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September 11th, 2001: Immediate and short run effects on U. S. commodity markets, financial statistics, and macroeconomic variables

Katie E. Lotz

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September 11th, 2001: Immediate and Short Run Effects on U.S.

Commodity Markets, Financial Statistics, and Macroeconomic Variables

(TITLE)

BY

Katie E. Lotz

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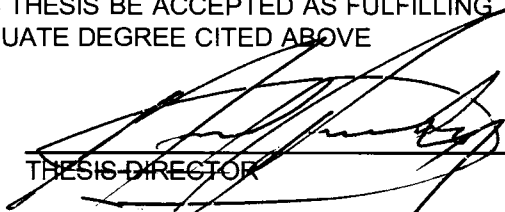
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September 11th, 2001:

Immediate and Short Run Effects on U.S. Commodity Markets,

Financial Statistics and Macroeconomic Variables

By: Katie E. Lotz

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ABSTRACT

In an attempt to identify and quantify the economic impacts of 9/11 on U.S. markets, this study individually examines a wide range of U.S. economic variables. Macroeconomic indicators, commodity prices, and financial statistics are the three main focuses of the project. Econometric analysis—ranging from simple ordinary least squares regression to more advanced techniques such as autoregressive conditional heteroscedastic models—is used to identify the various impacts.

The analysis finds that September 11th did have a wide array of impacts on the U.S. economy. Some variables appear to have been affected both immediately and in the short run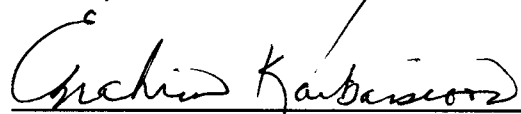, while others seem to have experienced no direct impact. As a whole, this study finds that the effects of 9/11 were more limited in scope than others had initially proposed. In addition, those effects that were evident seem to be mostly short-lived in nature.

The results of this study provide a good beginning for the application of econometric analysis to events such as September 11th. There are many possibilities for future research, including both the addition of supplementary study variables and the use of alternative econometric techniques.

For my parents, Keith and Jody Storck,

who have been the driving force behind all

my educational successes.

ACKNOWLEDGEMENTS

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CHAPTER 1

INTRODUCTION

September 11th, a day always to be remembered, has undoubtedly left its imprint on the United States of America. Buildings crumbled and lives were lost as the U.S. was forced to a momentary halt. The effects of the terrorist actions, however, stretched much further than the initial panic and loss of life. U.S. financial markets, along with the U.S. economy as a whole, began to wear under the combined weight of the recession and the sweeping devastation of the attacks.

The purpose of this study is to determine what effects, if any, September 11th has had on various aspects of the U.S. economy. Because the effects of 9/11 are not expected to be uniform in nature, this study examines many segments of the U.S. economy. More specifically, this study focuses on three main areas: commodity markets, macroeconomic variables and financial indicators. Research has shown that the effects within each segment may also be very heterogeneous and unpredictable in nature. For this reason, I include a wide range of variables for each segment under examination.

To examine the effects of 9/11 on the included variables, I use different forms of econometric analysis. These procedures include: ordinary least squares regression, autoregressive conditional heteroscedastic models, autoregressive integrated moving average models, and unit-root analysis. By combining these techniques with graphical analysis, I examine both the immediate and the more lasting short-run impacts of the terrorist attacks. Even in the short-run, it becomes difficult to analyze the effects due to

many exogenous influences. Because of these shown difficulties, I do not attempt to identify the long-run impacts of the attacks, despite the availability of long-run data.

While the exact effects of the terrorist attacks will be difficult, if not impossible, to ascertain, I still hope to offer some general insight into this area. By employing these specific techniques, I plan to provide evidence that the attacks either did or did not have significant effects on the variables included in the study. In addition, I hope to determine whether the attacks had any effect on the structural relationships witnessed between certain variables.

CHAPTER 2

LITERATURE REVIEW

Much work has already been conducted on the economic impacts of September 11th. Researchers have focused on many different sectors of the U.S. economy, ranging from the more obvious—such as the airline industries—to the not so obvious—such as consumer price indexes. The existing research, however, provides no general consensus on what actual effects the attacks have had on the U.S. economy.

This wide range of opinions can be attributed primarily to the condition of the U.S. economy pre-9/11. In the months preceding the attacks real GDP significantly declined, stock indexes plummeted, factory production decreased, and unemployment increased (Larkins et al., 2001). Because the economy had already entered this slowdown phase, it is unclear whether some post-9/11 events would have occurred regardless of the attacks.

The majority of available research endorses the view that the impacts of the attacks are hard, if not impossible, to isolate. Nicklaus (2002) writes that although the attacks did change the way consumers view risk and the role they assign to government in our economy, most of the problems we are experiencing would have occurred regardless of September 11th. The Bureau of Economic Analysis (Larkins et al., 2001) doesn't even attempt to quantify the impact of 9/11 on Gross Domestic Product and other major aggregates due to its uncertainty.

9/11: Deepening the Recession

Despite this ambiguity, some researchers do attempt to discern the effects of 9/11. When doing so, they usually reach one of three major conclusions. The first is that 9/11 did affect the U.S. economy, but only by deepening the recession already in place. Hilsenrath (2001) records that pre-9/11, economists were expecting gross domestic product to grow at an annual rate slightly above one percent. After the attacks, most revised their predictions, expecting the economy to shrink instead. Nicklaus (2002) agrees that September 11th did in fact reduce the overall level of economic activity in the U.S, helping to deepen the recession already in place.

Along these same lines, Lieser (2002) states that September 11th merely influenced the magnitude and timing of some of the adjustments occurring in the U.S. economy. Navarro (2002) agrees that many of the conditions following September 11th could have occurred even without the terrorist attacks.

9/11: Helping the Country Move out of Recession

The second currently held viewpoint is that the terrorist attacks actually helped the country recover from the recession. Thornberg (2002) points to the deep interest rate cuts after September 11th, feeling they led to a proportional increase in consumer purchases. This, along with increased government spending to fund the war effort, in his opinion, was beneficial to the U.S. economy as a whole.

Post 9/11, the U.S. Federal Reserve reacted by providing an unusual amount of liquidity and reducing the federal funds rate "more than would be expected from levels of output and inflation" according to Neely (2004). These actions helped reduce the pressure on the financial system and protect real economic activity.

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According to *The Economist* (2002), consumers remained confident even after the attacks, helping spur the economy back to life. In fact, although confidence levels fell sharply post-9/11, they surpassed pre-9/11 levels by November of that year.

Colvin (2001) writes that Americans "snapped wide awake on September 11th." In other words, he feels that the attacks helped us fully awake from the 1990s economic dream and enabled us to focus more on the economy today. Edwards (2002) supports this view but admits that his research presents "very uncomfortable conclusions."

9/11: Mixed Effects on the U.S. Economy

The majority of researchers feel that September 11th has had a wide array of mixed effects on the U.S. economy. According to Lieser (2002), 9/11 has had negative effects on some portions of the economy, while others have remained almost untouched.

When singling out one segment of the economy, however, most researchers focus on the travel and airline industries. According to the St. Louis Post Dispatch (2002), travel dropped by 43 percent immediately following the attacks, only to slowly recover over the following year. Layoffs by airlines and other travel businesses increased unemployment as companies eliminated nearly one million jobs in three months.

Airline executives (Air Transport Association, 2002)—while laying some blame on general economic conditions—attribute most of their troubles to the 9/11 attacks. According to them, public mood and the increased threat of further terrorism post-9/11 have greatly decreased consumer demand for air travel. In fact, numerous U.S. carriers— including United Airlines and US Airways—declared bankruptcy in the wake of the attacks. Using ordinary least squares regression, Ito and Lee (2005) measure and compare the impact of 9/11 on the demand for air travel. According to the authors,

"Their analysis provides strong evidence of a negative shift in airline demand following September 11th."

The St. Louis Post Dispatch (2002) also points to the huge losses suffered by the insurance industry. Lugo (2002) feels that these losses will in turn increase insurance costs for consumers. In fact, the St. Louis Post Dispatch (2002) reports that insurers have raised premiums sharply, reducing their underwriting loss to the lowest level in five years.

Another area cited by researchers is consumer prices. The Bureau of Economic Analysis provides a generalized report on this segment of the economy post-9/11. The GDP price index increased 2.1 percent in the third period of 2001 (2007). This statement—while giving the overall change in consumer prices following 9/11—does nothing to examine the specific effects of the attacks.

Richman and Santos (2005) highlight one area of the economy where the effects of the attacks were more transitory in nature. According to their study—examining a comprehensive sample of stock market indices from 33 industrial and emerging economies—9/11 did not cause a statistically significant increase in the systematic risk associated with the U.S. stock market. The study further suggests the absence of a permanent long-term impact in this area post 9/11.

Maillet and Thierry (2005) again examine the effects seen in the American stock market, but focus on identifying the initial "magnitude" of the financial crisis. According to their study—which computes the proposed index of market shock— 9/11 caused a major crisis within American markets. Their study identifies this crisis as being the most significant in U.S. history since the significant Dow devaluation of 1987.

Researchers have, then, identified multiple segments of the economy that may have been impacted by the terrorist attacks. While agreeing on the areas affected, however, economists often disagree on the length of the effects. For example, many feel that the effects of 9/11 were only immediate, while others see them persisting for some time. According to the Economist Global Agenda (2002), previous experiences have shown that massive economic shocks are relatively short lived. Supporting this, Alan Greenspan (2001) predicted that the attacks would have significant effects on the U.S. economy in the short term. He went on to say that the effects would be short-lived and would have limited, if any, lasting effects.

Others foresee the effects persisting beyond the short-run. Habito (2002) states that the U.S. will continue to feel the economic repercussions of September 11th for some time to come. When focusing specifically on the airline industry, many others endorse this same view. Edwards (2002)—after interviewing economists at the Air Transport Association—relates that the airlines today are still in a "miserable" condition. He notes that some airline shares are still resting around rock bottom, with Continental shares valued under $10.00 even one year after the attacks.

CHAPTER 3

METHODOLOGY

Examined Variables

In order to accurately portray the economic impacts of September 11th on the U.S. economy, it is first necessary to choose a representative group of assets. As already stated, I focus on three main areas: commodity markets, macroeconomic variables and financial indicators. Refer to Table 1 for a complete list of variables used in the study. All data used in this study is courtesy of Yahoo finance and freelunch.com.

Whenever possible, I utilize daily data. I feel that daily data more accurately reflect the economic impacts of September 11th. For all daily data sets, I employ data from one year prior to one year following the attacks. This data set, while large enough to accurately show any existing trends, remains small enough to not distort the true effects of September 11th. It becomes more difficult to quantify the impacts of any one event when looking at larger data sets, as you must then take into consideration the other events that have occurred during this time period to influence the variable under question.

For the majority of variables, I was unable to obtain daily data and rely instead on monthly data. While the monthly data do not provide the most accurate depiction of these variables, I feel it better to include what is currently available rather than exclude the variables completely. When using monthly data, I include data ranging from January 1994 to December 2002. Yet again, I feel that this data set is large enough to pick up any existing trends and activity but small enough to focus specifically on the effects of September 11th.

Several of the macroeconomic variables used in this study are only readily available in quarterly data. Although this data frequency may not pick up the complete effects of 9/11, the variables are still included due to their relevance.

Table 1.
List of Included Variables

Variable	Frequency	Data Length
Commodity Prices		
Beef Cattle Futures	monthly	1/94-10/02
Porkbelly Futures	monthly	1/94-10/02
Airline Fuel Costs	monthly	1/94-12/02
Oil Prices	daily	9/00-10/02
Gold Prices	daily	9/00-10/02
Soybean (Current Prices)	daily	9/00-10/02
Financial Indicators		
The Dow Jones Industrial Average	daily	9/00-10/02
The Nasdaq Composite Index	daily	9/00-10/02
10-Year Bond Index	daily	9/00-10/02
Domestic Auto Sales	monthly	1/94-12/02
Foreign Auto Sales	monthly	1/94-12/02
New Home Sales	monthly	1/94-12/02
Housing Starts	monthly	1/94-12/02
Consumer Installment Credit	monthly	1/94-12/02
Revenue Aircraft Departures	monthly	1/94-12/02
New Orders: Defense Capital Goods	monthly	1/94-12/02
New Orders: Computers & Related Goods	monthly	1/94-12/02
Macroeconomic Variables		
The Federal Funds Rate*	daily	9/00-9/02
Manufacturing Index	monthly	1/94-12/02
Announced Layoffs	monthly	1/94-12/02
National Savings Rate	monthly	1/94-12/02
Industrial Production Index*	monthly	1/90-10/02
Automobile Manufacturing Index	monthly	1/94-12/02
Real Gross Domestic Product*	quarterly	1/90-10/02
Personal Consumption Expenditures*	quarterly	1/90-10/02

*Data and tests on these variables courtesy of Dusty Sweet.

Econometric Procedures

Because the bulk of this study is based directly on statistical processes, I feel it necessary to briefly review the econometric procedures that will be undertaken. The econometrics software package Shazam is used to run all of the following econometric procedures.

The first statistical process employed is ordinary least squares (OLS) regression. This process is used to examine linear relationships between one dependent variable and the independent variables thought to influence it. In general, this is considered to be the most common method of estimating the parameters of a linear regression model, due both to its simplicity and explanatory capabilities. When looking at the included variables, it appears that linear relationships are present in some of the scenarios. Because of this, OLS modeling is a logical starting point for the econometric analysis.

When using regression analysis, I also employ the process of splining. By definition, this process is a way to detect and measure structural changes in variable relationships. More specifically, separate regression models are run with pre-9/11 data and post-9/11 data. By comparing the parameters from both models, I can test the hypothesis that some or all of the regression coefficients are different in different subsets of the data.

There is reason to suppose the date may possess characteristics that cannot be handled by a simple OLS model. One example of this comes in examining the heteroscedasticity of certain relationships. One type of heteroscedasticity occurs when the variance of the forecast error depends on the size of the preceding disturbance. The autoregressive conditionally heteroscedastic model (ARCH), proposed by Engle in 1982,

is one way for approaching such data sets. The ARCH model actually recognizes the presence of successive periods of volatility and stability and allows the conditional variance to move over time as a function of past errors (Engle, 1982). More importantly, when utilizing the ARCH model, the basic assumptions of the classical model[1] are now indirectly met.

Another available technique is the autoregressive integrated moving average (ARIMA) model. This procedure, proposed by Box & Jenkins in 1976, allows for the specific examination of one single variable. The AR term, or autoregressive element, determines how dependent the current value is on the previous ones. An AR equal to one means that the current value is highly dependent on the previous one value; an AR equal to 2 means that the current value is effected by the previous two values, and so on. The MA, or moving average element, describes the strength of the weighted average of current and past random disturbances. It indicates how the current value is affected by blocks of previous values. If MA equals one, it is affected by the average of two previous variables; if MA equals two, the variable is affected by the average of the previous three periods, and so on. The integration, or I, term is used to compensate for nonstationary data sets.

The unit-root test is another process available for the analysis of any specific variable. More specifically, a unit root test is helpful in determining any major trend or level changes within a specific data set. For this study, I employ the Dickey-Fuller and Phillips-Perron unit root tests. The two methods, while similar, do have some distinct

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[1] See Appendix for the basic assumptions of the classical model.

differences. The Phillips-Perron (Perron, 1988) technique uses a non-parametric correction for serial correlation. The Dickey-Fuller (1981) method uses the inclusion of lag terms to allow for serial correlation.

CHAPTER 4

RESULTS

<u>OLS and ARCH</u>

The first step in determining the effects of 9/11 is examining the relationships witnessed between certain variables. More specifically, I want to determine whether the attacks caused any significant structural change in any of the given relationships. In order to accomplish this, I utilize OLS and ARCH.

The first two models run are laden with an unknown type of heteroscedasticity. Although corrective measures have been undertaken, the appropriate technique has not yet been determined. Because of this, the parameters of the model are unreliable. However, the heteroscedasticity test statistics themselves yield some explanatory power.

The first model tests the Dow Jones Industrial Average and the Nasdaq Composite Index against oil prices. Pre-9/11, there is no heteroscedasticity present in the model. Afterwards, however, the level of heteroscedasticity greatly increased. With this information alone, it can be inferred that September 11th did have a significant impact on the relationships in question. Because there is no heteroscedasticity present before the attacks, there is little variation in the error terms of the models. In other words, the Dow-oil and Nasdaq-oil relationships are fairly stable. Post-9/11 the relationships are not as clear-cut.

The second model under examination—testing the Dow, Nasdaq and bond index against gold prices—also produces interesting results. In this case, there is significant heteroscedasticity present in the model pre-9/11. After the attacks, the heteroscedasticity

in the model, while still present, is greatly diminished. These results show much more stable relationships between the variables post-September 11th.

In the last model—testing the Dow and Nasdaq against the bond index—the heteroscedasticity violation is identified and compensated for by using the ARCH technique. The parameter estimates of the model are shown to have deviated around the point of the attacks. In fact, for both variables the parameters post-9/11 do not fall within the range:

$$pre\ 9/11\ b - 1.96s \leq post\ 9/11\ b \leq pre\ 9/11\ b + 1.96s$$

Because of this, I can be 95 percent confident that 9/11 did cause significant changes in the relevant coefficients. In other words, post-9/11, the Dow and the Nasdaq exerted less of an influence over the bond index.

ARIMA

I now examine individual variables, both in the immediate sense and in the short-run. I want to determine whether the attacks caused any noted deviation in the pre-existing behavior of the variables.

The ARIMA identification process is carried out on all suspect variables. In this stage, the sample autocorrelation function and the sample partial autocorrelation function are reported so that a specification for the ARIMA model can be made. To determine the appropriate specifications for each model, it proves useful to minimize following criteria: Akaike Information Criteria, the Schwarz Criteria, and the sum of squares error term (Newbold and Bos, 1994).

Appropriate ARIMA models are able to be fitted to several of the study variables by the process outlined above. Because of this, I am able to use the ARIMA technique to forecast future values. More specifically, I use the pre-9/11 data to predict what the values *should* be in the following year. I then compare the predicted values with the actual values to determine whether 9/11 caused any noted deviation.

Variables Impacted Immediately and in the Short Run

The first variable consistent with ARIMA analysis is oil prices. When examining

the graphed ARIMA output, it appears that 9/11 caused noted deviation from the

predicted values. Although prices plummeted after the attacks, however, they returned to

the predicted range by March 2002. According to this, oil prices—while significantly

impacted immediately and in the short run—did not sustain any long-lasting impacts.

Refer to Figure 1.

Figure 1.
Oil ARIMA
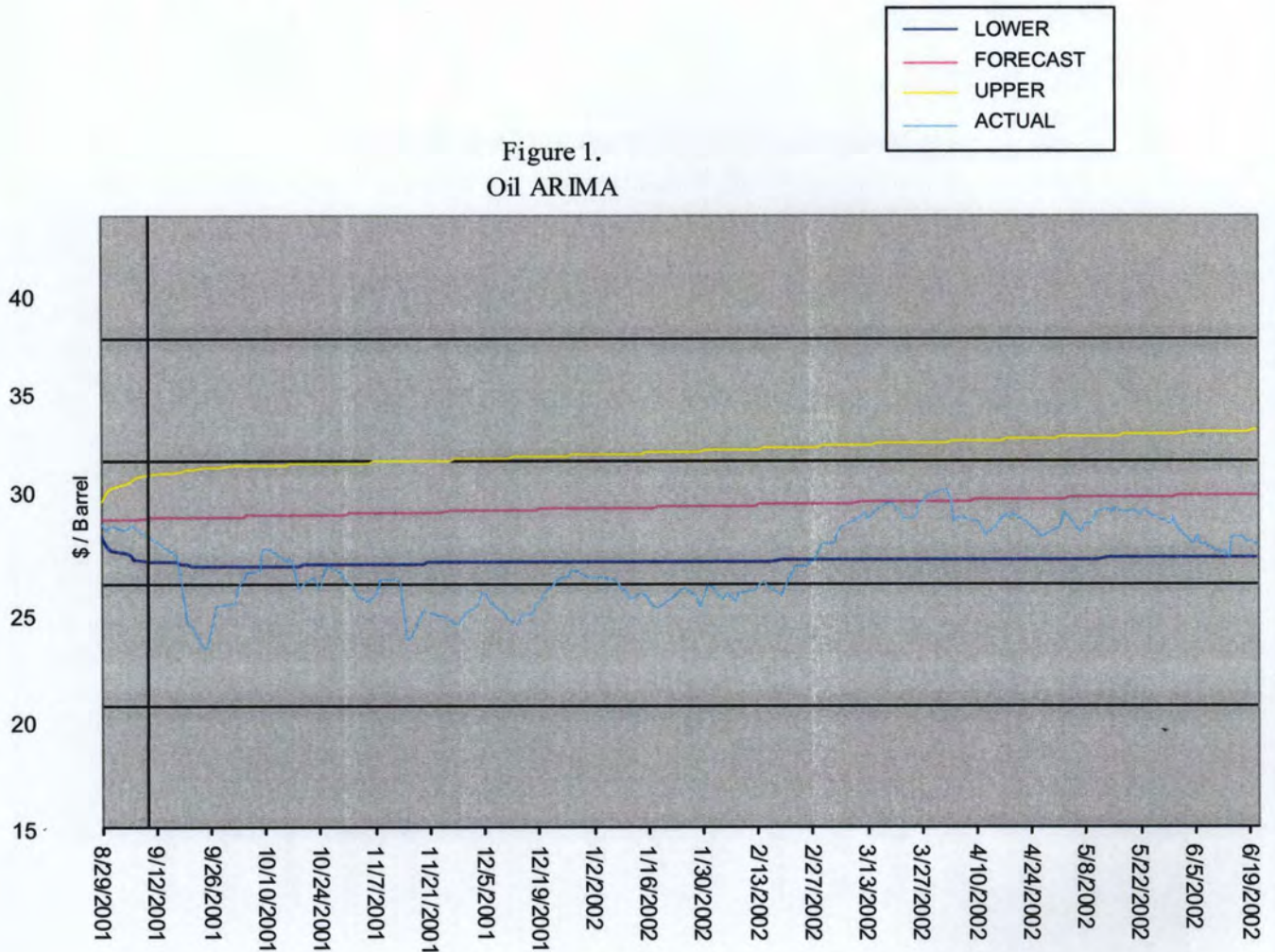
In the case of the automobile manufacturing index, it appears that September 11th, if impacting the index, did so in a more positive manner. Because the index had already began to approach its lower bounds pre-9/11, it is difficult to attribute any witnessed change to 9/11. However, even if the attacks did impact the variable, it appears that they did so in a positive manner. The automobile manufacturing index reached its lower limits immediately before and immediately following the attacks. After this, the index began to increase back towards its predicted values. Refer to Figure 2.

Figure 2.
Automobile Manufacturing Index ARIMA
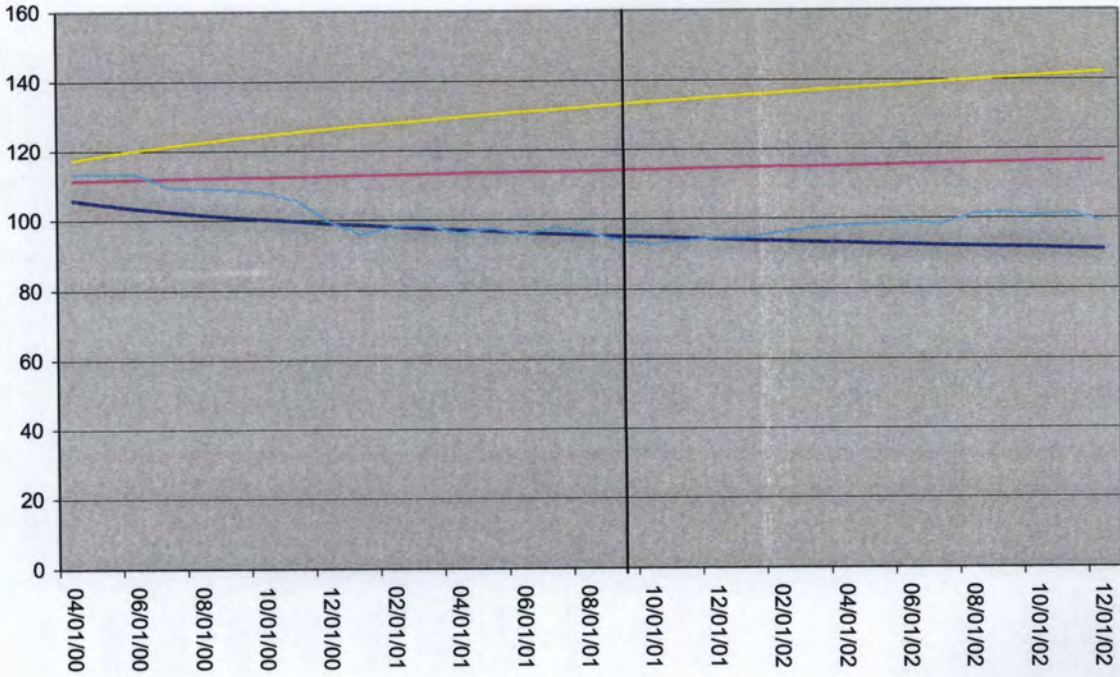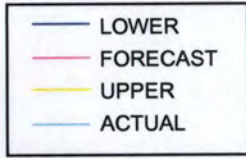
The manufacturing index is shown to have behaved in a manner very similar to the automobile manufacturing index. The index approached its lower bound immediately preceding the attacks. In addition, the index reached its lowest point in the months following the attacks. After this, the index began to increase back towards its predicted level. Although it is difficult to attribute this to September 11th with statistical certainty, it appears that the attacks, if impacting this variable, did so in a more positive manner. Refer to Figure 3.

Figure 3.
Manufacturing Index ARIMA
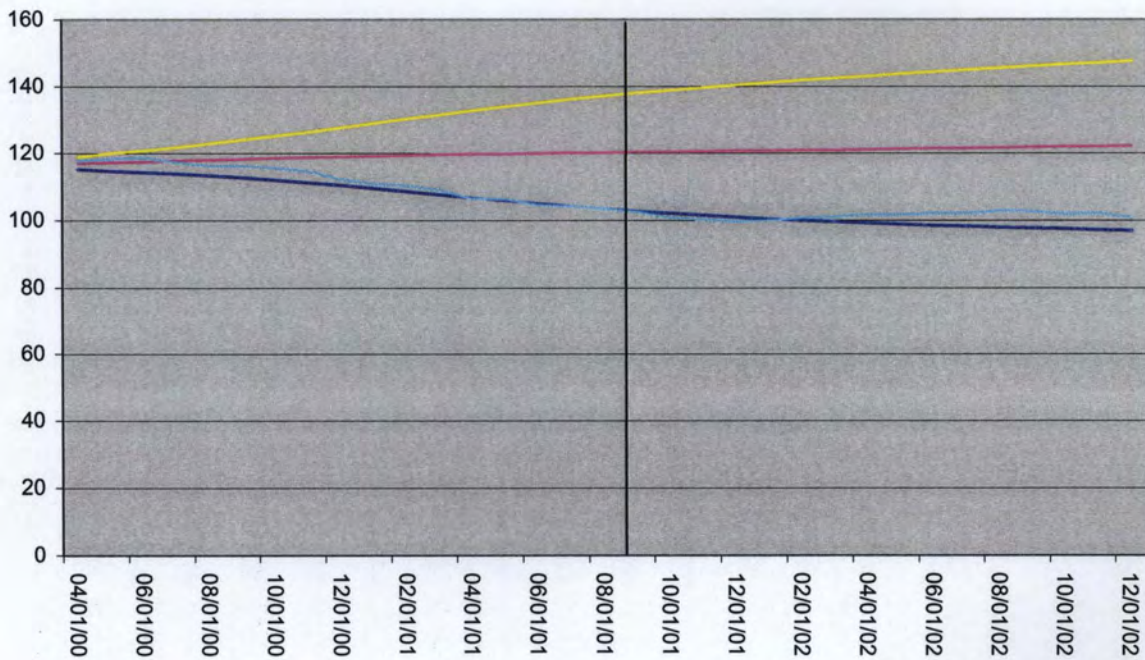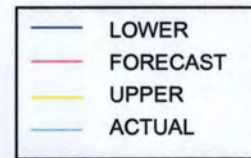
Next, I examined variables looking not at the manufacture of automobiles but instead at the sales. The first variable, domestic automobile sales, was shown to have been impacted in some way by the attacks. This variable had been following its lower bound for some time prior to the attacks, evidencing poor performance in the sales of domestic automobiles. The variable bottomed out immediately after the attacks, but proceeded to levels not seen since late 2000. It appears that September 11th had a more positive impact on this variable. Refer to Figure 4.

Figure 4.
Domestic Auto Sales ARIMA
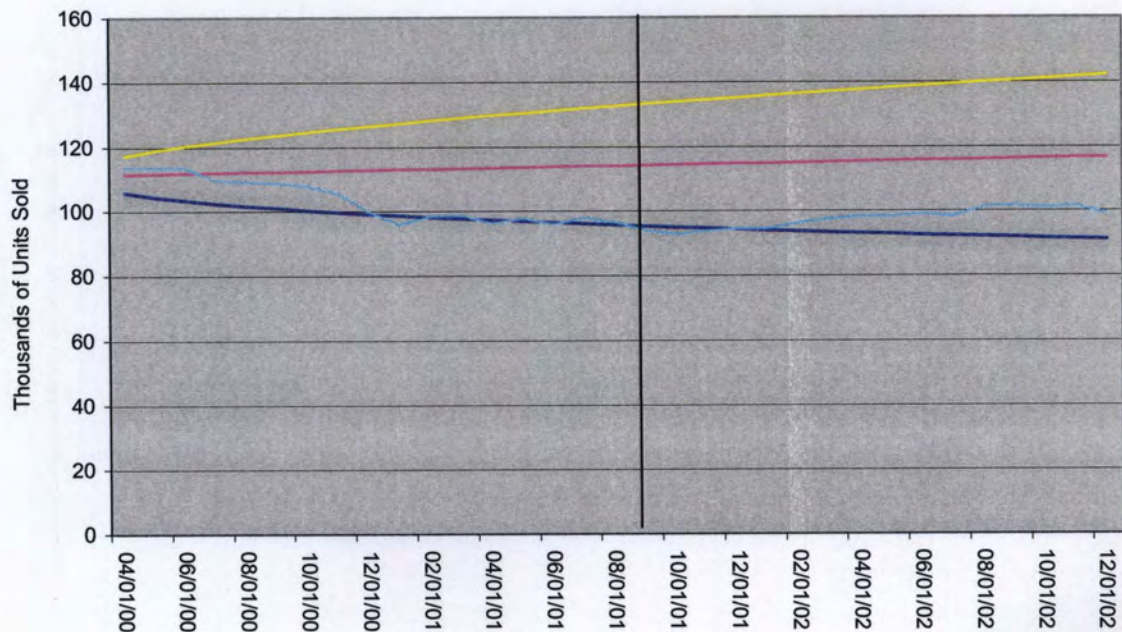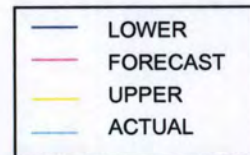
Foreign automobile sales were also shown to have been slightly impacted by the attacks. This variable had been following its lower bound for months prior to the attacks, evidencing poor performance in the sales of foreign automobiles. Like domestic auto sales, this variable bottomed out immediately after the attacks, but proceeded to levels not seen since the previous year. September 11th appears to have had a more positive impact on this variable. Refer to Figure 5.

Figure 5.
Foreign Auto Sales ARIMA
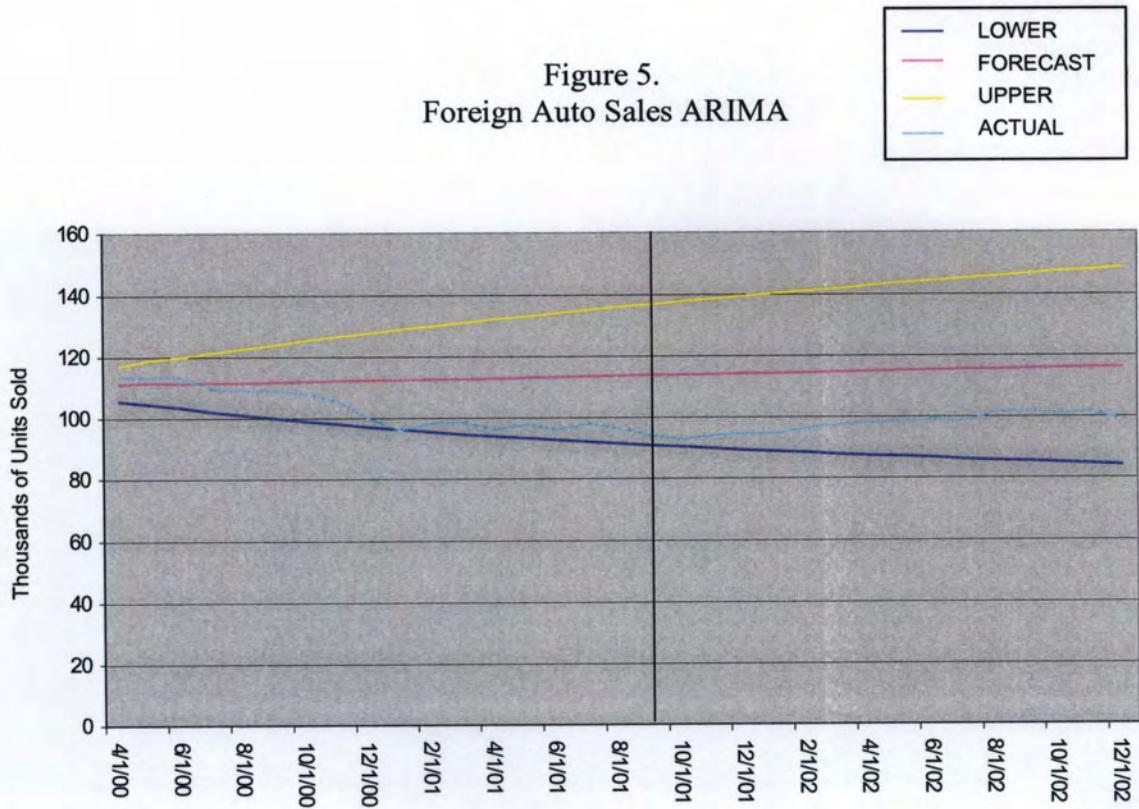
Unaffected Variables

Another variable fit with the appropriate ARIMA model is soybean prices.

According to the ARIMA output, 9/11 had no apparent impact on soybean prices. While

the prices did briefly fall below the lower bound post-9/11, they did not deviate from

their existing trend. In other words, prices had begun to fall pre-9/11. Because of this, it

is impossible to determine whether 9/11 did in fact depress soybean prices. Refer to

Figure 6.

Figure 6.
Soybean ARIMA

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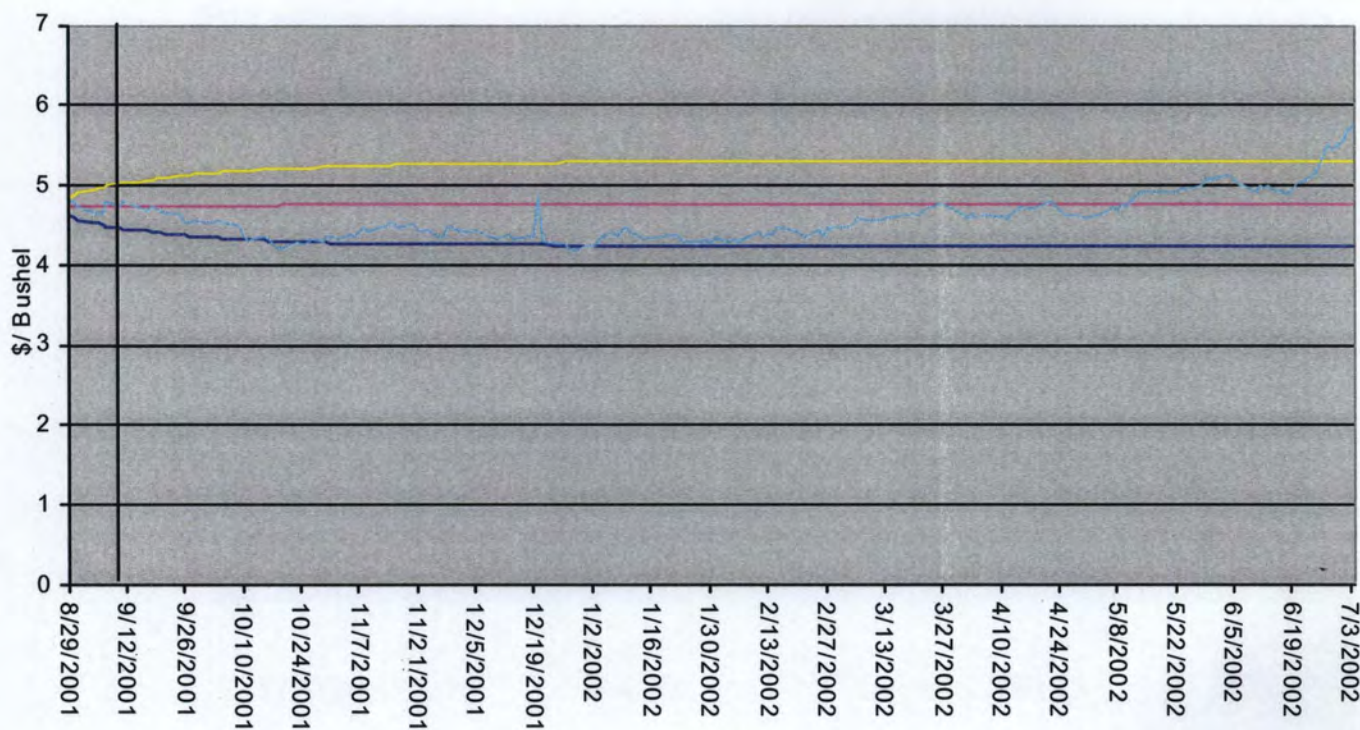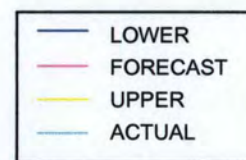
In the case of real gross domestic product (RGDP), it appears that the terrorist attacks had little, if any, impact. There is no significant deviation around the point of the attacks. In fact, RGDP follows quite closely with its predicted values both before and after the attacks. Growth of RGDP did slow briefly post 9/11 but it is unknown whether this resulted from the recession already in place or from the events precipitated by 9/11. From this model, it can be inferred that 9/11 had very limited effects on RGDP. Refer to Figure 7.

Figure 7.
Real Gross Domestic Product ARIMA
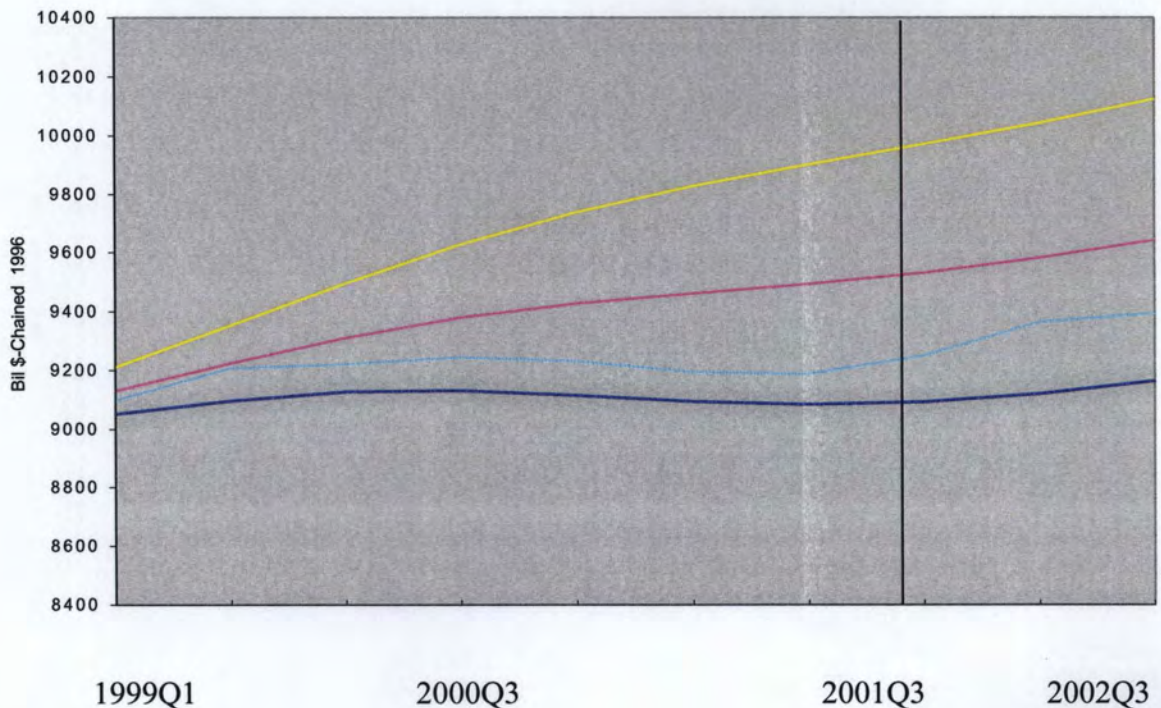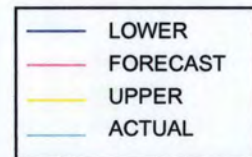
The next variable, personal consumption expenditures (PCE), also appears to have been unaffected by the terrorist attacks. In this case, the actual values remain in close proximity to the predicted ones throughout the examined time frame. The only slight deviation from the predicted values occurred some time before the terrorist attacks. Refer to Figure 8.

Figure 8.
Personal Consumption Expenditures ARIMA
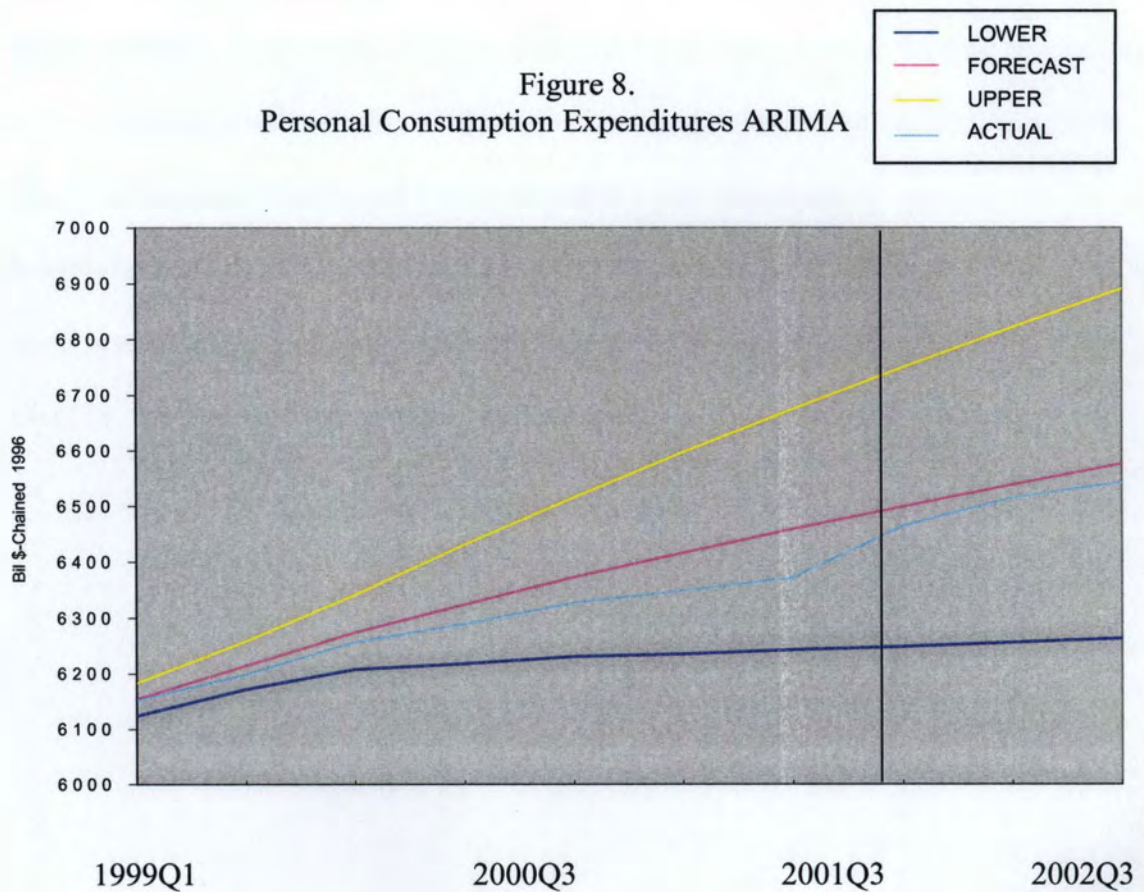
UNIT ROOT ANALYSIS

With unit-root tests, I am able to determine whether there has been any major trend or level change within the data of one specific variable. By comparing the test results to the graphed data sets, I am able to determine whether 9/11 caused any significant deviations in the data sets. Unit-root tests—testing for multiple trend and multiple level lines—are run on all variables included in the study. Once identifying whether a data set is characterized by a single trend, multiple trends, a single level or multiple levels, the appropriate line or lines are inserted into the graph to aid in the analysis process. I attempt to fit the inserted lines with the results of the unit-root results.

Augmented Dickey-Fuller unit-root tests are used on every variable, except oil prices. In this case, the data set is very volatile and is not accurately explained by the Dickey-Fuller model. The Phillips-Perron unit-root test is best in situations such as these; thus it is used to examine any significant changes in this case. To further cut down on volatility, the data set is logged prior to the tests.

Variables Impacted Immediately and in the Short-Run

Beef cattle futures do appear to be characterized by at least one trend. The unit root test reveals that this data set does, in fact, contain more than one root. Looking at zero drift and non-zero drift scenarios, the unit root test strongly supports the idea that at least one significant change has occurred in the data set. When looking at the graphed data in Figure 6, it appears that one of the biggest changes occurred at or immediately following 9/11. After the attacks, beef cattle prices appear to follow a more downward trend. From this, it can be concluded that 9/11 helped to depress beef cattle futures both immediately and in the short-run. Refer to Figure 9.

Figure 9.
Beef Cattle Futures
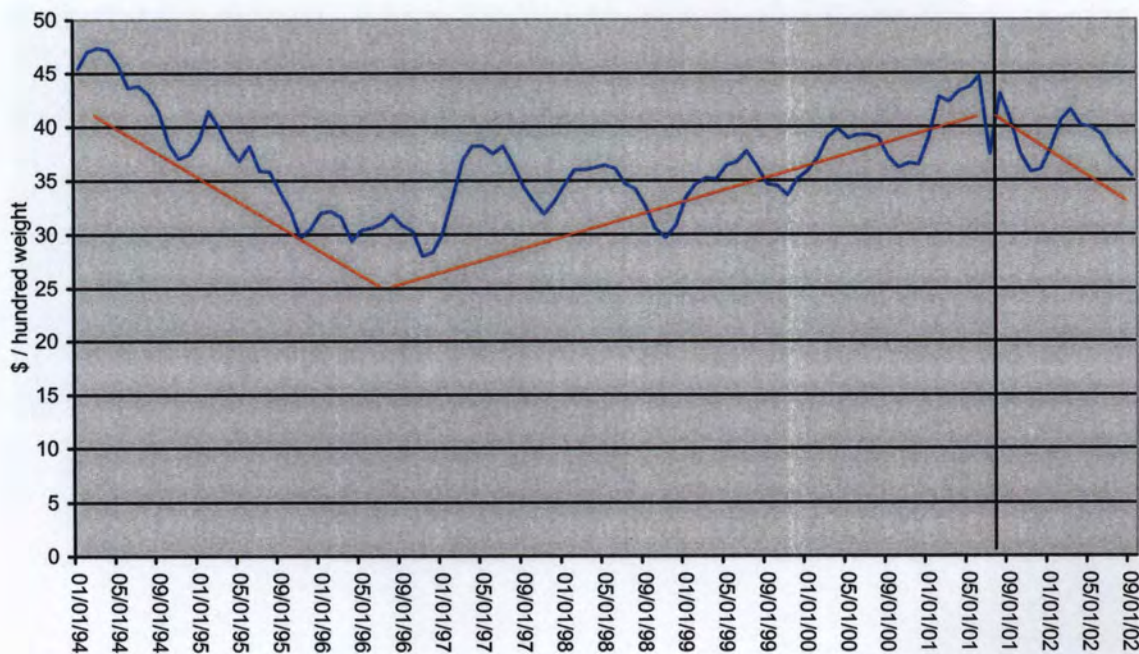
The Dow Jones Industrial Average is shown to have experienced significant changes over the specified time period. More specifically, it is shown to be nonstationary along a trend or trends. This means that the variable possesses multiple roots. When looking at the graphed data in Figure 11, it appears that this variable did experience a significant change post-9/11. In addition to the immediate decline, the level line is now situated below the 10,000 mark. Refer to Figure 10.

Figure 10.
Dow Jones Industrial Average
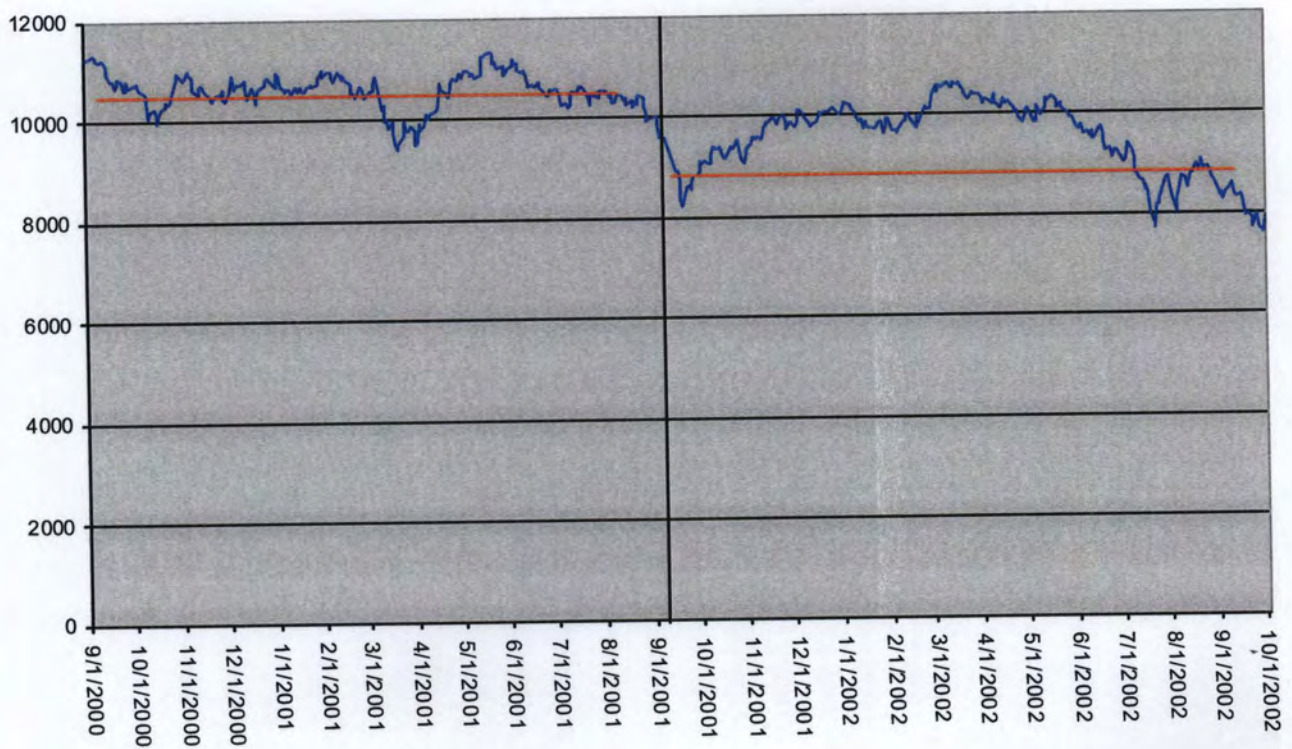
Oil prices do appear to have experienced significant changes over the said period. Supporting this, the unit-root test determines that there is more than one root in the data set. It becomes evident when looking at Figure 12 that one of the largest changes in oil prices occurred immediately following the terrorist attacks. In can be inferred that this change is what is being detected by the Phillips-Perron test. It follows, then, that September 11th has had immediate—and more lasting—effects on oil prices. Refer to Figure 11.

Figure 11.
Logged Oil Prices
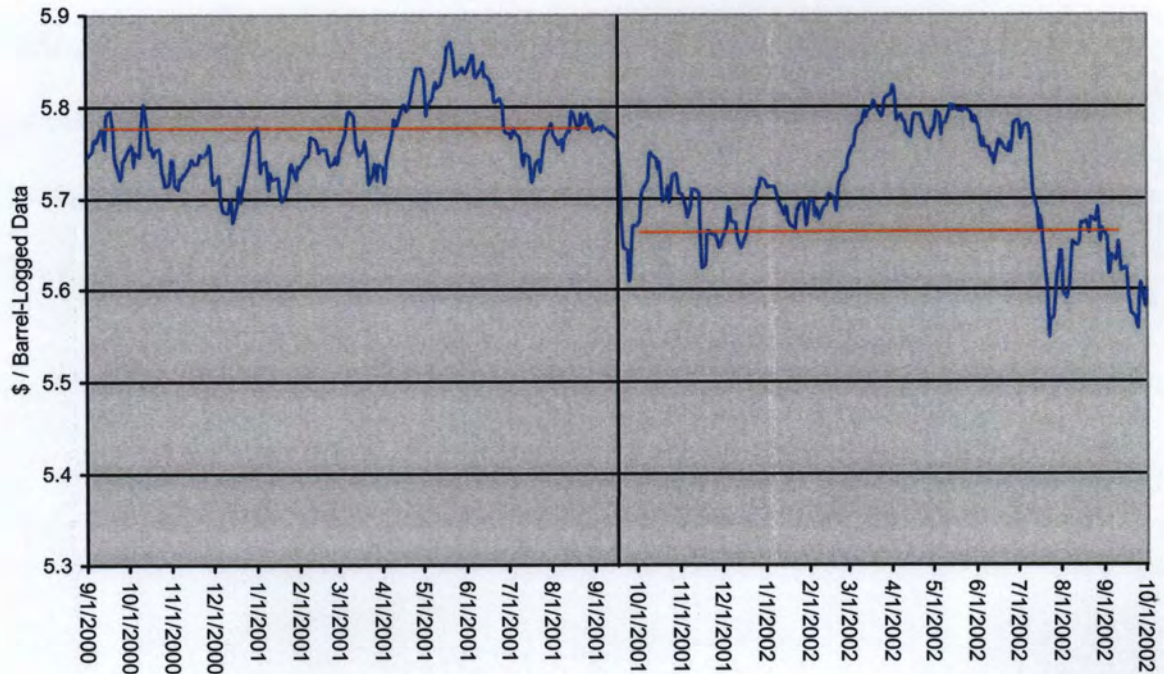
Variables Only Immediately Impacted

The next variable under investigation is porkbelly prices. According to the graphed data set, porkbelly prices experienced a sharp decline immediately following the attacks. Upon closer examination of the graphed data, however, it becomes apparent that, overall, the data varies around a common horizontal line. In other words, the data is merely "waving" back and forth around a set point. The unit root test, accounting for this drift, finds no significant changes within the data set during the specified time. The graphic analysis and unit root test, then, leads to the conclusion that porkbelly prices did not experience any lasting changes due to September 11th.

In fact, when looking at the past behavior of porkbelly futures, it becomes difficult to attribute even an immediate decline to 9/11. The data set is characterized by noticeable increases and drops. Although it is possible that 9/11 influenced the timing and magnitude of the decline seen post-9/11, it is impossible to attribute the effects to the attacks with statistical certainty. Refer to Figure 12.

Figure 12.
Porkbelly Futures
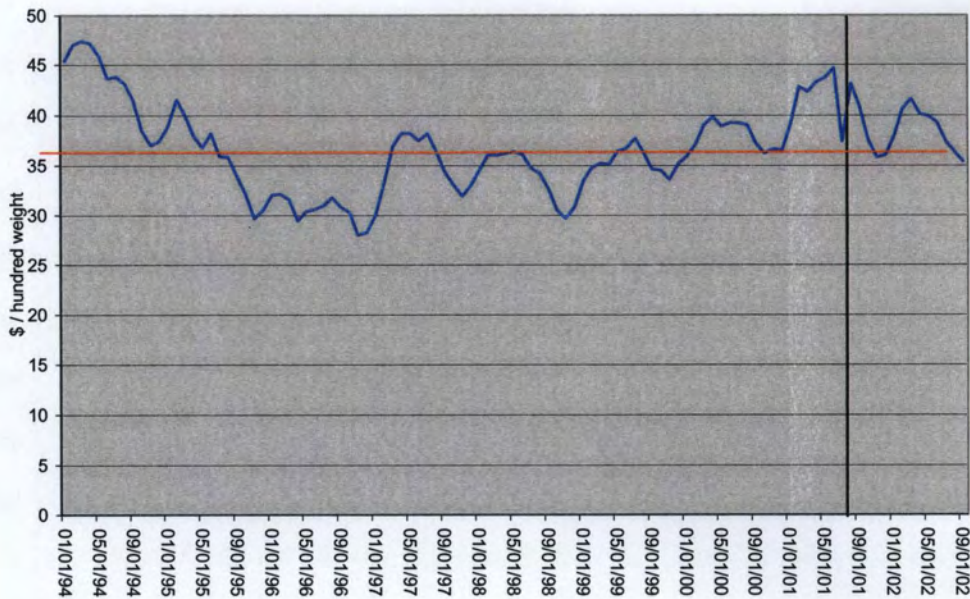
In examining the Nasdaq Composite Index, it appears that there was a significant decline in the days following September 11th. Despite this, the Index appears to have returned to its pre-September 11th level in the months following the attacks. The unit root test supports this analysis and finds that no significant changes occurred within the data set. The Nasdaq, like porkbelly prices, appears to have only experienced immediate and fleeting impacts due to September 11th. Refer to Figure 13.

Figure 13.
Nasdaq Composite Index
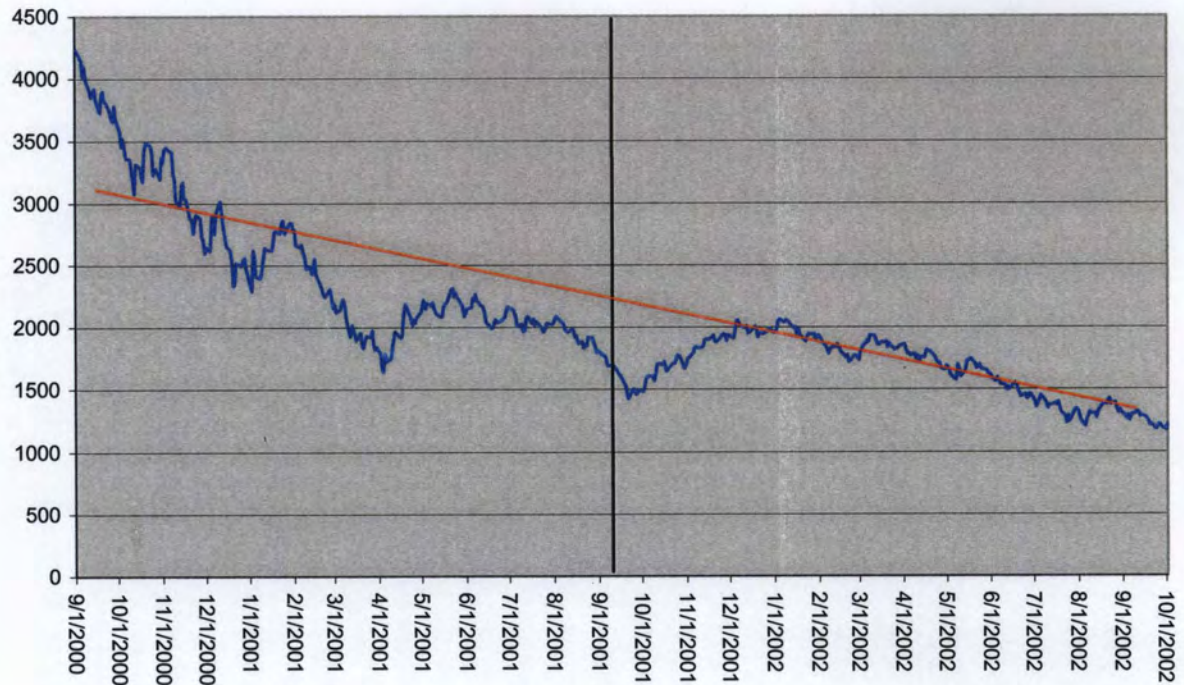
New home sales are also shown to have been immediately impacted by the

attacks. The unit root analysis determines that the data set is characterized by only one

trend. This becomes apparent when looking at the constant upward slope of the variable.

Upon further examination, however, it seems that the terrorist attacks did have an

immediate effect on new home sales. Although the dataset is characterized by sudden

ups and downs, it appears that its behavior deviated immediately following the attacks.

Refer to Figure 14.

Figure 14.
New Home Sales
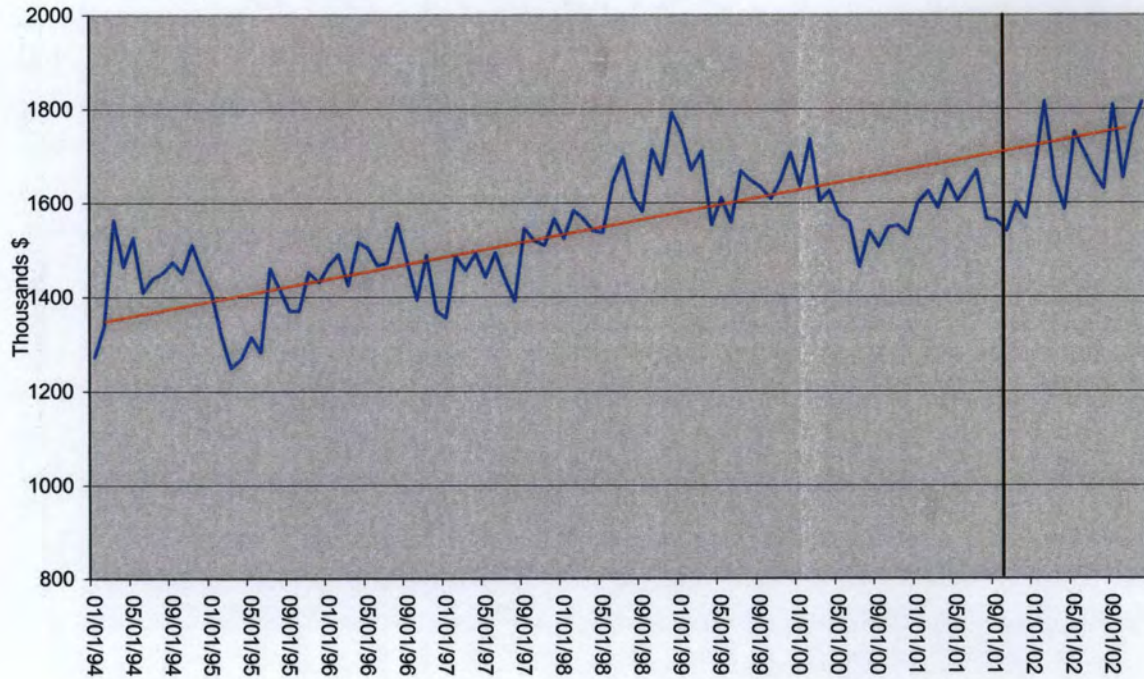
The federal funds rate is shown to be characterized by multiple trends. In this case, however, the unit-root test also finds evidence of multiple levels. Despite this, there appears to be no lasting changes that can be attributed to 9/11. With the exception of a one week "blip" in the data immediately following the attacks, the variable remains on its existing trend until some time after the attacks. Refer to Figure 15.

Figure 15.
Federal Funds Rate
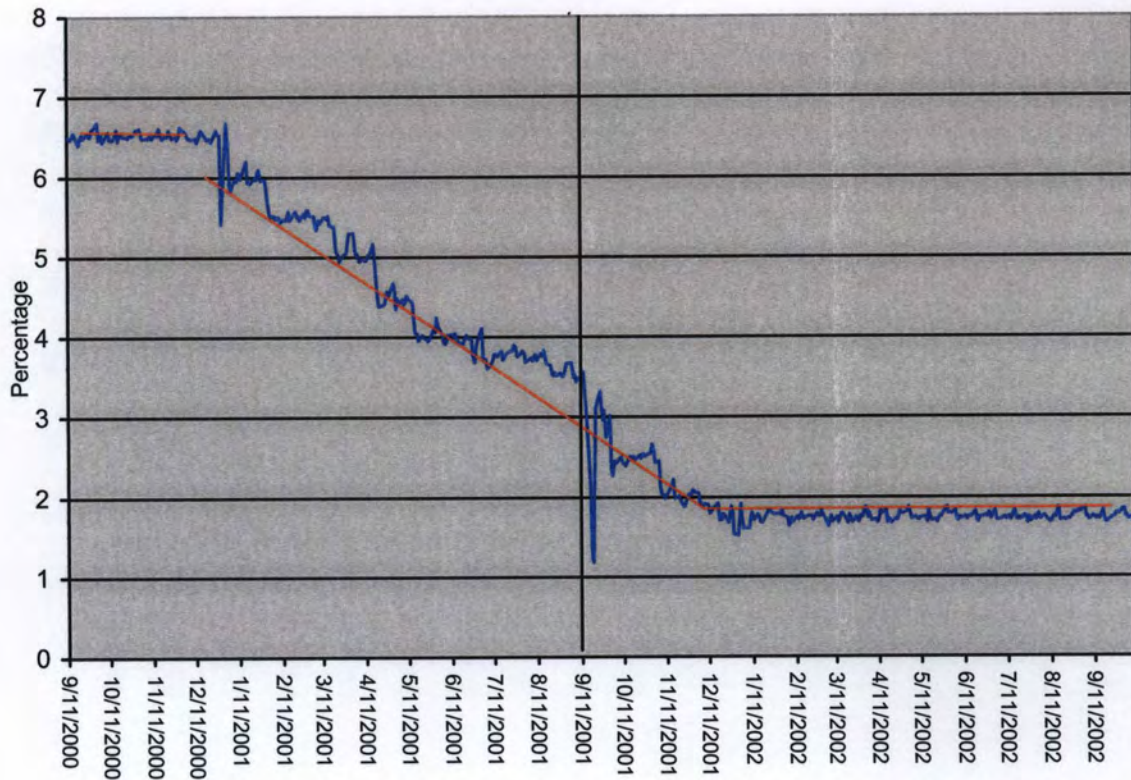
Airline fuel costs are shown to have been immediately impacted by the terrorist attacks. This variable dropped dramatically immediately post-9/11. Looking past this immediate affect, airline fuel costs are shown to have remained on a constant level. The unit root test picks up this single level, accounting for the drift in the variable. The variable, while being very volatile, behaves so in a predictable manner. Refer to Figure 16.

Figure 16.
Airline Fuel Costs
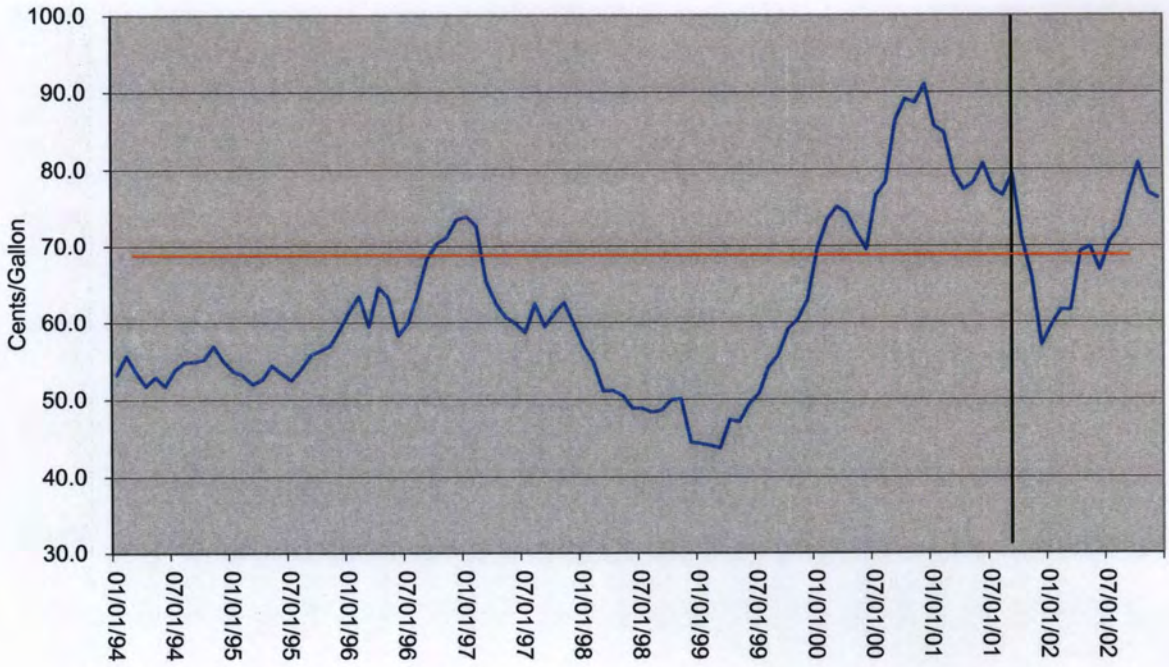
Like airline fuel costs, revenue aircraft departures are also shown to have been immediately impacted by the attacks. Immediately following the attacks, this variable is shown to have dramatically dropped. Despite this immediate decline, however, the unit root test shows that this variable is characterized by only one level with drift. The test determines that the immediate decline did not persist into the short-run. Refer to Figure 17.

Figure 17.
Revenue Aircraft Departures
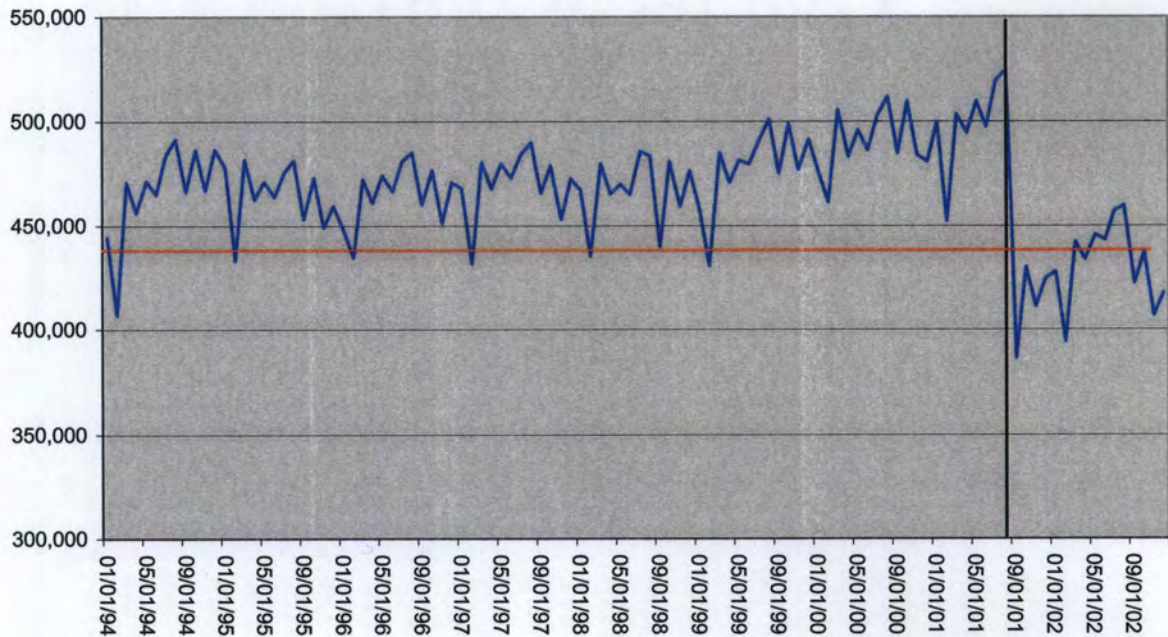
Unit root analysis determines that the savings rate is characterized by one trend throughout the said time period. These results, combined with the graphic analysis, are unable to show that that September 11th had a short-run impact on this variable. Despite this, the terrorist attacks are shown to have impacted the savings rate in the immediate sense. Immediately following the attacks, the savings rate experienced a sharp decline before later returning to its prior levels. Refer to Figure 18.

Figure 18.
Savings Rate
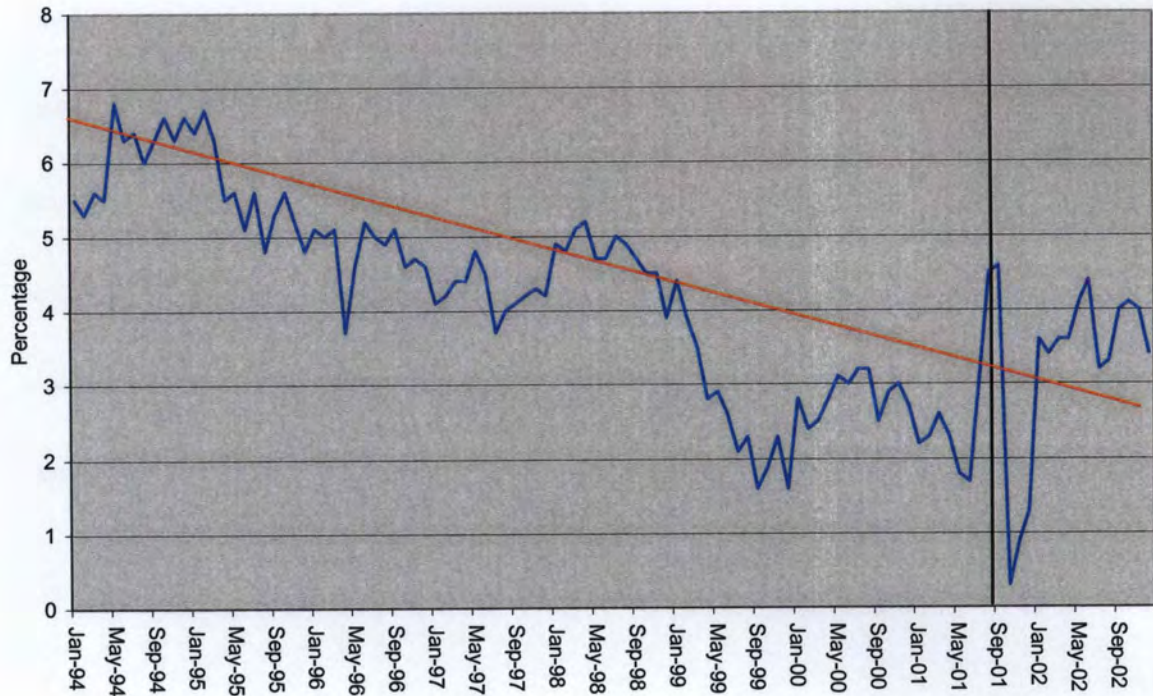
Announced layoffs also appear to have been immediately impacted by the attacks. Contrary to what one might expect, the variable decreased significantly following the attacks. With this variable, the unit root analysis determines that this variable is characterized by only one level. However, it appears that while the variable did deviate from this level for a short period of time, the terrorist attacks may have actually contributed to announced layoffs reaching their previous level. In other words, had the attacks not occurred, the variable might have experienced a significant level change. Although this analysis deviates slightly from the others conducted in this study, it does appear to solidly demonstrate the impacts of the terrorist attacks on this variable. Refer to Figure 19.

Figure 19.
Announced Layoffs
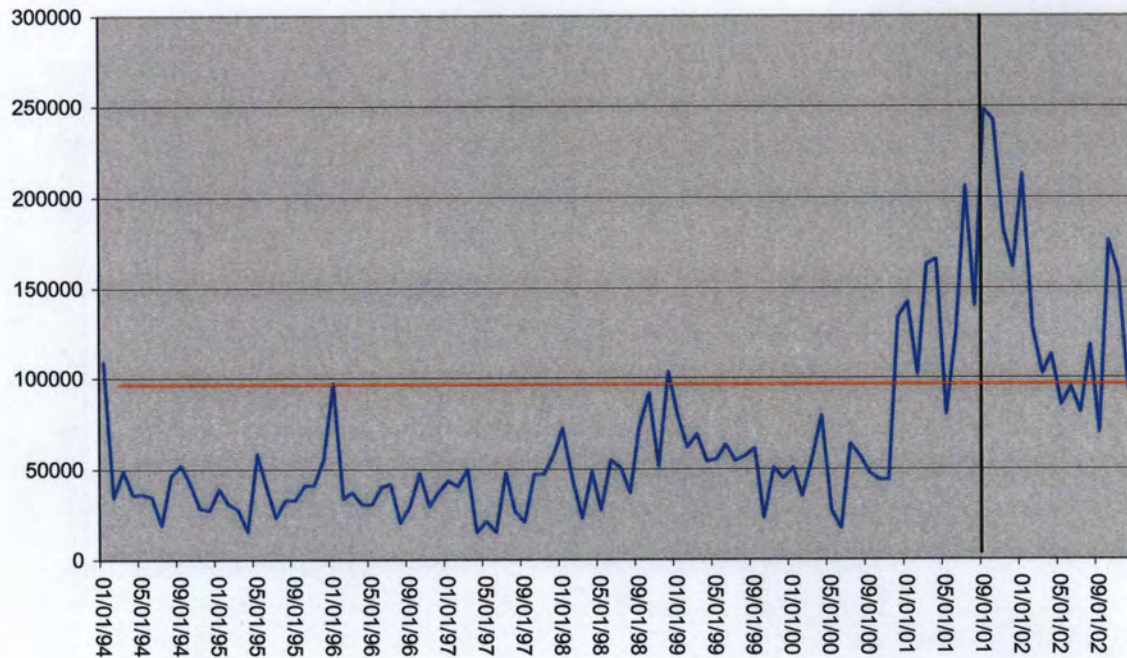
New orders of computers and related goods are shown by the unit root

analysis to be characterized be one level, accounting for drift. These results are unable to

show that the attacks had any lasting impact on this variable. Upon graphic analysis of

the variable it appears that there was a sudden spike in the variable immediately

following the attacks. This justifies the presence of an immediate impact. This variable

does, however, present an interesting interpretation of the results. It appears that had the

attacks not occurred, that this variable might not have remained on its previous level.

Without any specific econometric results, this theory remains just an interesting

interpretation. Refer to Figure 20.

Figure 20.
New Orders Computers and Related Goods
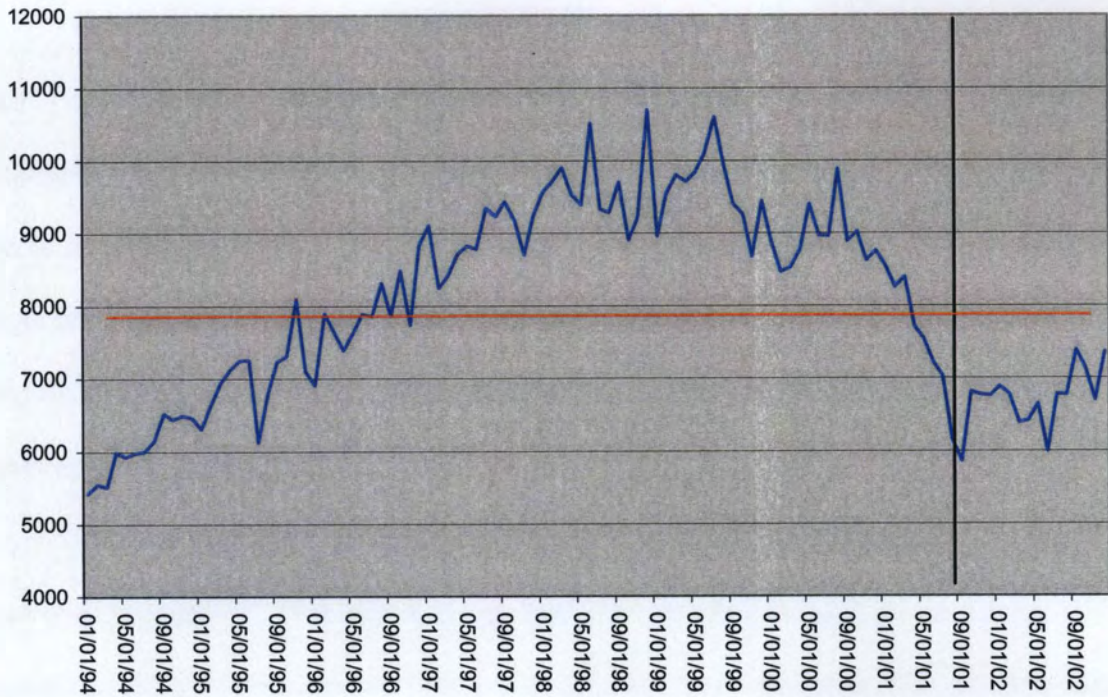
<div align="center">Unaffected Variables</div>

Soybean prices did not significantly deviate from the norm during the specified time period. In fact, it appears that September 11th caused no major deviations within the data set. The unit root test supports this statement and finds no significant change in the data. In other words, the data in question is characterized by a single unit root. These tests only further support the ARIMA results, which found that soybean prices were not significantly affected by the terrorist attacks. Please refer to the Appendix for all unaffected variable graphs.

The ten-year bond index does appear to have significantly changed over the specified time period. The unit root test finds that the bond index is nonstationary and is characterized by multiple roots. While it is apparent that significant changes did occur within the data, it is unclear from the graphic analysis that a change occurred at or immediately following September 11th. In other words, a significant change may have occurred post-9/11, but is impossible to determine with statistical significance.

Gold prices, while subject to slight deviations, have remained fairly consistent over the examined time period. Confirming this, the unit root test finds that gold prices are, in fact, stationary. In other words, there is only one unit root evident in the given data set. This supports the fact that September 11th had no lasting, if any, effect on gold prices.

Real gross domestic product is shown, by the unit-root test, to exhibit multiple trends. In other words, at least one significant trend change has occurred over the said time period. When looking at the graphed data, it is clear that the most significant

changes occurred well before the attacks. This analysis, then, supports the idea that 9/11 had no major effects on RGDP, either immediate or in the short-run.

Like RGDP, personal consumption expenditures is characterized by multiple trends. Here again, the most obvious change occurred some time before the attacks. In addition, this variable is shown to have remained quite stable immediately following the attacks. Due to this, we conclude that 9/11 had no apparent impacts on personal consumption expenditures.

The industrial production index is also characterized by multiple trends. At first glance, it appears that 9/11 did cause a trend reversal in the data set. In closer examination, however, it is evident that this series actually continued on its existing path until January 2002, at which time there was a significant trend change. Due to the time lapse, it seems unlikely to attribute this change to the terrorist attacks.

The manufacturing index is also shown to be characterized by one trend. This variable had been traveling a gradual upward trend for some time before the attacks. Although the trend appears to have deviated during the said time period, unit root analysis determines that this deviation is not significant. Furthermore, the slight change in the data set appeared some time prior 9/11. Due to this, it appear that the terrorist attacks had no affect on the manufacturing index.

The automobile manufacturing index is shown to be characterized by one level throughout the data set. The unit root, analysis, then, supports the fact that the attacks had no lasting impacts on the automobile manufacturing index. Even in the immediate sense, the witnessed deviations appear not to be significant.

Foreign auto sales is shown by the unit root tests to be characterized by multiple trends. Despite this fact, it appears that September 11th had no immediate or short-run impacts on this variable. Auto sales had been on an upward trend for several years preceding the attacks. The variable also appears to have continued on this upward trend despite the attacks. Auto sales did decline slightly immediately post-9/11, however, this short-lived deviation did begin several weeks before the attacks.

Domestic auto sales is shown by the unit root tests to be characterized by multiple trends. However, like foreign auto sales, this break in trend cannot be firmly attributed to the attacks. This variable has been very volatile throughout the data set so it becomes difficult to even attribute any immediate effects after the 9/11 attacks.

Housing starts is another variable that at first appears to have been immediately impacted by the terrorist attacks. Post-9/11, privately owned housing starts increased sharply. Despite this, the sudden spike is characteristic of the entire dataset, which leads to the conclusion that 9/11 had little immediate effect on the variable. The unit-root test does identify multiple roots within the data, but the most obvious trend changes do not appear to be associated with the 11th.

New orders of defense capital goods is shown to have increased slightly immediately following the terrorist attacks. The biggest spike in the data, however, occurred sometime pre-9/11. The unit-root test finds that the data set is characterized by multiple levels. In looking at Figure 13, it appears that one of the most significant level changes occurred immediately following the 11th. Because the data set is laden with such changes, however, it is not possible to attribute any significant short-run or immediate

impact to the terrorist attacks. Any witnessed changes are more than likely just normal variation within the dataset.

CHAPTER 5

ECONOMIC ANALYSIS

Thus far, I have simply presented the results of the econometric procedures. To truly examine and understand the impacts of September 11th, however, economic analysis is needed along with the econometric techniques. By utilizing basic economic and financial theory, one can begin to understand the various impacts of the attacks.

Structural Relationships

The first OLS model, testing the Dow and Nasdaq against oil prices, found less stable relationships post-9/11. This newfound volatility could be contributed, in part, to the uncertainty surrounding financial markets post-9/11. Because the Dow and the Nasdaq were shown to become more volatile post-9/11, it is expected that their relationships to oil prices would also become less clear. In addition, oil, a commodity more abundant in foreign lands, is likely to show more volatility in times of political and economic unrest.

The second model tested the Dow, Nasdaq, and bond index against gold prices. Unlike the last model, these relationships were shown to be more stable following the attacks. This could be explained, in part, by the way gold is viewed in society. It is generally regarded as a value staple and turned to in times of uncertainty. This may have helped "even out" the above relationships post-9/11.

Finally, the relationship between the Dow and Nasdaq against the bond index was shown to have been altered by the attacks. Post-9/11, these financial variables exerted

less of an effect over the bond index. Yet again, this could be explained, in part, by the increased volatility in financial markets post-9/11. Because the variables were no longer moving in the predicted manner, there was less of a recognizable correlation between them.

<u>Commodities</u>

As previously stated, oil prices are expected to demonstrate increased volatility in times of political and economic unrest. The supposed affiliation between certain Middle East oil states and terrorist organizations could be expected to have played a role in the observed volatility post-9/11. However, it becomes important at this time to recognize the many other players within the global oil market, such as Russia, Venezuela, and China to name a few. Activities within these nations would be expected to play an important role in this market.

It becomes necessary, then to examine other reasons for the obvious volatility post 9/11. One of the sectors hardest hit by the attacks was the airline industries. Demand for air travel fell dramatically post 9/11. This drop in demand then indirectly impacted the demand for oil, which could have contributed to lower oil prices post 9/11.

Airline fuel costs are shown to have experienced a sudden and immediate drop post 9/11. This effect is one of the few that can be directly connected to the attack itself. Because planes were grounded for a short period following the attacks, the demand for airline fuel also decreased. This drop in demand, then, resulted in a lower overall price for airline fuel. Even after planes returned to the air, the number of flights within the U.S. remained at a lower level, pushing lower fuel costs into the beginning of 2002.

These effects did not persist, however, as airline fuel costs returned to their previously observed level.

Although OLS analysis showed that the relationships of certain variables to gold "evened out" post 9/11, the variable itself showed little change. This could be attributed, again, to the very nature of the variable. Gold, by very definition, is thought to be a stable variable. It was no surprise, then, when gold was shown to remain stable and withstand the effects of an event such as the terrorist attacks.

The immediate drop in beef cattle futures could be related to uncertainty in the trading market. If traders feel uncertain about the beef market, their future actions are likely to demonstrate this uncertainty. This, ironically, can often bring about the realization of their previous worries. Looking beyond 9/11 induced uncertainty, however, there is a more obvious reason why beef futures did not rebound, while other commodities—like soybeans—eventually did.

The terrorist attacks coincided with another major event in the beef market, mainly the emergence of mad cow disease in the Japanese market. The first case of mad-cow disease was discovered near Tokyo in September of 2001. As consumers shied away from beef products, beef prices plumetted, with year end 2001 prices being approximately 40 percent lower than the year previous (McMillan, 2001).

Porkbelly futures are shown to have been much more resilient than beef futures. The immediate drop—if attributed to the attacks—could again be explained by uncertainty in the trading market. Even if the attacks and the following uncertainties caused the depression in porkbelly prices, there is absolutely no short-run impact able to be attributed to the attacks.

The mad cow scare, while depressing beef prices, could have impacted pork markets in a more positive manner. Pork exports increased by approximately 30,000 pounds in October of 2001 and by approximately 25,000 pounds during November. Beef exports, on the other hand, increased by only 5,000 pounds in October and then decreased in November (Cattle-Fax, USDA Data Page). The increased foreign demand for pork products could have helped this variable remain more consistent than beef futures. These variable movements are most likely due to events such as the Japanese mad cow scare, rather than the terrorist attacks.

Soybean markets remained fairly resilient despite the attacks. There appears, from the existing literature, to be no apparent reason for this. The lack of movement within this agricultural sector further supports the theory that mad-cow disease—not the terrorist attacks—was to blame for the market variations in pork and beef.

Financial Indicators

In examining the Nasdaq Composite Index, it appears that the attacks had only an immediate effect. This sudden decline can most likely be explained by uncertainty in the market. Even so, this Index remained remarkably stable despite the attacks. In other words, the immediate uncertainties that most likely depressed the Index, did not persist into the short-run.

Financial uncertainty is also a likely culprit for the sharp drop-off in the Dow Jones Average. Unlike the Nasdaq, however, the Dow seems to have experienced a more lasting impact. The difference of effects felt can most likely be attributed to the variables' behavior pre-9/11. The Nasdaq was already on a steep downward trend before the attacks. Because of this, the Nasdaq did not have as far to fall from ensuing trader

uncertainty. The Dow had experienced a period of relative stability pre-9/11. Because of this, there was more to be lost in the market post 9/11.

Even though the Dow trough lasted months after the attacks, the variable was still shown to have been remarkably resilient when compared to similar historic cases. For example, this index dropped approximately seven percent the day after the attacks. This is historically consistent, with drops after Pearl Harbor and Iraq's invasion of Kuwait being 3.50 percent and 6.30 percent respectively. The decline after these two events continued, being down 9.4 percent and 5.8 percent respectively six months later. Conversely, six months post 9/11 the Dow was up by 10.4 percent (Dow Jones Indexes, 2006).

The 10-year bond index is shown to have behaved fairly consistently through the attacks. The index is shown to have remained on one trend line for some time preceding and following the studied date. Although variables such as this are susceptible to political and economic shocks, they can be somewhat insulated by effective monetary policy. Post-9/11, the Fed flushed the American economy with an influx of cash. With this flood of currency the bond market was able to absorb some of the 9/11 shock.

In some ways, the terrorist attacks could be viewed as positively impacting this variable. The attacks motivated the Fed to act strong and fast to ward off an ever increasing recession. As the Fed dropped interest rates and increased the money supply, the bond index rebounded. It is unclear whether these actions would have been taken had the terrorist attacks not occurred.

New home sales are shown to have been slightly affected by the attacks. Although this variable is shown to exhibit consistent "ups and downs," the variable did

remain at a lower level for a longer period following the attacks. This can more than likely be attributed to uncertainty within the consumer market. As the literature review demonstrates, many initially predicted catastrophic and long-lasting effects. Consumers—picking up on this idea—were hesitant to make any major purchases immediately after the attacks. In a short amount of time, however, interest rates and other economic factors again induced consumers to enter the home market.

Housing starts are shown to have behaved very similarly to new home sales. In this case, however, we are unable to pin any seen behavior on the attacks. The variable does drop immediately post-9/11, but does not do so in any unpredicted nature. I would hypothesize that this variable was affected in the same way as new home sales, but cannot justify this with the econometric processes used in this study.

Consumer installment credit appears to have been unaffected by the attacks. Looking at the historic evidence, one would suspect this variable to fall during times of war or uncertainty, as the savings rate rises. In this situation, however, it appears that another variable was working in a counter direction—the monetary policy of the Federal Reserve. As the Fed increased the money supply and lowered interest rates more consumers were enticed to make purchases on credit. This helped insulate this variable from the impacts of the attacks.

It seems logical that defense purchases would experience a notable increase following an event such as 9/11. However, in this case, defense purchases appear to have been unaffected. The rationalization of this effect is based on political, rather than economic reasoning. When examining any variable it becomes important to have all relevant information. When dealing with a variable such as defense purchases this

becomes nearly impossible. There are many events and activities that the public is not made aware of. Because of imperfect information, it becomes difficult to draw any correlation between 9/11 and the movement of this variable.

New orders of computers and related goods are shown to behave similarly to defense purchases. There was a sudden spike immediately post 9/11, but the variable did remain on its previous level. I would hypothesize that the sudden increase in this variable could be tied to government purchases of technology designed to increase the security of our borders.

Revenue aircraft departures are shown to have dropped dramatically immediately following the attacks. This variable is one of the easiest to interpret, being directly influenced by the attacks. As planes were grounded and the demand for air travel dropped, it seems logical that this variable would decline. Similarly, as travelers and planes returned to the air, the immediate effects are shown to slowly diminish.

Macroeconomic Variables

The federal funds rate is shown to have been immediately affected by the attacks. Other than this, however, no effects are evident. The federal funds rate had been on a downward trend for some time pre 9/11. It is unclear whether the effects on this variable would have been more pronounced had the country not already been in a state of recession. It is also unclear as to whether this variable would have continued to decline past 9/11 had the attacks not occurred.

Announced layoffs were shown to have been immediately impacted by a sharp decline. In this case, the decrease can most likely be attributed to the movement of other variables, including the manufacturing index. This statistic points to the way that many

variables are interconnected. In this case, the attacks had impacts on other variables which, in turn, affected announced layoffs.

The savings rate appears to have behaved in a manner not wholly consistent with common expectations. Historically, the savings rate has been shown to increase during times of war or other major uncertainties. The data presented, however, shows that the savings rate actually dropped immediately post 9/11. And while these effects did not persist beyond the immediate sense, the savings rate continued to follow a downward trend. These movements could be attributed to the monetary policy taken by the Federal Reserve post 9/11. As the Fed pushed more money into the economy and lowered interest rates, consumers would be motivated to spend rather than save.

The Industrial Production Index was shown to be unaffected by the attacks. IPI can be defined as a measure of the physical output of the nation's factories, mines and utilities (Econoday, 2004). Based on this definition, it would follow that the IPI would behave in a manner similar to the manufacturing index. These two variables are shown to follow a similar trend; however, the manufacturing index exhibited more pronounced highs and lows. From this, one could conclude the production in mines and utilities are less susceptible to economic events such as 9/11, resulting in a more stable IPI.

The terrorist attacks had little to no impact on RGDP. Thus far, this study has shown that the effects of the attacks were very limited at best. It seems logical then that RGDP—the broadest possible measure of output—would also show limited impacts.

Personal consumption expenditures was also unaffected by 9/11. Yet again, because this is a broad variable measuring U.S. "consumption" as a whole, we would expect it to be unchanged. It is possible, however, that there was a deeper, more

structural change within this data set. While personal consumption may have remained consistent, the way in which consumers were spending their money may have changed. For example, data shows that consumers began spending less on travel expenditures post-9/11. This drop in travel was then made up in other areas of consumption.

<u>Unclear Results</u>

In several instances, the results shown by the ARIMA analysis and the unit root tests present conflicting results. With these variables, it becomes difficult to definitively determine the effects of the attacks. By using econometric analysis, however, it is possible to draw interesting and plausible hypotheses.

ARIMA analysis shows that 9/11 had a slight positive effect on both domestic and foreign auto sales. When looking at unit-root results, however, any deviation is not clearly attributable to the point of attacks. With these variables, the increase in sales after the attacks is most likely attributed to moves by the car manufacturers themselves. In an attempt to invigorate stagnant sales, many car companies—including General Motors, Dodge, and Toyota—began offering additional rebates to consumers. Even without the attacks, companies would have likely been driven to such acts to stimulate sales. I would attribute these results, then, more to the existing recession rather than to the terrorist attacks.

The U.S. Manufacturing Index and Automobile Index are shown to have behaved in a similar manner. ARIMA analysis shows that any slight effects are more positive in nature. Unit-root analysis, showing the lack of multiple trends, supports the idea that any effects were not directly related to the attacks. These two variables, while presenting no conclusive evidence, do offer interesting suggestions as to what role 9/11 actually did

play in the state of the economy. It is very possible that 9/11 helped bolster consumption by inducing further cuts in interest rates.

The fact that the automobile manufacturing index neared its lower bounds pre-9/11 can most likely be credited to the overall state of the economy at that time. Because the nation was already experiencing a recession, it follows that consumers would decrease purchases, in turn signaling firms to lower production levels. The months following the attacks were witness to additional drops in interest rates. This likely spurred increased car purchases, thus increasing the automobile manufacturing index. And while this explanation seems to be the most logical, it is still impossible to attribute the index increase to the attacks. For example, as some researchers have pointed out, if the country had remained in a recession even without the terrorist attacks, interest rates would have fallen regardless. The real question becomes whether interest rates would have fallen at the same rate.

CHAPTER 6

CONCLUSION

In summation, it appears that September 11th had a wide array of effects on the U.S. economy. Some variables seem to have been affected only in the immediate sense. For example, porkbelly prices and the federal funds rate both experienced sudden and drastic drops, without any extended effects. Other variables appear to have remained fairly consistent, both immediately and in the short-run. Soybeans and the Consumer Price Index both portray this behavior. In these cases, no significant changes were detected either immediately following the attacks or in the short-run.

Other variables seem to have been more susceptible to the terrorist attacks. For example, the effects on beef cattle futures and the Dow Jones Industrial Average were more extended in nature. See Table 5 for a summary of the studied results.

Although the effects of 9/11 are very mixed, there are some generalizations that can be drawn. First of all, it appears that the majority of impacts experienced were less substantial than many had earlier proposed. Furthermore, the effects that were experienced seemed, for the most part, to be short-lived. These results demonstrate the apparent resilience of the U.S. economy and provide a sense of optimism in the face of future attacks.

This study also highlights the difficulty of attributing variable behaviors to any specific event, such as 9/11. When dealing with an economic system as complex as the U.S. system, it becomes almost impossible to isolate any one effect. This complexity must be taken into consideration when interpreting any results found.

Table 2.
Effects on Included Variables

VARIABLE	Effects of September 11th		
	Immediate	Immediate and SR	No Effects
COMMODITY VARIABLES			
Beef Cattle Futures		X	
Porkbelly Futures	X		
Soybean Futures			X
Oil Prices		X	
Gold Prices			X
Airline Fuel Costs	X		
MACROECONOMIC VARIABLES			
The Federal Funds Rate	X		
Manufacturing Index		X (ARIMA)	X (Unit root)
Announced Layoffs	X		
Savings Rate	X		
Industrial Production Index			X
Automobile Manufacturing Index		X (ARIMA)	X (Unit root)
Real Gross Domestic Product			X
Personal Consumption Expenditures*			X
FINANCIAL VARIABLES			
The Nasdaq Composite Index	X		
The Dow Jones Industrial Ave.		X	
10-Year Bond Index			X
Domestic Auto Sales		X (ARIMA)	X (Unit root)
Foreign Auto Sales		X (ARIMA)	X (Unit root)
New Home Sales	X		
Housing Starts			X
Consumer Installment Credit			X
Revenue Aircraft Departures	X		
New Orders: Defense Capital Goods			X
New Orders: Computers & Related Goods	X		

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APPENDIX

Basic Assumptions of the Classical Ordinary Least Squares Model

1. The quantities X_t are either fixed numbers or they are realizations of random variables that are uncorrelated with the error terms e_t.
2. The error terms e_t all have mean zero.
3. The error terms e_t have a common variance, say o^2.
4. The error terms e_t are not correlated with one another.
5. The values X_t of the independent variable are not all the same.

TABLE 3.

MODEL (OLS)	Pre-9/11		Post-9/11	
	White Test Statistics			
Y=Oil Prices; X_1=The Dow, X_2=The Nasdaq	0.002		17.438	
Y=Gold Prices; X_1= The Dow, X_2=The Nasdaq, X_3=Bond Index	23.752		0.878	
MODEL (ARCH)	Pre-9/11		Post-9/11	
	B	Test Stat	B	Test Stat
Y=Bond Index				
X_1=The Dow	9.35E-05	27.40	8.07E-05	27.14
X_2=The Nasdaq	1.10E-04	25.53	8.48E-05	20.92

TABLE 4.

VARIABLE	Model Specifications		
	AR	I	MA
Oil Prices	2	1	2
Automobile Manufacturing Index	1	0	1
Manufacturing Index	2	1	2
Domestic Auto Sales	1	1	1
Foreign Auto Sales	2	1	3
Soybean Futures	1	0	1
Real Gross Domestic Product	3	1	2
Personal Consumption Expenditures	2	1	3

TABLE 5.[2]

VARIABLE	Trended $\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 t + \sum \gamma_j \Delta Y_{t-j} + \varepsilon_t$		Untrended $\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum \gamma_j \Delta Y_{t-j} + \varepsilon_t$		Significant Change
	Test Stat	Critical Value	Test Stat	Critical Value	
Beef Cattle Futures	6.2601	5.34			YES
Porkbelly Futures			2.0761	3.78	NO
Soybean Futures			0.9314	3.78	NO
Wheat Futures	3.1628	5.34			NO
10-Year Bond Index			4.3679	3.78	YES
The Nasdaq	1.5026	5.34			NO
The Dow Jones			4.4012	3.78	YES
Gold Prices	2.8719	5.34			NO
Oil Prices (Logged Data)			5.1728	3.78	YES
RGDP	4.8423	4.68			YES
Consumer Installment Credit	5.8046	5.34			YES
Airline Fuel Costs			1.4956	3.78	NO
New Orders: Computers	2.8300	5.34			NO
Domestic Auto Sales	6.4252	5.34			YES
Foreign Auto Sales	8.1027	5.34			YES
New Home Sales	3.0279	5.34			NO
The Federal Funds Rate	4.4905	4.03	6.6814	4.59	YES
IPI	6.2113	5.34			YES
Savings Rate	2.0163	6.25			NO
PCE	5.7192	4.68			YES

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[2] Italicized values were run at $\alpha = 5\%$, all others run at $\alpha = 10\%$.

GRAPH 1.
Residuals of the original oil data set

Residual Plot
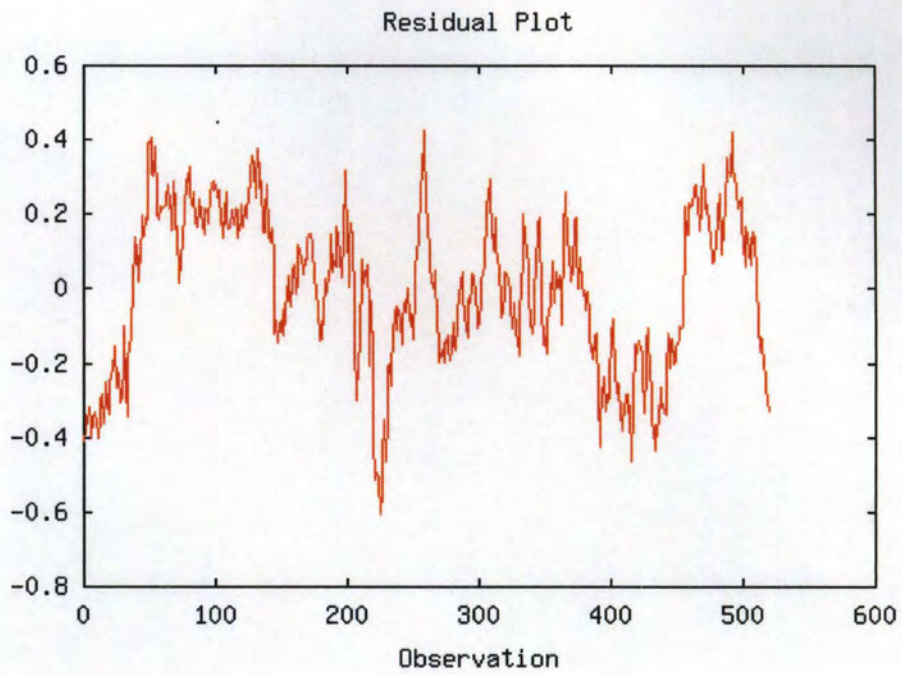
GRAPH 2.
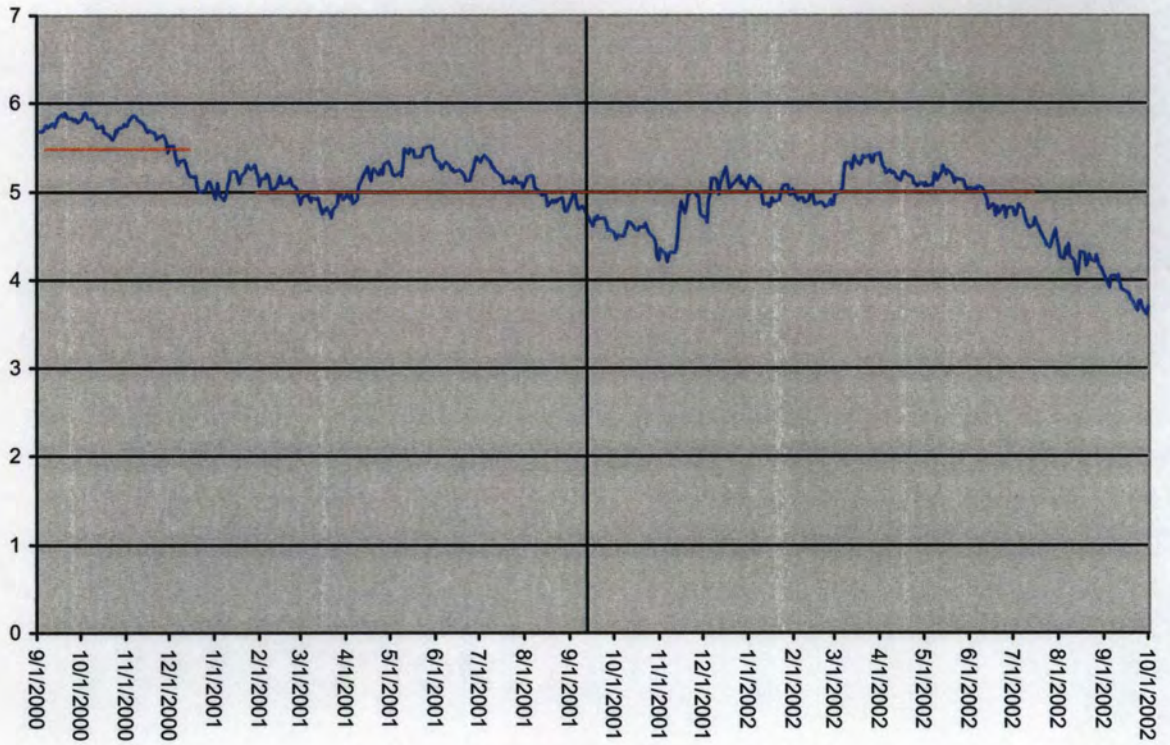Residuals of first differenced data.

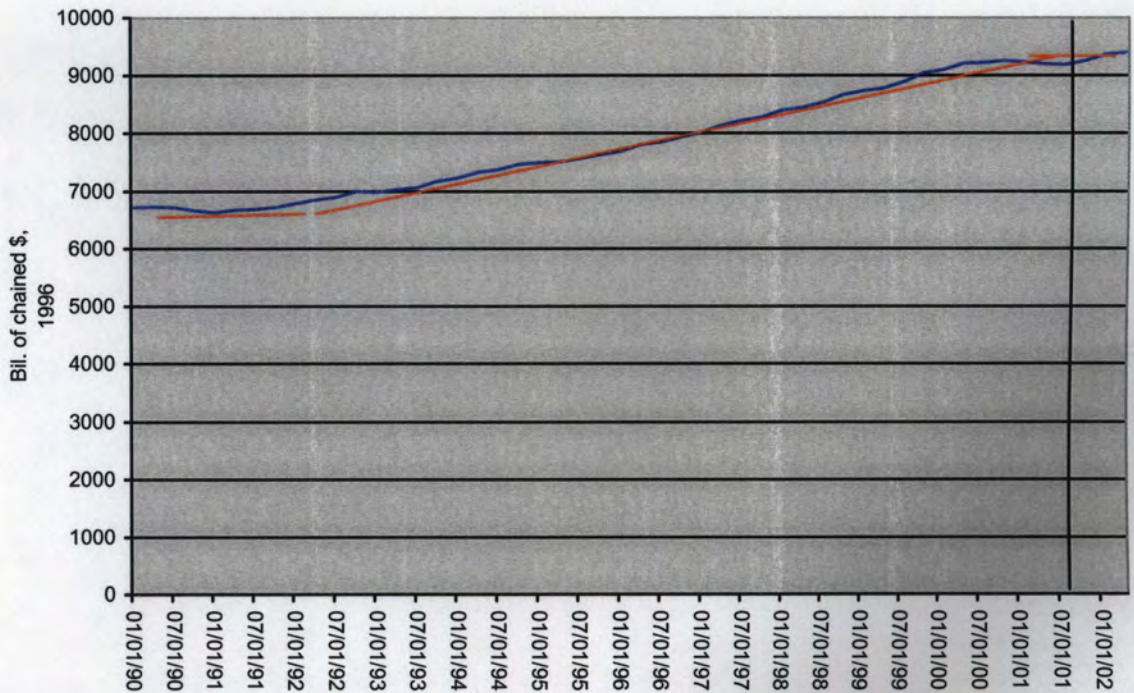Residual Plot
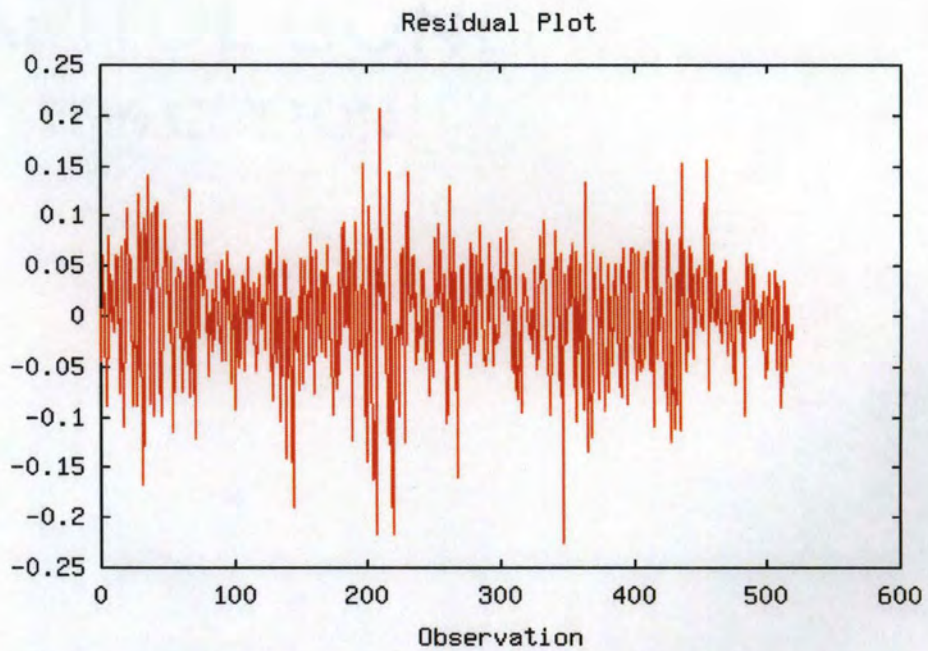
Figure 21. 10-Year Bond Index
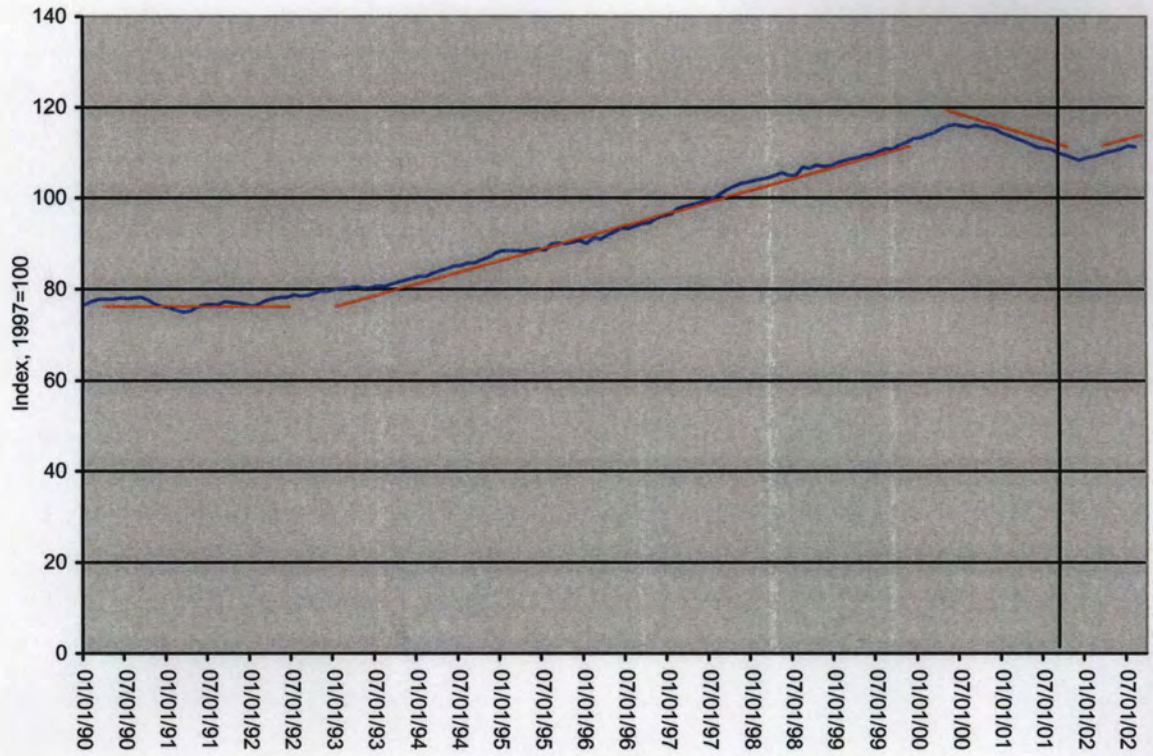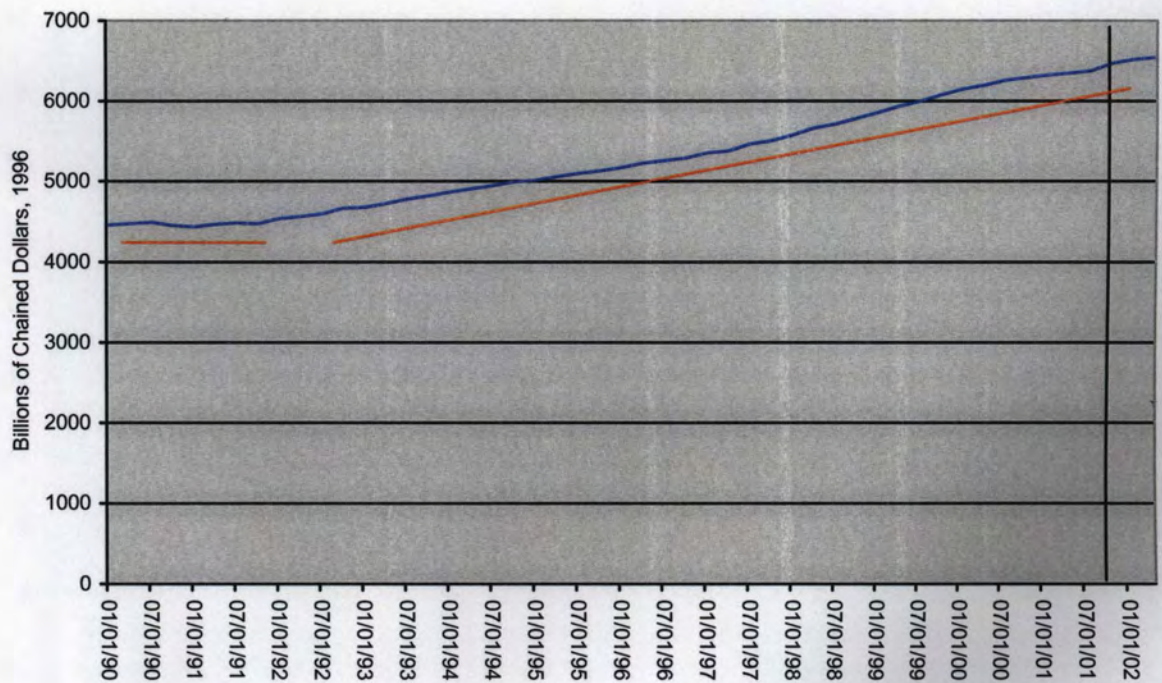

Figure 22. RGDP
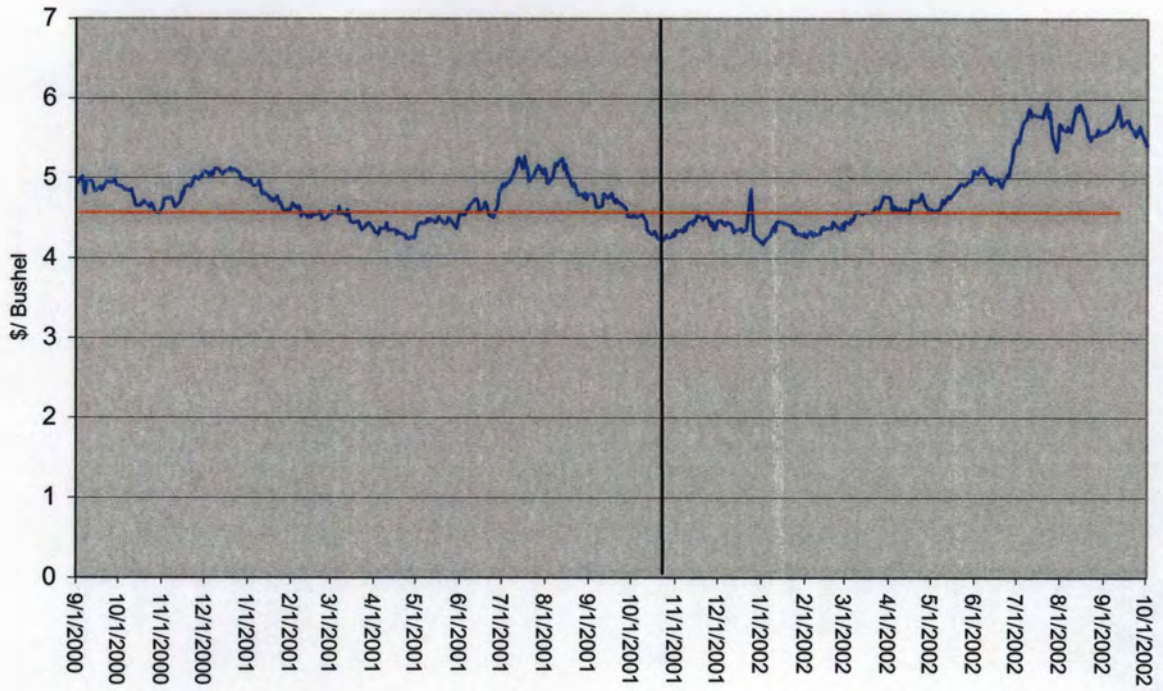
Figure 23. IPI

Figure 24. PCE
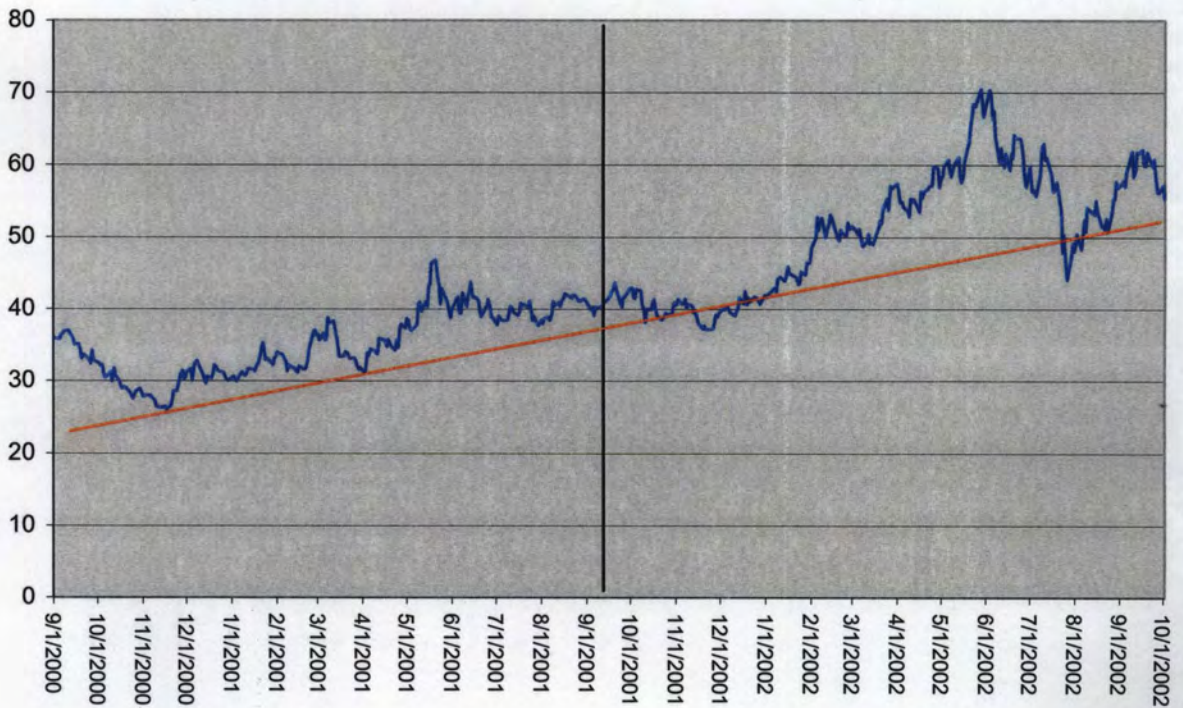
Figure 25. Soybeans

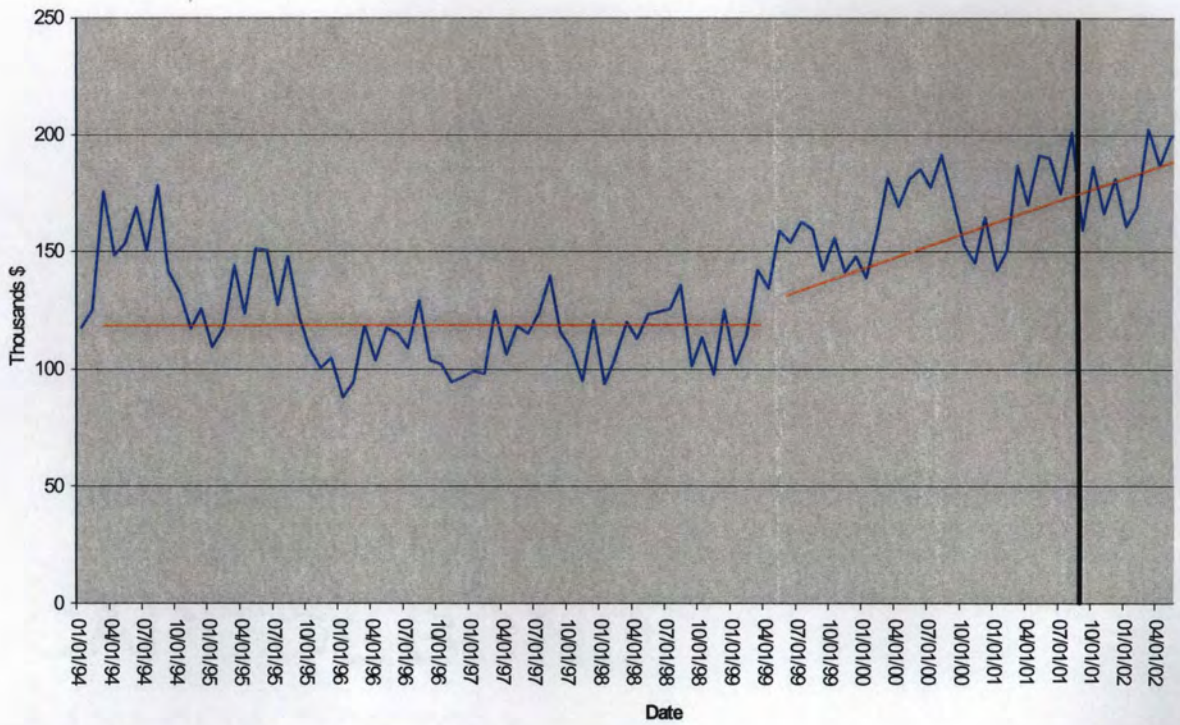Figure 26. Gold

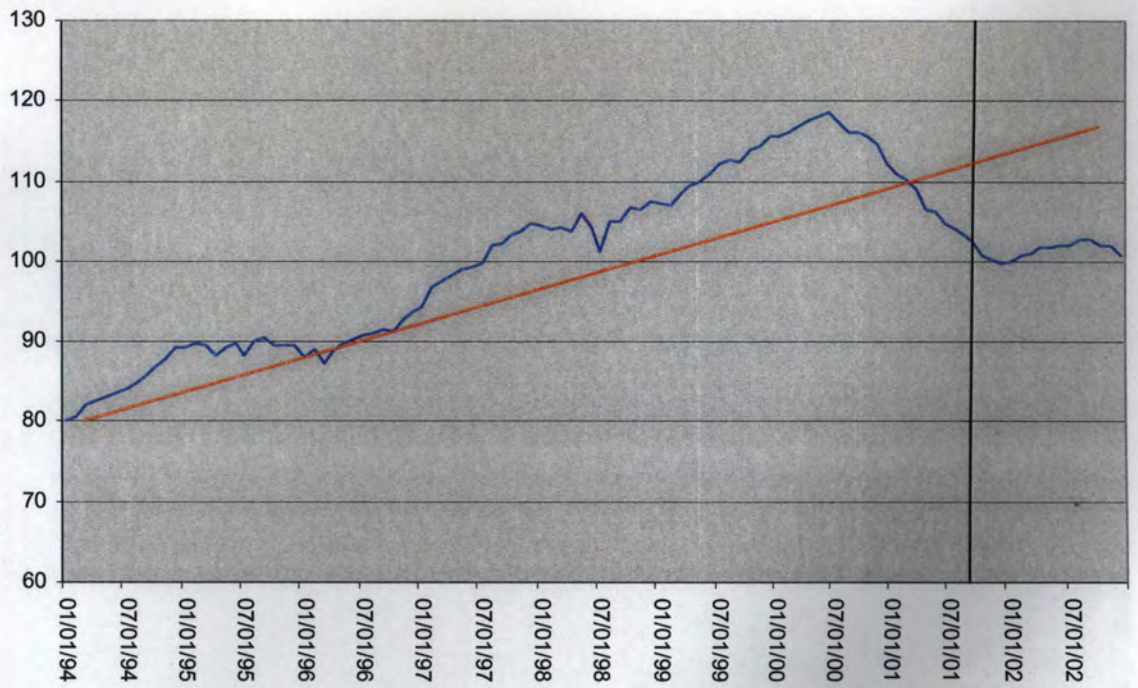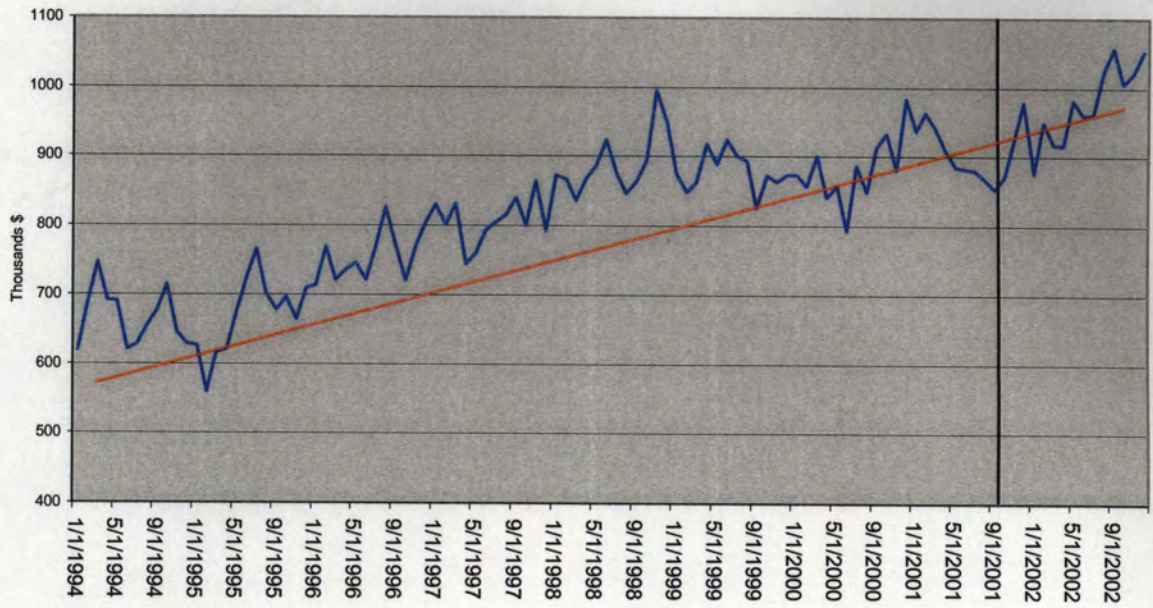Figure 27. Foreign Auto Sales

Figure 28. Manufacturing Index.

Figure 29.   Housing Starts

Figure 30. New Orders: Defense Capital Goods