P 500 and the total GDP. This gave a better feel of the true relationship of the data rather than stock prices because the monetary values used in stock prices and GDP would show no relationship. In order to test whether or not the S&P 500 is a leading indicator of GDP, the S&P 500 data was lagged both one and two quarters so that quarter two of GDP would be compared to quarter one of the S&P 500, and quarter three of GDP was compared to quarter one of the S&P 500.

Before the relationships could be analyzed a confidence interval had to be set. The confidence interval was set at 95% meaning that the p-value would have to be less than 0.05 in order to reject the null. Almost all of the results met this threshold and rejected the null hypothesis. This proved that there is a relationship between the two sets of data and that most of the sectors of the S&P 500 are leading indicators of GDP. In order for this data to be statistically significant the t-statistic had to be taken into account. The t-statistic shows evidence of the correlation being significant. For the results of this study to be significant, there needed to be a t-statistic less than 2 or greater than -2. Each t-statistic for the separate regressions met this criterion, this meant that the results were statistically significant. Regression was then run again for each individual sector of the S&P 500 to see if any are better at predicting GDP than the others. Some sectors did prove to have greater correlation than others and should be used rather than the sectors that did not show as strong a relationship. Research was then done to describe why some sectors were better at predicting GDP than others.

Once the data was collected and analyzed it was time to start focusing on how the model could be used to help policy makers, businessmen, and investors. Other

studies have attempted similar analysis and served as a guideline or framework for the GDP model. These articles include: ways to deal with excess money, what happens to businesses when the economy is up/down, and why human capital investments are important. This information will help with different scenarios such as: economy up, economy down, and over/under hiring and how/when to fix it. The hope is that the GDP model that was created will help policy makers, investors, and businessmen will be able to be one step ahead of the curve and taking initiative rather than being in the backseat and being reactionary.

Results and Analysis

After running regression on all of the individual sectors as well as the overall S&P with both a one-quarter lag and a two-quarter lag to GDP, it was discovered that many of the sectors were correlated with varying strengths.

Sector Break Down and Correlation Results

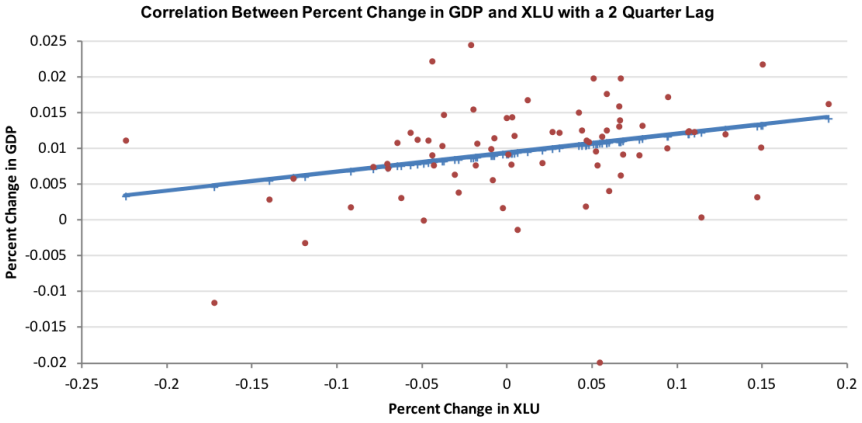
Regression Number	Independent Variable	Dependent Variable	# of Quarter Shift	R Statistic	R Squared	P-Value	Date Started
1	Overall S&P 500	Total GDP	1	0.165	0.027	0.01	1954
2	Overall S&P 500	Total GDP	2	0.231	0.053	0.00032	1954
3	Utilities (XLU)	Total GDP	1	0.336	0.113	0.0037	1999
4	Utilities (XLU)	Total GDP	2	0.293	0.086	0.0124	1999
5	Industriales (XLI)	Total GDP	1	0.323	0.104	0.0054	1999
6	Industriales (XLI)	Total GDP	2	0.296	0.088	0.0115	1999
7	Financials (XLF)	Total GDP	1	0.257	0.066	0.0287	1999
8	Financials (XLF)	Total GDP	2	0.309	0.095	0.0083	1999
9	Energy (XLE)	Total GDP	1	0.346	0.12	0.0027	1999
10	Energy (XLE)	Total GDP	2	0.24	0.056	0.0424	1999
11	Materials (XLB)	Total GDP	1	0.256	0.066	0.0286	1999
12	Materials (XLB)	Total GDP	2	0.238	0.081	0.0157	1999
13	Technology (XLK)	Total GDP	1	0.265	0.07	0.0232	1999
14	Technology (XLK)	Total GDP	2	0.261	0.068	0.0265	1999
15	Consumer Discretionary (XLY)	Total GDP	1	0.192	0.037	0.103	1999
16	Consumer Discretionary (XLY)	Total GDP	2	0.246	0.06	0.0375	1999
17	Health Care (XLV)	Total GDP	1	0.151	0.023	0.0234	1999
18	Health Care (XLV)	Total GDP	2	0.221	0.049	0.0618	1999
19	Consumer Staples (XLP)	Total GDP	1	0.014	0.0002	0.9086	1999
20	Consumer Staples (XLP)	Total GDP	2	0.207	0.043	0.0804	1999

Table 1

Table 1 shows us all of the sectors being compared to GDP. Of the sectors being compared, all but three showed to be leading indicators of GDP. Of the eleven different

sectors, the top performers were the overall S&P, Financials (XLF), Industrials (XLI), and Utilities (XLU). These four sectors all rejected the null hypothesis of there being no relation, this meant they all showed a correlation of being leading indicators. Surprisingly, the overall S&P was not the strongest indicator of GDP. It was surprising that it did not show the strongest correlation because the overall S&P 500 consistently goes up as it is less volatile than each of the individual sectors because it is more diversified, the consistent upwards trend is much like GDP.

Figure 1:



The sector that proved to be the best indicator of GDP was XLU. *Figure 1* shows a scatterplot with a line of best fit that shows the relationship between the percent change of GDP and XLU with a two-quarter shift. The scatterplot shows that there is a moderate positive linear relationship between the percent change in GDP and the percent change in XLU with a two-quarter lag. The data points mostly stay moving in a positive trend; however, there are a few outliers on both the positive and negative side of the X-Axis. These outliers are likely explained by the rare large jumps in either GDP or XLU. The outliers are often close to one another because of the two-quarter lag in XLU, the

lagged values of XLU are predicting the change in GDP. This is not the case for all of the outliers, but it is prevalent in some of the instances.

GDP and XLU Data with both 1 and 2 Quarter Lag

	1 Quarter Lag	2 Quarter Lag
R Statistic	33.61%	29.32%
R Squared Statistic	11.30%	8.50%
N	73	72
P-Value	0.0037	0.0124

Table 2:

Table 2 highlights the statistical data for the correlation between GDP and XLU with both a one quarter and two-quarter lag. XLU proved to be a top predictor in both the one-quarter shift and the two-quarter shift, followed closely by XLF and XLI. The XLU sector had a p-value of .00365 for the one quarter shift, and a p-value of .0124 for the two-quarter shift. Both of these values are less than or equal to .05 which means they provide strong enough evidence to reject the null hypothesis. Having a low p-value also helps to decrease type 1 error, which would mean there is a false positive result. In statistics a type 1 error is described as the null hypothesis being rejected even though it should have been accepted. Furthermore, XLU had a R Statistic value for the one-quarter shift of .336 and a R Statistic of .293 for the two-quarter shift. These values indicate that XLU is able to explain 33% of the data, i.e. percent of the variance explained. This value is relatively low since a perfect positive explanation of the data would be 1.0. It is possible the R Statistic is low for a few reasons. The first reason being the lack of data points, the data for each individual sector goes back quarterly to the year 1999 meaning there are 73 data points to compare to GDP data. This is the least likely of the three possibilities

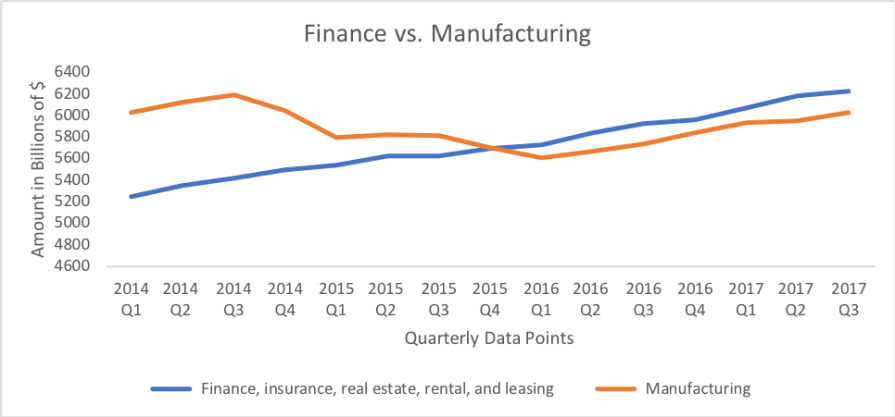
because even when compared to the overall S&P 500 that went back quarterly to the year 1957, 242 data points, the R Statistic was even lower at .16 for the one-quarter shift, and .23 for the two-quarter shift. The next possible reason to explain this unusually low R Statistic could be the fact that each sector changes quite a bit from quarter to quarter. If regression was run on yearly data points it would have been expected that the data would have had a higher R Statistic because the data points would show a more consistent pattern. The problem with doing yearly is that there would be a lot fewer data points to compare to which could make the results not as statistically significant. The third possible reason for the low R Statistic is that GDP has gone up all but ten quarters of the total 242 that were tested. This consistent upwards trend makes it hard to have a high R Statistic because the individual sectors are constantly going up and down. The regression run on this data is showing whether or not GDP is slowing rather than dropping when compared to the ups and down of the market.

The last major statistic taken into account when analyzing the data was the R-Squared statistic. This statistic is similar to the R Statistic, but it focuses on how closely the data are to the fitted line. XLU had the highest R-Squared statistic of all of the sectors coming in at .0113 for the one-quarter shift and .086 for the two-quarter shift. A 100% fit would come out as a 1.0 and no relation would come out as 0% or a 0.0; yet again, the data falls low on this rating scale. This can be attributed to the volatility of the sectors when using quarterly data.

A review of the results revealed that XLF, XLI, and XLU, are the best predictors of GDP because the products and services they provide are a necessity in our society. These sectors do especially well when people are buying their products in excess, this

means companies have to produce more and that in turn leads to a higher GDP. The main industry that connects all three of these sectors is the housing industry. When these sectors are doing well it usually means more people are buying homes which in turn helps the sectors to do even better. When the economy is good people generally have more discretionary income. When people have this buffer, many feel it to be the best time to buy or rent the new home they have been thinking about getting. The new homes being built will need industrial equipment from the big industrial companies to build them and will need utilities from the big utility companies to ensure the home can be functional. This now only leaves the connection to XLF. Most people, when buying a home, do not have a ton of cash sitting around that can be used to make a purchase of that magnitude. Instead, they go to a bank and take out a loan. In doing so they are helping the financial industry by giving them more money to loan out and therefore make back. Another reason why the housing industry is an underlying factor to the correlation between these sectors and GDP is the housing wealth effect. When the housing market is doing well the paper value of homes increase. As a result, home owners feel like they have more money than they actually do. This in turn leads to more spending (Investopedia, 2017).

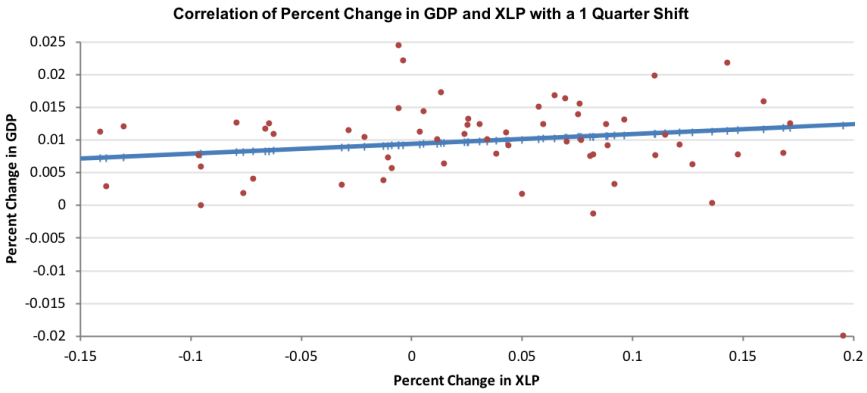
Figure 2:



Too add to the claim that the housing industry is the underlying factor when it comes to the success and failure of the top sector performers, data on gross national income for each sector was found and then compared to the sectors that had the most in common with GDP. The largest gross national income sector was the finance, insurance, rental, and leasing sector of the US economy. This sector is most comparable with the XLF sector of the S&P 500, one of the top performers in the relationship testing. The gross national income data used goes back to 2014 and ends in 2017. In every quarter since Q4 of 2015, the finance industry has had the largest portion of the total gross national income of all the sectors. The next highest gross national income by industry is manufacturing, this industry is most comparable with the XLI sector of the S&P 500, another top performer in the relationship testing. As seen in *Figure 2,* the manufacturing industry made up the largest portion of income until Q4 2015 when it was overtaken by the finance sector. Since these two sectors make up such a large portion of the gross national income of various industries in the US it can be deduced that they also produce the most goods and services as compared to the other industries in the US. The sectors that produce the most correlate to the making up a larger portion of GDP.

In general, the results were good but as with any test there were some solutions that did not work. In regard to this study, three of the eleven sectors did not show correlation: Real Estate (XLRE), Consumer Staples (XLP), Consumer Discretionary (XLY). The XLRE sector did not have enough data as it is a relatively new sector that opened in 2015, the lack of data makes the results statistically insignificant. Of the other two remaining sectors, XLP failed to reject the null in both the one-quarter shift and the two-quarter shift. The variability of this sector was too great to show any predictable

Figure 3:



relationship with GDP. When looking at the graph of the XLP and GDP data we see that the line of best fit is relatively flat meaning the data points are scattered all over the place. This can be seen in *Figure 3.* Consumer Discretionary (XLY) is a little different than the other two failed sectors in that it does reject the null in a two-quarter shift. It was predicted that there would be more sectors that would fall into this same boat because a one quarter shift is not a big portion of time to show any significant change in both GDP and the S&P. Before any data collection or analysis, XLY, was predicted to be the most highly correlated and best predictor of GDP. However, it turned out to be quite the opposite. Consumer discretionary is the term given to goods and services that are considered to be non-

essential by consumers; I thought this would mean that as this sector went up GDP would go up too because there would be a greater demand for goods, services, and therefore production increases.

Income elasticity might play a large role in why some of the sectors did not show a strong correlation and why others did. Income elasticity is the quantity demand for a certain good based on a change in real income of consumers who buy this good (Investopedia, 2017). The sectors that did not have a strong correlation produce non-essential goods and services. When the economy starts to slow the non-essential products and services are the first thing that consumers stop purchasing (Johnson, 2013. The sectors that showed the strongest correlation to GDP produce goods and services produce goods and services that are essential. As the economy slows, the prices for these products might decrease, but they will still be purchased at a rate similar to when the economy is doing well.

Application of Results

Having a model of how GDP is going to move can be beneficial in a variety of contexts. For example, the model can be used by a policy maker, a businessman, or an investor. Each has the same information, but how they rationalize and conform it to what they need in order to be successful can be very different. Having a basic understanding of an indicator that seems to work is good for anyone that is investing, owns a mortgage, has money in a bank, or even something as simple as holding a job. Being knowledgeable about the economy can help with preparation for whatever is going to happen next.

Policy makers, defined in this study as those who are members of a government department or legislature, constantly have to make important decisions regarding an ever-changing economy. This leaves them walking a very fine line that will have a similar consequence if they lean too far either direction. If they are late to react to the changing economy, they will lose the support of the public or superiors. Therefore, it is smart for policy makers to stay ahead of the curve and try to predict outcomes using models before they occur. One of the most important aspects of a policy maker's job is to make sure they have enough money to accomplish what they want to accomplish. If tax revenues are low, then they will have to charge a higher tax rate on the tax payers to make up for the decrease in funding. If GDP is predicted to increase more than in previous years or quarters, then an assumption could be made that companies are producing more and making more money. Therefore, there will be more money coming in from tax revenue. By using a GDP model, policy makers will be able to predict the future sources of tax revenue which can make it easier to help their platform, especially if the indication is that tax revenues will be increasing rather than decreasing.

A GDP model is beneficial in setting interest rate targets for the economy. For example, should the Federal Reserve Board (FED) foresee a slow in GDP and thusly the economy, it would be possible to make a decision or advertise the possibility of making a decision, to lower interest rates. This would decrease the likelihood of a bearish economy before it ever occurs. Economic regulation put into place by the FED, or any other government department, has a high correlation with the betterment of the S&P 500 (Selmier, 2013). While this is generally viewed as positive it brings up some dilemmas: 1) does the regulation merely prevent economic agents from extra risk-taking

until they adapt to the new regulation 2) does this mean the economy (stock market) is not as free-flowing as we may suspect but rather structured and controlled 3) would an absence of regulations crash our economy (Selmier, 2013). Alternatively, if there is an indication that GDP will be increasing at a faster rate rather than in previous years or quarters, then the FED can make a decision to increase interest rates to slow the growth of the economy. If it is not slowed, then the market might bubble and crash. There is never going to be one interest rate that is maintained to keep the economy at a safe and ever-growing rate, but by predicting the upturns and downturns of GDP it can be possible to maintain a steady growth. Selmier is quoted, “We might visualize such a system as a cross-roads traffic light system where the lights represent guidelines and structures in a global financial regulatory framework”. Although basic framework exists, evolution of the framework is a necessary process. Take cross-roads for example, since cars were created there has been a framework of how to get through cross-roads, but as time has gone on, the way drivers maneuver through these crossroads has evolved. Stoplights are now used rather than hand rules. The main framework of safe maneuvering through cross-roads in still in place but the way it is achieved has evolved.

In general, there is a misconception within the general public that the corporations in the United States are the driving factors that manipulate GDP rather than react to it. In basic terms this is true; however, the businessmen that run the corporations do in fact make decisions based on GDP. A major decision that businessmen have to make is whether or not to make major purchases with either cash or with debt. There are benefits to using both but the benefits change depending on the economic situation in the US. When GDP is up the consensus is to make a large

purchase or prepare for a large purchase. The question then arises whether or not to make the purchase with cash or debt. If the prediction is that GDP will be increasing faster than in previous quarters, then businessman should make the decision to pay with cash because it is believed that they are going to increase production and have an increase in cash flow. In short, they will make the money back that they spent quickly without having to worry about interest on a loan. Contrarily, if GDP is predicted to go down, or continue to go down, it is a better time to make large purchases with debt. This change occurs because of the usual drop in interest rates that the FED usually enacts as a reaction to a slowing or decreasing economy.

Employment growth or decline has a lot to do with knowledge about the economy and what is to come. Greater uncertainty about the economy has a negative impact on employment growth. The effects of this are primarily felt by smaller businesses due to a lack of resources (Ghosal, 2015). There are many channels by which businesses navigate for information about the economy. Smaller businesses have fewer channels and therefore fewer resources, as a result they are not able to be as informed about happenings as the larger corporations (Ghosal, 2015). A GDP model can help to provide more certainty to small-business operations and therefore help with employment growth. As companies become more knowledgeable about the economy, especially when the outlook is good, employment growth increases and the unemployment percentage drops (Zappe, 2015).

GDP is one of the most important facets of the economy to trace because it is recording how much is being produced in the US. If the indication is that production is going to be increasing, meaning supply is going up, businessmen will likely have to

decease the price of their product or service to undercut competitors and attract consumers. This will be the case until demand starts to catch up with supply. An increase in GDP is also an indication that demand is up or is going up. When GDP is in decline, businessmen might make the decision to decrease prices because there is less supply and less demand. Just because GDP is decreasing it does not necessarily mean that people are not as well off as they were before the decline. In the long term, it is likely that the economy will also be in decline if GDP continually slows or takes a dip. However, the short-game, quick decisions to change prices might pay off.

The financial structure of a country's economy is either bank (fixed-income) or market based (equity). As the economy grows and evolves the market becomes more equity oriented (Heiberger, 2018). One of the most common uses of a GDP model is when it comes to investing. GDP models can help to decrease the immense complexity of financial markets by still retaining core information such as GDP growth or decline. This has been shown to be very useful to predict financial crises and economic shocks (Heiberger, 2018). If the indication is that GDP will be growing faster than in previous quarters, then it is likely a good time to invest in equities because company values are theoretically increasing. The percent change in GDP can help to predict equity market increases (Sharma, 2014). A GDP model not only predicts whether or not GDP will be increasing faster or slower, it also helps to show what industry of GDP can be responsible for the change. It is most likely a result of one of the largest industries such as finance or manufacturing, but it might also be attributed to another industry such as utilities. The S&P 500 demonstrates the overall growth of the economy with high correlational numbers (Heiberger, 2018). Information about S&P 500 numbers can help

determine which sector is attributed for GDP increase of decline. This is why it is important for investors to have diversified portfolios. By having money invested in different industries investors will likely have a larger payout when GDP is on the rise.

GDP is not always increasing faster than in previous quarters and is sometimes even in decline. When this occurs, investors should not panic and pull all of their money out of the market, instead they just need to modify where they have it. When the indication is GDP is slowing, investors should put money into the fixed income market. These become the safer option because it has a guaranteed return either through interest or dividends. The fixed income market is not as liquid as the equity market but because of its guaranteed return it is much safer, and a good place to put money when the equity market is down or looks like it might go down. The rate of growth on these is much slower, which is part of the reason they are safer. The slow growth also means slow decline, the combination of this leaves these outlets to have low volatility. Fixed income has a slower growth rate and rate of return because they have much lower risk. Payouts on low risk investments are almost always lower that payouts on high risk investments. Much of the fixed income market is government backed which means that though the interest rate may get smaller it is still guaranteed that you are receiving payouts. The only reason that payments would stop would be in the occurrence of government default, which is nearly impossible in the U.S. (Harvey, 2012).

The fixed income shares that should be bought in this situation do not give ownership but are rather seen as a capital investment that will be paid back by the company or the government, depending on which shares are bought (Investopedia, 2017). Some examples of interest bearing vehicles would be things such as treasury

bonds, treasury notes, treasury bills, state or municipal bonds, corporate bonds, or bank certificates. These are most often bought by the elderly or people who are close to retirement because they want to invest in something as stable as possible. If the market takes a hit they don't want to lose all of their retirement money. Elderly people, or those who are close to retirement, don't have time to recover from a large loss.

There are many uses of an indicator that is able to predict the accelerations and decelerations of GDP, all of which depend on what each individual, or group of individuals, needs out of it. The more that is known about the economy the better off we will be. To be successful in the business world, a knowledge about GDP is extremely important because it is the base of the economy. Without the production of goods and services the economy would be at a standstill; therefore, no one is making money. A GDP model can be even stronger and more accurate with the use of other indicators that might help with predicting the rises and falls of the S&P 500 index, as well as other major indices such as the DOW Jones and the NASDAQ.

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