2018

2008 Financial Crisis and the Deviation from the Taylor Rule

Uzoma H. Okoye
Georgia Southern University

2008 Financial Crisis and the Deviation from the Taylor Rule

An Honors Thesis submitted in partial fulfillment of the requirements for Honors in Department of Finance and Economics.

By
Uzoma Henry Okoye

Under the mentorship of *Dr. Mark Yanochik*

ABSTRACT

In this paper, we derive possible causes of the 2008 financial crisis, as well as provide evidence of a possible deviation from the Taylor rule by the Federal Reserve. This research draws up mostly primary sources such as published books and speeches by John B. Taylor himself, as well as articles from academic journals related to the topic. Other prior research tends to take a side on the argument as to whether the Federal Reserve deviated or not. This paper serves as a descriptive analysis of different sides of the argument to come up with suggestions regarding the Fed's actions.

Thesis Mentor:

Dr. Mark Yanochik

Honors Director:

Dr. Steven Engel

April 2018
Department of Finance and Economics
University Honors Program
Georgia Southern University

I – Introduction

The Great Recession of 2008-2009 and the subsequent period of stagnation is one of the most significant events in US economic history. The financial bubble and subsequent collapses of the real estate and stock markets triggered a severe economic downturn. Real GDP dropped 4.0% from the second quarter of 2008 to the second quarter of 2009. Unemployment during this same period rose from 5.0% to 10.0%. During the eight years following the crash, the labor force participation rate has fallen from 66.0% to 62.8% (Federal Reserve Bank of St. Louis. FRED II). Perhaps the most notable feature of the Great Recession was the impact on real estate and housing prices. According to the Shiller Real Home Price Index, U.S. house prices reached a peak in 2006, then fell a staggering 34% by 2009 (Byun, 2010).

In October 2008, the U.S. Congress authorized the *Troubled Asset Relief Program* (TARP), which eventually authorized $475 billion in bailout funds. Of this total, $248 billion was committed to stabilizing the banking sector, and $80 billion was committed to stabilizing the U.S. auto industry (U.S. Department of the Treasury, 2016). These were extraordinary fiscal policy moves, the likes of which have never been seen before in peacetime America. It is not a surprise that economists have begun to make comparisons between the Great Recession and the Great Depression of the 1930s. (Koch, et al., 2016; Anderson, et al., 2017; Duca, 2017).

Understandably, the Great Recession has generated much interest among scholars. Economists study the Great Recession with the hopes of understanding its root causes. In doing so, researchers attempt to discover macroeconomic policy prescriptions that can help the US economy avoid economic catastrophes of this magnitude in the future. One

area of research that has received considerable attention among economists is the role of monetary policy in contributing to the economic collapse. To what extent was the Federal Reserve responsible for the stock market and more specifically the real estate bubbles that eventually burst, thus beginning the Great Recession? In this paper, we will explore the connection of monetary policy to the Great Recession.

The Federal Reserve is responsible for the United States' monetary policy. The Fed controls the US money supply in order to achieve macroeconomic stability. The Fed board members analyze the conditions (e.g., output, unemployment, and inflation) of the U.S economy on a periodic basis and then make adjustments to the money supply that the members believe will bring about the desired outcomes. One of the interesting aspects of monetary policy has to do with the methods by which appropriate policies are decided upon. This presents a possible dilemma, and is often referred to as the "rules versus discretion debate" (Mankiw, 2013, 529-534). On the one hand, the Fed might use a discretionary approach to monetary policy. This method of policy choice is flexible, and allows the Fed to respond immediately to changing macroeconomic conditions. On the other hand, the Fed may decide on policy using a rules approach. Many economists believe that a rules approach to monetary policy, which would presumably cause money growth to be consistent, would cause greater stability in output, prices, and employment. The focus of this paper is to consider the rules-based approach to monetary policy, and to assess the possible use of one monetary policy rule in particular – the Taylor Rule. By extension, we will consider use or neglect of monetary policy rules in the years leading up the Great Recession.

The Taylor rule for monetary policy (Taylor, 1993) has received considerable attention in economic research. Economists have sought to determine the extent to which the Federal Reserve's policy decisions have been impacted by the outcomes of the Taylor Rule. More recently, economists have tried to find a connection between the Taylor Rule, monetary policy, and the events leading up to and during the Great Recession. This line of thought leads to some interesting questions. Did the Federal Reserve policy over the last couple of years contribute to the housing price boom and bust? Or were there external factors yet to be discovered which could be attributed to being the cause of the crash in housing prices? In this paper, we try to analyze these events, focusing mostly on the monetary events leading up to the Great Recession. This paper provides a descriptive analysis of Federal Reserve (Fed) policy, its possible adherence or deviation from the Taylor Rule, and the extent to which these policy prescriptions contributed to the 2008 financial crisis and recession.

The paper begins with a biographical sketch of John B. Taylor, dating back to his time as a professor at Columbia University to his term as the Senior Economist on the President's Council of Economic Advisers. We also review the economic theory that influenced Taylor in his creation of the Taylor rule. The paper goes on to give a detailed analysis of the Taylor rule, which is coined the Federal Reserve's "reaction function" (Kumar, 2013) due to the alterations made to monetary policy in response to economic developments. Then, a review of literature sheds light on various points of view regarding the 2008 financial crisis. On one hand, several economists such as A. Orphanides and R. Porter provide suggestions of the ineffectiveness of the Taylor Rule and its inability to perform efficiently during financial turmoil. On the other hand, the

possibility of a deviation by the Fed is brought up with the statistical evidence presented in the argument. Here it will be instructive to examine what Taylor himself has to say on the issue, and an examination of Taylor's views on the Great Recession will enhance our understanding. The paper will conclude with our assessment of the competing arguments on this debate on monetary policy, and will propose ideas for future research on the topic.

II John B. Taylor - Biographical Sketch

John B. Taylor, born December 8, 1946, is the economist known for his contribution to the creation of the Taylor Rule, which establishes a relationship between the nominal interest rate and other macroeconomic factors. Currently an Economics professor at Stanford University, Taylor earned his Bachelor's Degree in Economics at Princeton in 1968 and Ph.D. in Economics at Stanford in 1973 (Stanford Profiles). He is an expert in macroeconomics, monetary economics, and international economics. Taylor is known for his research on modern policy theory which came about from his strong interest in public policy. It was from this interest that he was chosen to serve as senior economist on the President's Council of Economic Advisers from 1976-1977, and again from 1989-1991.

Taylor is generally thought of as a member of the New Keynesian school of economic thought. His economic thought is also influenced by the works of economists Milton Friedman and Paul Volcker. Taylor took a special interest in Friedman whom he had interviewed some years back. They had indulged themselves in a two-hour long conversation on various topics ranging from the natural rate theory to the optimal

quantity of money, and money growth rules (Taylor, 2000). Through their conversation, it was evident that both Friedman and Taylor shared similar values regarding monetary policies.

New Keynesian economics is a modern school of thought that combines elements of microeconomics with macroeconomic models. It is a school of thought in modern macroeconomics that was derived from the ideas of John Maynard Keynes (Mankiw, 2008). In the 1930s, Keynes constructed an economic theory to explain how recessions can be inherent to market-based economies. For the most part, economic thought for roughly one hundred and fifty years prior to Keynes taught that market economies were characterized by flexible prices and wages. This period of thought is known as the Classical school of economics. The interaction of supply and demand in goods, labor, and money markets would mean that prices, wages, and interest rates would freely adjust to changing conditions. These market adjustments would prevent prolonged shortages or surpluses of goods, and would also prevent unemployment from being a long-term problem. Classical economics therefore suggests that a free market economy tends to be inherently stable. In addition, the Classical theory of economics is a body of thought that focuses on the supply side of the economy.

Keynes disagreed with this assessment of the market economy. He believed that markets do not always adjust in a predictable way - prices, wages, and interest rates are not always flexible. According to Keynes, the actual "stickiness" of prices and wages can cause a general glut of goods, thus a recession. The Keynesian theory is a statement of how government spending policies can be used to relieve an economy experiencing recessionary conditions. To Keynes, demand was the more important side of the market,

and government spending should be used to stimulate aggregate demand. Government spending, which cause increases in aggregate demand, would ultimately lift the economy out of recession and reduce unemployment.

In the 1970s, questions were raised by economists such as Robert Lucas and Robert Barro (Mankiw, 2008) regarding the Keynesian school of thought. These economists attempted to revamp the Keynesian theory of the 1930s, and the term "New Keynesian" was coined. Like their predecessor Keynes, economists of this school of thought believe involuntary unemployment exists due to the "stickiness" of wages and prices in the economy (Mankiw, 2008). However, they extend the analysis of Keynes to include microeconomic foundations. New Keynesian economists blend the Keynesian notions of price and wage stickiness with the modern macroeconomic theories of rational expectations and Real Business Cycle Theory.

Real Business Cycle (RBC) theory is a macroeconomic theory that focuses on how sudden and significant changes to the factors of production can impact a nation's economy. It was developed by modern classical economists to explain cyclical fluctuations in the economy. RBC economists believe that "productivity shocks" are the main cause of business cycles and recession. Productivity shocks include outcomes such as the development of new production methods, changes in the quality/quantity of capital and labor, sudden changes in raw material availability, and changes in government regulations that affect production (Abel, et al., 2017, pp. 366-367). RBC therefore represents a return to the classical doctrine, where problems in the supply side of the economy are more important in understanding business cycles and recessions.

We can see that the theory that provides the foundation for Taylor's thought, New Keynesian economics, is actually a synthesis of Classical economics and Keynesian economics. Although it focuses on the supply side of the economy, it is a theory that also includes assumptions about sticky wages and prices. These macroeconomic models are often referred to as *dynamic, stochastic, general equilibrium (DSGE) models* (Mishkin, 2012, p. 571). It was from this macroeconomic perspective that Taylor developed his famous rule to guide monetary policy.

Given that we have considered Taylor's theoretical influences, we now look at the Taylor Rule. In the next section, we discuss the Taylor Rule for monetary policy. A detailed discussion of each component of the Taylor Rule is included.

III - The Taylor Rule

Prior to the seeming reliance on the Taylor rule by the Federal Reserve, there was uncertainty as to what monetary policy rule was being used to manipulate the federal funds rate. In the period immediately preceding the advent of the Taylor Rule, the chairs of the Board of Governors of the Federal Reserve were Arthur F. Burns (1970-1978) and Paul A. Volcker (1979-1987). They were directing the Fed during the period of the Great Inflation (Bryan, 2013). After the conclusion of World War II, the Fed shifted its attention to policies focused on the promotion of maximum employment, production, and purchasing power (Bryan, 2013). This era was dominated by the use of the Phillips curve in monetary policy, which held that an inverse relationship between unemployment rate and inflation existed. The law implied that a decrease in unemployment would cause the

labor market to tighten, resulting in firms raising the wage rate in order to attract workers. Prices would also tend to increase and unemployment decreased. The inverse is also true – an increase in the unemployment rate would coincide with a decrease in the inflation rate. This trade-off between inflation and unemployment appeared to be the guiding principle of monetary policy during this time. Economists such as Edmunds Phelps and Milton Friedman were, however, quick to criticize it, stating that the tradeoff between unemployment and inflation could not be sustained in the long-run (Hoover, 2008). Hence the need for a more reliable policy for the economy.

The Taylor Rule was created as a form of recommendation for central banks, such as the Federal Reserve. It suggests how the central bank should alter the interest rate depending on the economic condition in order to achieve the short-run goal of a stable economy and inflationary stability in the long-run (Federal Reserve Bank of San Francisco, 1998). The rule follows the thought process that an economy performing above full employment is above its target. It therefore usually experiences an increase in interest rate and vice versa. The Taylor Rule is meant to guide the Federal Reserve in setting its monetary policy target, the real federal funds rate. According to the rule, the federal funds rate should be set at its historical average of 2%, plus a weighted average of the inflation gap and the output gap (Mishkin, 2012, 329-330).

By Taylor's own admission, the Taylor Rule is quite straightforward. The original formulation of the Taylor Rule is expressed like this (Taylor, 1993. P. 202):

$$r = p + .5y + .5\,(p - 2) + 2$$

where

r = the federal funds rate

p = the rate of inflation over the previous four quarters

y = the percentage deviation of real GDP from a target.

The term r represents the federal funds rate to be implemented by the Federal Reserve. The principle behind the determination of the federal funds rate is that the federal funds rate is expected to rise in the event of inflation (p), rising above the set target rate of 2 percent, or if real GDP (y) surpasses the estimated GDP for a given economic year (Taylor, 1993). In the case where both the inflation rate and GDP are within the expected target, r would be equal to 4 percent, which is 2 percent in real terms.

The term p serves as the rate of inflation over the previous four quarters. The reasoning behind using the rates from the previous quarters are for those quarters to serve as a benchmark for comparison for policymakers. Think of a company trying to measure the growth in revenue over the current financial year. It would be impossible for the company to do so without some sort of yardstick to evaluate its performance. It, therefore, has to look through the financials from previous years to identify its revenue, as well as to compare with the current year to determine whether there was growth or decline in revenue. This is why the inflation from the previous four quarters are used, hence it is safe to say that the policy operates in “real” terms.

The term y is the percentage deviation of real GDP from a set target by the Federal Reserve, sometimes referred to as the output gap. The term y is determined by the formula

$$y = 100 (Y - Y^*)/Y^*$$

where Y represents real GDP and Y* represents the trend in real GDP (this is also referred to as "potential real GDP"). Taylor notes that the trend in real GDP was 2.2 percent per year from 1984.1 to 1992.3. The greater the difference between actual real GDP from estimated GDP, the greater the value of y, and vice versa.

Taylor states that there is not a consensus about the size of the coefficients of policy rules. However in his representative model expressed above, the coefficients of .5 seem to "capture the spirit of recent research" and therefore seem justifiable.

Below are numeric simulations of an economy experiencing three different economic cycles. Each situation is characterized by unique events in an attempt to demonstrate the recommendations made by the Taylor Rule. The first economy (economy A) is currently in a recessionary period. This period is characterized by slow economic growth in the economy and a high unemployment rate. We assumed a negative output gap in economy A given its underperformance, as well as an inflation rate of 1 percent during the financial period.

Economy A:

$$p = 1\%$$

$$y = -1.0$$

Using the Taylor Rule,

$$r = 1 + .5(-1.0) + .5(1 - 2) + 2$$

$$= 2.0\%$$

The Taylor Rule recommends a low interest rate in order to stimulate the underperforming economy and also encourage spending from consumers who have lowered confidence in the current financial system and have a preference of holding their money. The second economy (economy B), is currently in a relatively normal state in which both the inflation rate and unemployment rate are closer to their "natural" rates. Unlike the economy in a recession, conditions in economy B are rather favorable and require little or no intervention from the central bank.

Economy B:

$$p = 2\%$$

$$y = 0.15$$

Using the Taylor Rule,

$$r = 2 + .5(0.15) + .5(2-2) + 2$$

$$= 4.075\%$$

As stated earlier, the economy needs little intervention in this economic period. The central bank might however, attempt to adjust the interest rate closer to the target rate of 2 percent. The last economy (Economy C), is currently experiencing a boom. Economic activity is at its peak with current output surpassing the expectations of the government and policy makers. Due to this, there is a relatively high inflationary pressure compared to the other economy, with a significant output gap.

Economy C:

$$p = 6\%$$

$$y = 2.0$$

Using the Taylor Rule,

$$r = 6 + .5(2.0) + .5(6 - 2) + 2$$

$$= 11.0\%$$

The central bank in economy C would need to slow down the economy as the inflation rate is at risk of a further increase. It would therefore need to target a higher Federal funds rate in order to reduce money creation.

According to Frederic Mishkin (2012, pp. 330-332) the Taylor Rule fairly accurately describes the Federal Reserve's control of the federal funds rate after 1987 under the chairmanship of Alan Greenspan and Ben Bernanke. Mishkin also shows that the Fed has not always followed the Taylor Rule since its creation. Most notably, a divergence between the Taylor Rule and the federal funds rate begins around 2002. The Taylor Rule indicates a federal funds rate that is higher than the actual Fed rate during that time. It is also interesting to note that, according to Mishkin, during the 1970s, there was a large deviation between the federal funds rate forecasted by the Taylor Rule and the actual federal funds rate. During this period the Taylor Rule suggested a rate considerably higher than that that actual existed by Fed policy. This provides additional evidence that the 1970s were a period of substantial monetary inflation.

IV-Review of Literature

The 2008 financial crisis was coined the worst economic disaster since the Great Depression of 1929. Prior to this event, there were several warning signs such as the

housing bubble anomaly and the hike in the Fed rate that indicated a potential issue in the economy. The Federal Housing Price Real Index, according to the Federal Housing Finance Agency, showed a 40% increase in housing prices in 2007, compared to prices prior to 2000 which showed more gradual increases (Mislinski, 2018). This asset bubble resulted in a 52% decrease in housing prices by 2011 (Federal Housing Finance Agency), which is still in recovery as of today. According to the U.S Department of Treasury, real GDP fell to an all-time low from the pre-recession peak, the worst since the great depression (Figure 1).

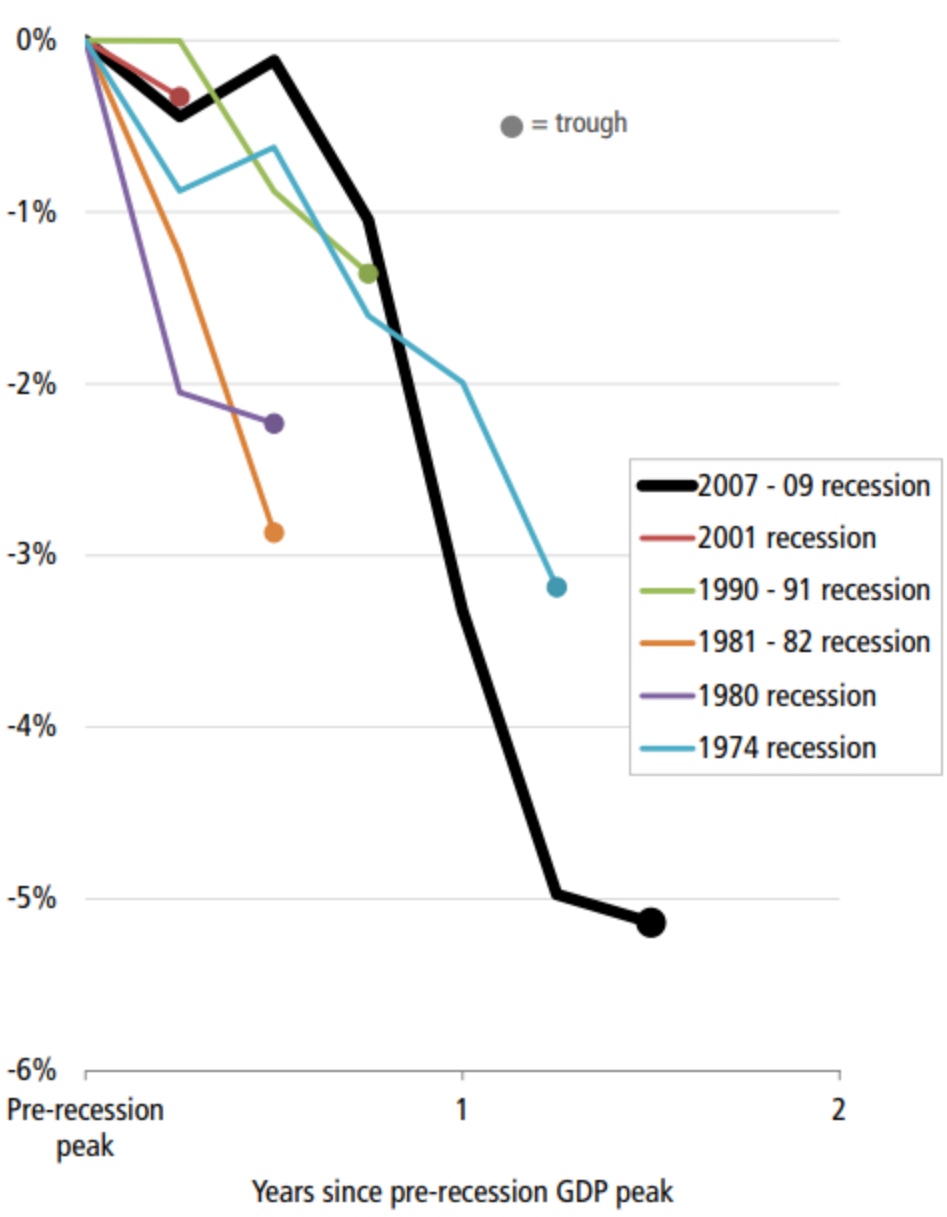

Figure 1. Real GDP, Percentage Fall from Pre-Season Peak. Adapted from "The Financial Crisis Response" by the U.S Department of Treasury, 2012.

The U.S Department of Treasury reported that 8.8 million jobs were lost during the 2008 financial crisis, with $19.2 (2011 dollars) trillion lost in household wealth (2012). Household debt as a percent of disposable income was at a high of approximately 135% of their disposable income, with a large overhang of debt remaining as of today. FIGURE 2.

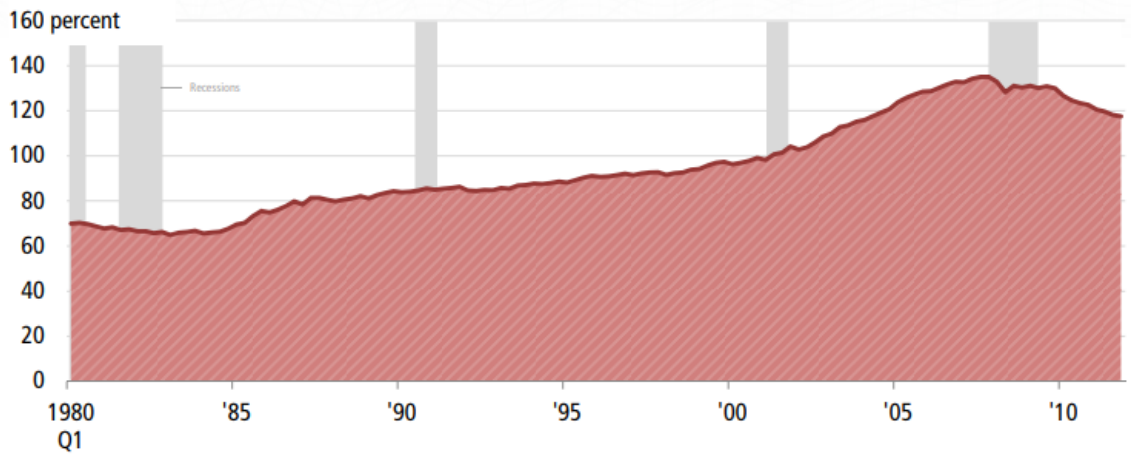

Figure 2. Household Debt, Percent of Disposable Income. Adapted from "The Financial Crisis Response" by the U.S Department of Treasury, 2012.

So we proceed with the question of whether errant monetary policy contributed to the recession. As discussed above, the Taylor rule is believed by many to be the guiding policy in which the Fed uses to determine the monetary policy. It is a formula that sanctions the "nominal interest rate" dependent on the inflation rate and the difference between the economy's potential and the actual level of output (Vitruk, 2014, pg. 105).

The rule specifies to what extent the federal funds rate should be adjusted in response to various macroeconomic pressures. However, several questions have been raised by economists such as McCallum (Vitruk, 2014, pg. 106), who criticize the Fed's adherence to the rule, as well as its usefulness during economic periods of uncertainty. Opponents of the Taylor Rule claim that the problems result from the existence of fallibilities in the monetary system. Firstly, the Taylor Rule limits the Fed to choose a single measure of inflation from a list of various indices. Secondly, interest rates are formulated based on data gathered from previous years which might be invalid. Lastly,

the rule considers few variables that influence the policy, disregarding several significant variables in the process (Vitruk, 2014, pg. 107).

Economists such as Jung, Porter, and Finan have suggested that the McCallum Rule would be a better alternative to the Taylor Rule given the exclusion of unobservable variables such as real interest rate and output gaps, which have proven difficult to measure over the years (Jung, 2017). The McCallum Rule, proposed by Bennett McCallum of Carnegie-Mellon University, targets the dollar value of output in an economy (Nominal GDP), by placing a benchmark for the growth rate of money supply. This consists of bank reserves and money in circulation (Croushore & Stark, 1995). The rule follows an adjustment mechanism in which monetary policy changes in response to the deviation in nominal GDP from its target. Should Nominal GDP be below the set target, economic growth is stimulated by increasing money growth which could be accomplished by lowering the Fed rate. This increase would encourage banks to borrow more. On the other hand, if Nominal GDP is above target rate, economic growth could be slowed down by increasing the required bank reserves, causing banks to reduce its monetary transactions.

Advocates of the McCallum Rule such as Brian Motley and John Judd (Croushore & Stark, 1995) carried out research that suggests the rule's reliability in various economic models. Studies from Croushore and Stark suggest that had the Fed followed the McCallum Rule rather than the discretionary policy adopted, inflation could have been significantly lower than the actual rates, with real output unchanged. Their studies also claimed that the adopted of the McCallum Rule would have avoided the Great Depression (Croushore & Stark, 1995).

Studies of some of the largest economies in the world such as Russia and China indicated that the McCallum Rule could be a suitable benchmark to assess central bank's policy decisions (Jung, 2017). This is due to the effectiveness of the McCallum Rule during financial crisis where prolonged low-interest rates are bound to be experienced. During this particular situation, there is little or nothing that can be done using the Taylor Rule to stimulate the economy other than implementing a negative interest rate.

Jung (2017) favors a base money rule, which the McCallum Rule is, in favor of an interest rate rule. In his studies, the difficulty in accessing the state of the economy in real time makes a money based rule preferential to interest rate rules. Nations such as Japan, Spain, and Russia could find the adoption of money based rule as a good benchmark for their central banks. Most central banks held to a low interest rate policy, with lower boundaries approaching zero (i.e., short-term interest rates were reduced to nearly zero). This increased the difficulty in interpretation for policy makers. This lends support for the adoption of a money based rule as opposed to an interest rate rule.

On the opposite side of the spectrum are economists who believe in the effectiveness of the Taylor Rule. Most critics tend to draw an argument based off of the events that occurred prior and during the 2008 financial crisis. Ben Bernanke (2015) for example, believes that interest rates between 2003-2005 were held too low for too long by the Fed. This was extremely risky and likely contributed to the housing boom.

Bernanke's studies came to the conclusion that the adherence to the Taylor Rule could not have caused the housing boom. So the question of what exactly caused the financial crisis remains to be answered. Questions by Taylor himself have been raised concerning the possibility of the Fed deviating from the Taylor rule years leading to the

financial crisis. A study by Nikolsko-Rzhevskyy, et al., proposes a statistical method of distinguishing between a "rules-based" era and a "discretionary" era (2014). It was important to outline what these two eras meant since people tended to characterize the rules-based era with good economic performance and the discretionary era with relatively bad economic performance. Nikolsko-Rzhevskyy, et al. identified the late 1960's and 1970's as a period of the discretionary policy, 1980-1984 as a transition, 1985-2003 as the rules-based era, and 2003-2012 as the ad hoc era (Nikolsko-Rzhevskyy et al). Results from the study highlighted the superiority in terms of economic performance of the rules-based era compared to the discretionary era which had a greater economic loss. The authors conclude that years after 2006 can be characterized as a discretionary era, which strengthens that argument that the Fed deviated from the original Taylor rule. Although deviating from the Taylor rule seems like a likely explanation for the financial bubbles that preceded the bust of 2008, it is still unclear whether this could be attributed as the sole cause of the Great Recession.

V - Taylor's Analysis of the Great Recession

In Taylor's book *Getting off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis,* he makes a compelling argument that the Fed's deviation of monetary policy from the Taylor Rule was the largest seen since the 1970's, prior to the housing boom (Taylor 2009, pg. 2). Although the deviation by the Fed occurred due to fear of deflation, it could be identified as the root of the housing boom which inevitably led to the housing bust. Results from his study showed

that had the Fed complied with the Taylor Rule, the levels of the "counterfactual" housing starts would have been well below what the actual housing starts were. This, in turn, resulted in a gradual rise in overall prices, as the Consumer Price Index (CPI) level averaged 3.2%, 60% above the target suggested by policy makers (Taylor, 2009. Pg. 5).

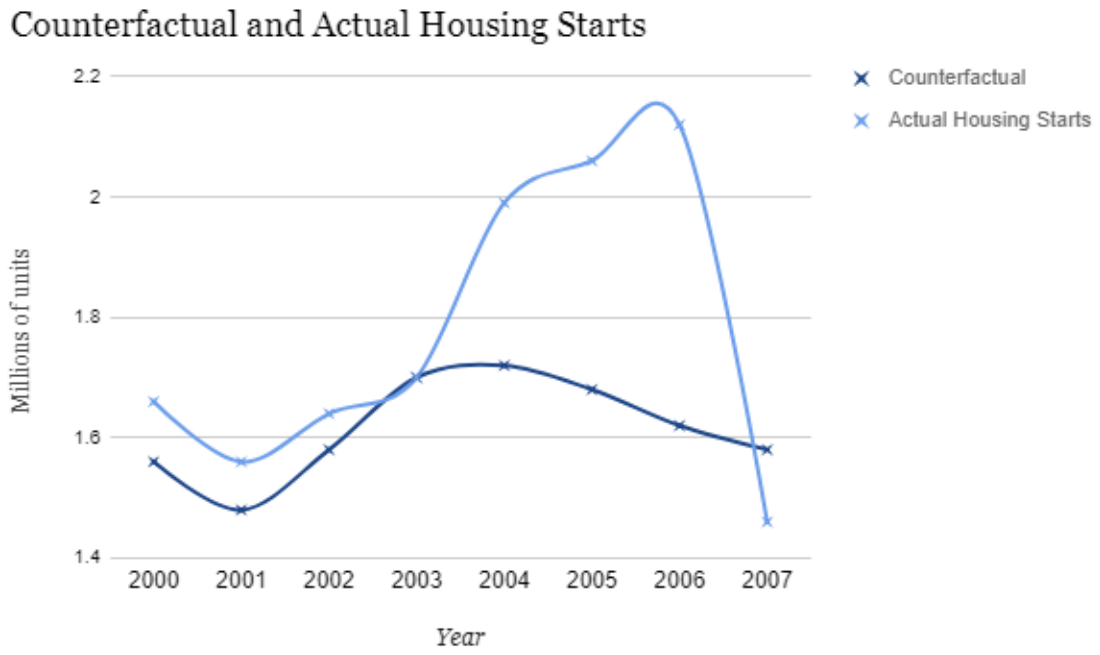

Figure 3. The Boom-Bust in Housing Starts Compared with the Counterfactual. Recreated from "Getting Off Track", by Taylor, J. B., February 2009.

From Figure 3, had the Fed followed the Taylor Rule which is labeled "Counterfactual", the huge housing boom and bust would have been avoided as the line is well below 1.8 million units. However, looking at the actual housing starts, it was evident that the housing bust was inevitable.

He also criticized the unusually low interest-rate set by the Fed in an attempt to avoid the threat of deflation after its occurrence in Japan in the 1990's (Taylor, 2009, pg. 3). From Figure 4, it is quite evident that the interest-rate set was well below what the

Taylor rule had prescribed. According to Taylor, this was the largest deviation by the Fed since 1970s. This was evidence of the monetary excess leading up to the housing boom as ease of lending for financial institutions became convenient, which meant more circulation of money in the economy.

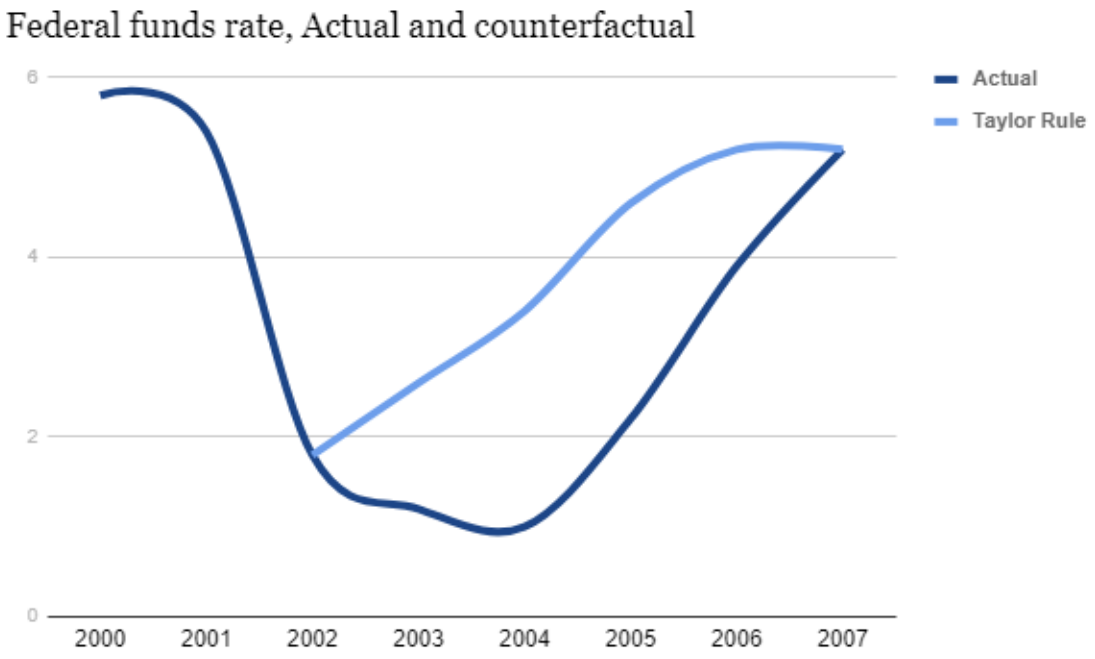

Figure 4. Federal Funds Rate, Actual and Counterfactual. Recreated from "Getting Off Track", by Taylor, J. B., February 2009.

Taylor goes on to look at the 2008 financial crisis from a global perspective. Some economists argue that some factors which were beyond the control of the monetary authorities might have had a role to play in the financial crisis. There were speculations of a global savings glut which drove down interest rates in the United States as well as other nations. Figure 5 depicts the global savings and investment glut that occurred during the period. From the graph the majority of the period was characterized by an excess of investments over savings, with the exceptions of 1970-1975 and 1995-1997.

However, empirical evidence suggests otherwise. Results show that although there was an excess between savings and investment globally (outside the United States), it was offset by the current account deficit being experienced in the United States which generated no extra impact on the world interest rates.

.

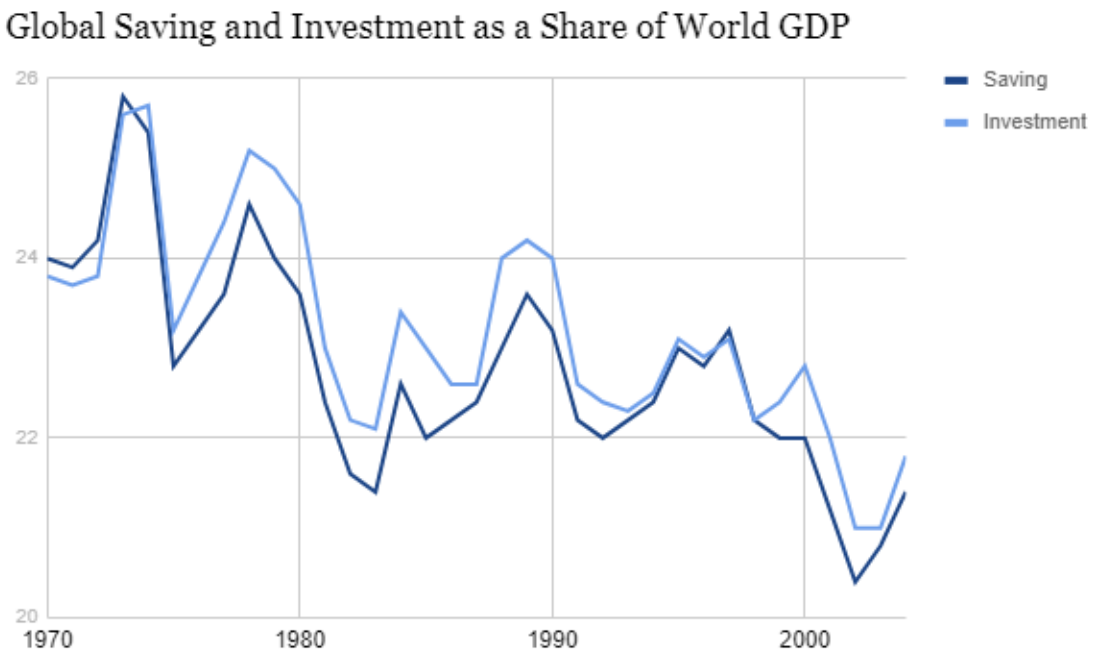

Figure 5. Global Saving and Investment as a Share of World GDP (in Percent). Recreated from "Getting Off Track", by Taylor, J. B., February 2009.

Taylor goes on to identify a potential alternative explanation for the crisis. Still based on a global outlook, Taylor believes that the deviation from the rule by the central banks in other countries could have contributed to the crisis. Data gathered showed that housing booms were largest in nations such as Spain, which deviated more from the rule. Other nations such as Austria experienced relatively less impact from the housing boom

due to their deviation. In summary, it seems to hinge on the central bank's deviation (whether that of the United States or other nations) from the Taylor rule.

VI - Conclusion: Future Research

The topic of the 2008 financial crisis is one that has caused a divide in the financial world as economists have yet to come to a general conclusion for the primary cause of the crisis. On one side of the spectrum, some economists question the legitimacy of the Taylor rule and its usefulness before and during financial crisis such as the one that occurred in 2008. On the other side of the spectrum, economists such as Taylor argue that the Fed's level of deviation was the sole cause of the housing bust, although other global factors might have had a role to play in the crisis.

It is understandable that the Fed was reluctant to follow the rule strictly as it would reduce their flexibility and adaptability in monetary policy. However, the threshold within which deviation would be permitted with little or no effect on the economy was seemingly surpassed, and as such, the Fed's decision could be identified as a likely cause of the 2008 financial crisis. The Fed policy could have been implemented better to avoid, or at least reduce, the impact of the crisis. Certain data, however, were not clearly conveyed in the aggregate financial statistics of the U.S economy which contributed to the severity of the crisis. The increase in reliance of short-term funding for longer-term financial instruments (such as bonds) which left the financial system vulnerable to a withdrawal of liquidity was difficult to identify from the data available (Eichner et al, 2010). There was also an increase in credit risk associated with the growth

in the home mortgage which left borrowers vulnerable to any decline in housing prices. The Fed policy was therefore not strong enough to protect the economy from the crisis.

There is still much to be studied regarding monetary policy adoption by the Fed and previous financial crises that have changed the scope for policymakers in the nation. The high level of uncertainty makes it difficult to discern the causes of such economic crisis, as well as to come up with safeguards to help prevent future occurrences. It would be beneficial in future research on the topic was directed toward attaining a numerical threshold within which deviation from the Taylor rule is acceptable. It is evident that deviation from the Fed had occurred prior to the 2008 financial crisis, along with other past periods. It is also evident that strict adherence to any monetary policy rule adopted reduces flexibility and rate of adjustment by the Fed. Finding a permissible range within which deviation from the Taylor rule causes no harm to the economy could prove quite useful for the Fed.

Reference List

Abel, A., Bernanke, B. and Croushore, D. (2017). *Macroeconomics*, 9th ed., Boston, MA: Pearson.

Anderson, R., Bordo, R., and Duca, M. (2017). Money and Velocity during Financial Crises: From the Great Depression to the Great Recession. *Journal of Economic Dynamics and Control*, Vol. 81 (August 2017, 32-49).

Bernanke, B. S. (2015). The Taylor Rule: A Benchmark for Monetary Policy? *Brookings.* Retrieved from https://www.brookings.edu/blog/ben-bernanke/2015/04/28/the-taylor-rule-a-benchmark-for-monetary-policy/

Bryan, M. (2013). The Great Inflation. *Federal Reserve History.* Retrieved from: https://www.federalreservehistory.org/essays/great_inflation

Byun, K. (2010). The U.S. housing bubble and bust: impacts on employment. *Monthly Labor Review*. Bureau of Labor Statistics. December.

Croushore, D. & Stark, T. (1995). B*usiness Review (Federal Reserve Bank of Philadelphia)*, 3. Retrieved from http://eds.b.ebscohost.com/eds/detail/detail?vid=3&sid=419dee39-dbb0-4206-87da-6a95df5cdf79%40pdc-v-sessmgr01&bdata=#AN=9502271479&db=fth

Duca, M. (2017). The Great Depression versus the Great Recession in the U.S.: How Fiscal, Monetary, and Financial Policies Compare. *Journal of Economic Dynamics and Control*, Vol. 81 (August 2017, 50-64).

Eichner, M.J., Kohn, D.L., and Palumbo, M.G. (2010). Financial Statistics for the United States and the Crisis: What Did They Get Right, What Did They Miss, and How Should They Change? *Finance and Economics Discussion Series.* Retrieved from: https://www.federalreserve.gov/pubs/feds/2010/201020/201020pap.pdf

Federal Housing Finance Agency. (N.A) *Quarterly Average and Median Prices for States and U.S.* [Date file]. Retrieved from: https://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx#atvol

Federal Reserve Bank of San Francisco. (1998, March). *What is Taylor's Rule?* Retrieved from https://www.frbsf.org/education/publications/doctor-econ/1998/march/taylor-rule-monetary-policy/

Federal Reserve Bank of St. Louis. FRED II. Retrieved from https://fred.stlouisfed.org.

Hoover, K. D. (2008). Phillips Curve. *The Concise Encyclopedia of Economics*. Library of Economics and Liberty. Retrieved from: http://www.econlib.org/library/Enc/PhillipsCurve.html

Jahan, S., Mahmud, A.S., & Papageorgiou, C. (2014). What Is Keynesian Economics. *Finance & Development, 51,5.*

John B. Taylor. *Stanford Profiles*. Retrieved from https://profiles.stanford.edu/john-taylor

Jung, A. (2017). Does McCallum's rule outperform Taylor's Rule During The Financial Crisis? *The Quarterly Review of Economics and Finance.* Retrieved from https://www.sciencedirect.com/science/article/pii/S1062976916301478

Koch, C., Richardson, G., Van Horn, P. (2016). Bank Leverage and Regulatory Regimes: Evidence from the Great Depression and Great Recession. *American Economic Review: Papers and Proceedings*, 106 (5): 538-542.

Kumar, S. (2013). Financial Crisis, Taylor rule and the Fed. *Applied Economics Letters*. Vol. 20. 1557-1561. Retrieved from https://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=4&sid=bc0bd0e4-8b60-4bf3-b69c-176477d78435%40sessionmgr103

Mishkin, F. (2012). *Macroeconomics: Policy and Practice*. Boston, MA: Addison Wesley.

Mislinski, J. (2018, February 27). FHFA House Price Index: Index Up 1.6% in Q4 2017. *Advisor Perspectives.* Retrieved from https://www.advisorperspectives.com/dshort/updates/2018/02/27/fhfa-house-price-index-index-up-1-6-in-q4-2017

Mankiw, N. G. "New Keynesian Economics". *The concise Encyclopedia of Economics*. 2008. Library of Economics and liberty. 18 March 2018. Retrieved from http://www.econlib.org/library/Enc/NewKeynesianEconomics.html

Mankiw, N.G. (2013). *Macroeconomics*. New York: Worth Publishers.

Nikolsko-Rzhevskyy, A., Papell, D.H., & Prodan, R. (2014). Deviations From Rules-Based Policy And Their Effects. *Journal of Economics Dynamics and Control,* 49, 4-17.

Retrieved from https://www-sciencedirect-com.libez.lib.georgiasouthern.edu/science/article/pii/S0165188914002565

Taylor, J. B. (2009). *Getting Off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis.* Available from https://ebookcentral.proquest.com/lib/gasouthern/reader.action?docID=3301906&query=

Taylor, J.B. (1993). Discretion versus policy rules in practice. *Carnegie-Rochester Conference series on public policy, 39.* Retrieved from: https://web.stanford.edu/~johntayl/Papers/Discretion.PDF

Taylor, J. B. (Interviewer) & Friedman, M. (Interviewee). (2000). *An Interview With Milton Friedman* [Interview Transcript]. Retrieved from Macroeconomic Dynamics: https://web.stanford.edu/~johntayl/Onlinepaperscombinedbyyear/2001/An_Interview_with_Milton_Friedman.pdf

The U.S Department of Treasury. (2012). [Graph illustration of Cost Estimates of Troubled Asset Relief Program]. Retrieved from: https://www.treasury.gov/resource-center/data-chart-center/Documents/20120413_FinancialCrisisResponse.pdf

The U.S. Department of the Treasury. (2016). *TARP Programs. (November 15, 2016).* https://www.treasury.gov/initiatives/financial-stability/TARP-Programs/Pages/default.aspx#

Vitruk, A. (2014). Federal Reserve Monetary Policy and the Taylor Rule. *Review of Banking & Financial Law,* Vol. 34(1), 102-110.