# Introduction

Macroeconomics, in its current form is a combination and interaction of business cycles and monetary policy. The history of business cycles can be traced back from Jevons and Juglar to Mitchell, and monetary theory, building on the work of Hume, Thornton, Ricardo, Wicksell, and Fisher, supplemented by the circular flow analysis of Quesnay and Marx1.

Business cycles, indigenous part of an economy have for long troubled economists. One of the primary aims of economics is its attempt to explain business cycles and regulate it. Various institution in an economy work in the direction “*to extend the period of expansion and curb down the effects of contraction*”. The central bank of a country is one such institution.

The Federal Reserve System, often referred to as the Federal Reserve or simply "the Fed" is the central bank of the United States of America.It was created by the Congress to provide the nation with a safer, more flexible, and more stable monetary and financial system2. One of the five functions as listed by the Fed is “Conducting the nation's monetary policy”.

Monetary theory, dealing with prices, money and output was initially explained by the “Quantity theory of money”, it has evolved long way since then. Monetary theory suggests that how different monetarypolicies can benefit nations depending on their unique set of resources and limitations. However, as Milton Friedman (1968) clearly articulates monetary policy has limits.

The role of monetary policy and its independence has been debated since the establishment of Bank of England in 1694. However, since Paul Volcker, the former chairman of the Fed’ it has settled; at least in the United States, to keeping inflation low and stable. This produced a prolonged period of stability in the economic environment. This period is often referred to as the period of “Great Moderation”3.

This is the kind of period that Minsky (1974) was referring about when he said “Stability breeds instability”. The financial markets which are heavily influenced by the monetary policies is one of the primary component of instability. The instability in economy originates from the financial market, be it the “Great Depression” or the “Great Recession”.

In this paper we will try to examine the monetary policy rule. Section 2 and 3 briefly deals with the role of central bank and the financial crisis of 2007-08. The policy rule followed by the FED and that proposed by John Taylor (1993) are compared in Section 4 of the paper. Section 5 further analyses the role of monetary policy in stabilizing the financial market and will try to answer the question “Weather monetary policy should explicitly target the asset prices”? Section 6 will provide counterfactual scenario for the housing stats with various rule proposed. Section 7 concludes the paper by summarizing the main finding of the study.

In all this debate of monetary policy and financial stability we will try to answer weather monetary policy can be used for financial stability or specifically to target the asset market or not.

# Economy, Crisis and Role of Central Bank

Business cycles are integral part to almost every economy on this planet. Every boom is followed by a bust and every trough by a high. Business cycles and financial crisis are not a new phenomenon. The history of financial crisis in an economy can be traced back to 1st Century. It was a “financial panic” caused by mass issuance of unsecured loan by the Roman Banking houses. If we broadly analyse all the financial crisis till date, we will find almost the same reason for a majority of them. Weather be it the 1st Century Crisis or the 14th Century Banking Crisis or the Tulip Mania or the 19th and 20th Century crisis, they are all caused by the heard behaviour; usually preceded by a relatively long stability.

The recent housing bubble of 2007 which led to the “Great Recession” can be easily compared to the tulip bubble of the 17th Century. Tulip bubble has been stated by historian as the “history’s most extreme example of a fundamentally irrational speculative fever”. It saw the price of a single tulip bulb rise to the value of a luxury house in 17th Century Amsterdam. It was primarily caused by failed attempts of the conversion of ordinary futures contracts to option contracts by the Dutch burgomasters to bail themselves out of the previously incurred speculative losses4. On the other hand the housing bubble, which saw an unprecedented rise in prices of real estate, was caused by the unregulated betting through Mortgage backed security; loose monetary policy; loosely regulated housing and financial sector. Like the 17th century tulip bubble what lied in the heart of the recent housing bubble was an unregulated financial market which promoted the risk taking behaviour of the investors without strong fundamentals.

Crisis, in form of various events are a part of every economy. It is also the proof of its dynamic nature and need for actors in an economy to continuously react to these events. One such actor or institution that constantly keeps a check on the economy and influences the financial market is the Central Bank of the Economy.

In United States, the Federal Reserve’s System was established in 1913 with the enactment of the Federal Reserve’s Act by the Congress. The five general functions performed by the federal reserves for effective operations of the US economy are:

1. Conducting the nation’s monetary policy
2. Promoting the stability of the financial system
3. Promoting the safety and soundness of individual financial institutions and monitors their impact on the financial system as a whole.
4. Fostering payment and settlement system safety and efficiency
5. Promoting consumer protection and community development

Like the banking panics of 1930s, the financial crisis of 2007-08 is attributed to also the FED by many. In words of J. B. Taylor (2009) “Financial crisis is caused by Excesses-frequently monetary excesses.”5 and FED is mandated to conduct the monetary policy. It is clear from the financial crisis of 2007-08 that the FED failed in two of its functions. First, it failed to promote the financial stability. Second, it failed to ensure the soundness of financial institution. With the FED mandated to conduct the monetary policy of the US it becomes extremely important to analyse the conduct of FEDs monetary policy to critically comment on the role of FED in the crisis. It is also necessary to analyse the monetary policy because many including Taylor (2007) have argued that the loose monetary policy of the Federal Reserve was one of the reason for the financial crisis. The Monetary policy directly and indirectly affects the financial market therefore also needs to be analysed for the scope of capturing the signals of a crisis.

# FEDs Monetary Policy

The Federal Open Market Committee sets U.S. monetary policy in accordance with its mandate from Congress: to promote maximum employment, stable prices, and moderate long-term interest rates in the U.S. economy. The Federal Reserve conducts the nation’s monetary policy by managing the level of short-term interest rates and influencing the availability and cost of credit in the economy. Monetary policy directly affects interest rates; it indirectly affects stock prices, wealth, and currency exchange rates. Through these channels, monetary policy influences spending, investment, production, employment, and inflation in the United States. Though not officially the FED has moved to a rule based system rather than a pure discretionary policy. However since there is no public rule for the conduct of monetary policy put forth by FED, there is a scope of discretionary policy. Taylor (2010) called this “well intended” deviation from the policy rule as “discretionary fine tuning”.

* + 1. **Monetary Policy Rule**

Apparently, the Fed in the recent past has settled down to follow the twin objective of stabilizing inflation around its target and keeping the output close to its potential. Though the weights and variable in the monetary policy rule suggested by different authors, have varied from unemployment gap to output gap, the level of output, and the growth rate of output. However, it is consistent of the twin objective in most of the models suggested by academicians and Federal Reserve’s researchers. It is also generally acceptable that there is a trade-off between the inflation and output, however many disagree with the significance of this trade-off.

John B. Taylor (1993) proposed a policy rule which is commonly referred to as the “Taylor Rule” and is since then considered as the optimal policy rule by many. Taylor (1993) argued that the monetary policy instrument which is the federal fund rate6 must respond to deviation of inflation from its target (which was assumed to be 2%) and percentage deviation of output from its trend.

--***Equation 1***

where

*r is federal funds rate*

That is,

\*100

*Y is real GDP*

*Y` is trend real GDP*

Although not explicitly the FED has followed the Taylor rule particularly under the chairmanship of Paul Volcker and Alan Greenspan. However, the rule is not free from criticism. Some argue for looking at only inflation for the policy rule whereas others propose including additional variables to explicitly capture the financial condition of the market.

Of the five functions of the FED listed above can the first three, particularly the conduct of monetary policy and maintaining the financial stability be clubbed together? Can we capture the cues of financial instability in the monetary policy rule and use the monetary policy instrument to regulate the financial market? Is monetary policy instrument a blunt instrument or twelve people sitting in a room cannot decide better than the markets? All such questions can be answered by critically analysing the monetary policy and creating the counterfactual scenarios.

The financial crisis of 2007-08 provides us with an opportunity to analyse

1. Weather or not we can incorporate the parameters giving cues of financial instability to enhance the Taylor rule.
2. Create a counterfactual scenario to check for the financial stability of the system.

# The “Great Recession”

The “Great Recession” which resulted in general decline in world market is a result of financial crisis of 2007-08 and US subprime mortgage crisis 2007-09. Though crisis started with the with fall of Lehman Brothers but the seed for the crisis were sown long back in late 1990’s. The lack of government regulation for financial institutions, lax lending standards, government intervention with the function of Freddie Mac and Fannie Mae, loose monetary policy by FED are amongst a few widely accepted causes of the crisis.

Housing sector was at the core of the crisis. It all started with popularization of mortgage backed security (MBS) by Lewis Ranieri considered by many as one of greatest innovator7 and blamed by others for the sub-prime crisis. A mortgage-backed security (MBS) is a type of asset-backed security that is secured by a mortgage or collection of mortgages. The mortgages are sold to a group of individuals (a government agency or investment bank) that securitizes, or packages, the loans together into a security that investors can buy.

Since it was a safe investment with a high rate of returns investors flocked to by the MBS in form of Collateral Debt Obligation (CDO), synthetic CDOs etc. The decade preceding the crisis saw an unprecedented growth of 124% in house prices. The year on year house price inflation increased from 0% in 1997 close to 10% by 2005 as evident from Figure 1. The sudden and a continuous rise in house price inflation led to investors and households taking extra risk. This promoted the heard behaviour amongst the investor. Complimenting it was the loose lending standards as well as the affordable housing programme by the Government of United States.

**Figure 1:** The quarterly housing price inflation calculated based on the Shiller’s housing price index

High housing inflation was further supplemented by the low perceived risk in the market. The Ted Spread8 which captures the perceived credit risk in market was at close to 0% as seen in Figure 2. The low perceived risk also indicate that common perception amongst investors of “everybody pays their mortgages”. The fall in investor sentiment is evident from the abrupt rise in the spread post 2007. This clearly indicates that the problem was indeed of credit risk9 rather than a liquidity problem.

**Figure 2:** The quarterly average of TED Spread

All this along with loose monetary policies led to US housing bubble, which busted in 2007-08. The crisis which originated in US was transferred worldwide and was converted to the “Great Recession”.

# Various variants of Taylor Rule

# Taylor Rule with CPI

To establish the argument of loose monetary policy we will try to estimate the Taylor rule (equation 1) for the period of 1987-2008. It is aimed at capturing the response of the independent variables viz. inflation and output gap during the crisis as well as pre crisis period. The year 1987 is marked as the start of long period of the chairmanship of Alan Greenspan and the period of “Great Moderation”. This allow us to fully capture the dynamics of economy including the period of advent of crisis. Post 2008 the monetary policy instrument viz. the federal funds rate was forcefully kept close to 0% to support the recovery of the economy. Therefore, the period of study seems appropriate to cover most of the aspect of the study. The extended period will allow us to even accommodate the loose monetary policy in the policy rule.

The estimated Taylor rule for the period is:

**1.5** --***Equation 2***

where

*r is federal funds rate*

That is,

\*100

*Y is real GDP*

*Y` is potential GDP as estimated by the Congressional Budget’s Office*

This is in line with the Taylor Rule (1993) in equation 1 with increased weightage to output gap. If we compare the actual federal funds rate to that with estimated rate from equation 2, we see a clear deviation from the policy rule post 2002-Q2.

The difference between the actual Federal Funds rate and from the counter factual scenario i.e. the had the estimated Taylor rule been followed is significant only for a period of 2002-Q2 to 2006-Q3. This estimation is also in line with the estimations of Taylor (2009) despite accounting for a complete cycle. This clearly indicates of the discretionary nature of policy by the FED. Though there are many competing arguments given by the various researchers included the then chairmen Ben S. Bernanke. Some of the prominent arguments by researchers include the presence of “Saving Glut” and fear of deflation but none of that changes the fact that the monetary policy was loose. The deviation was as high as 3 percentage point particularly after 2004.

**Figure 3:** The graph compares Federal Funds Rate i.e. the actual policy rate with the estimated rate as per equation 1. From 1987-2002 the difference between the actual and estimate rate is insignificant.

The FED described in 2002 that

The consequences of this deviation can be logically analysed and argued upon. The loose monetary policy led to excess money supply in the economy and hence investor taking extra risk

# Taylor Rule with Personal Consumption Expenditure (PCE)

However, the erstwhile chairman of the FED Ben S. Bernanke argued that the use of GDP deflator (as used by John Taylor) or CPI is not what the FOMC prefers to target. It has always been clear to target the core personal consumption expenditure (PCE). If we change the measure of inflation from CPI to core-PCE and re-estimate the Taylor rule we get the following result.

Graph and equation of taylor rule with PCE

The results rubbishes Ben Bernanke’s claim that the FED never deviated from the policy. Careful manoeuvring by Ben Bernanke like changing the time period of study10 etc. though reduced the burden of the loose monetary policy from FED but it is not logical enough to explain the correlation between low perceived risk and monetary policy during the same period (2003-05).

1. Dimand, Robert W., "macroeconomics, origins and history of", "The New Palgrave Dictionary of Economics", Eds. Steven N. Durlauf and Lawrence E. Blume, Palgrave Macmillan, 2008, The New Palgrave Dictionary of Economics Online, Palgrave Macmillan. 06 April 2017, DOI:10.1057/9780230226203.1009.
2. As listed by the Federal Reserve System.
3. Stock, James; Mark Watson (2002). ["Has the business cycle changed and why?"](http://www.nber.org/chapters/c11075.pdf) (PDF). NBER Macroeconomics Annual.
4. Thompson, E.A. Public Choice (2007) 130: 99. doi:10.1007/s11127-006-9074-4.
5. Getting off the Track by J B Taylor.
6. Fed funds rate is the interest rate at which banks make overnight loans to each other.
7. BusinessWeek presented him as the greatest innovators of the past 75 years in 2004.
8. Ted spread is calculated as the spread between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill.
9. Getting off the Track by J B Taylor.
10. The time period of study by Bernanke was from 1993