

The Federal Funds Rate and Unemployment Relationship: Does Business Confidence Matter?

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Abstract

Following the 2008 financial crisis, the United States' economy went into one of the most severe recessions since the Great Depression. In an attempt to stimulate the economy, the Federal Reserve lowered the federal funds rate to near zero in 2008. The unemployment decrease is not as large or fast as many had hoped, spurring much debate on whether business confidence may play a role in the federal funds rate's inability to affect the unemployment rate. It was hypothesized that high levels of economic policy uncertainty and low levels of business confidence negatively affect the unemployment rate. Using a regression analysis, results indicate that a negative contemporaneous relation exists between the federal funds rate and unemployment. Given the long term positive relationship between the federal funds rate and unemployment, lowering the federal funds rate should have brought down the unemployment rate, but that hasn't happened. The persistently high unemployment exists because the low level of business confidence is deterring businesses from hiring in the face of economic policy uncertainty despite the incentive of a low interest rate's incentive to do so.

Keywords: Federal funds rate; unemployment rate; business confidence

Introduction

Following the 2008 financial crisis, the United States' economy went into a deep recession with a peak unemployment rate around 10% during the summer of 2009. To stimulate the economy, the Federal Reserve lowered the federal funds rate to near zero shortly after the crisis broke. Historically, when there

was an increase in unemployment, the Federal Reserve would lower the current federal funds rate to help lower the future unemployment rate. The logic behind this decision is simple: a lower interest rate incentivizes businesses to borrow more for investment to produce capital, ultimately leading to a higher demand for labor and a lower unemployment rate (Gavin, 2013). Modeste and Mustafa (2011) found a significant long-term relation between the federal funds rate and unemployment both with the Engle-Granger ADF test and the Johansen-Juselius cointegration; To test the long-run relationship between the federal funds rate and unemployment, Modeste and Mustafa (2011) used both the Engle-Granger ADF test and the Johansen-Juselius cointegration, they found a significant cointegration relation; also that one percent change in the federal funds rate results in a three-tenths of a percent change in the unemployment rate in the same direction. Given this relationship between the two variables, lowering the federal funds rate should have produced a larger reduction in the unemployment rate, but the unemployment rate remains high despite a federal funds rate frozen close to zero.

The ineffectiveness of the federal funds rate in lowering the unemployment rate has sparked debate surrounding the role that economic uncertainty and business confidence may play. Economic uncertainty has been pinpointed as a major factor that exacerbated the latest recession, but uncertainty usually increases during recessions. The difference is that the increase in uncertainty during the Great Recession was much greater than the normal expected increase and led to an increase between one and two percentage points in the unemployment rate (Leduc & Lui, 2012). Uncertainty is able to influence the unemployment rate because it makes businesses more cautious and reluctant to invest when uncertainty is high.

This paper's focus was on the role of economic uncertainty and business confidence in the relationship between the federal funds rate and unemployment. With a federal funds rate frozen close to zero and an unemployment rate still high above the natural rate of unemployment[†], this is a relevant topic not only to the understanding of current economic conditions, but also policy matters concerning a way to correct for them. A multiple-regression analysis was used to analyze data concerning the federal funds rate, unemployment and business confidence to

[†] In the United States, the natural rate of unemployment is between 4 to 6 percent.

establish any relationship between the variables.

Literature Review

The lowering of the federal funds rate was not the only action taken by the Federal Reserve to help stimulate the economy. In what is known as Quantitative Easing, the Federal Reserve also started buying long term US bonds (Krugman, 2013). The Federal Reserve has continued to pump \$85 billion a month into the economy and will continue to do so until target unemployment is reached. Despite the lowering of the federal funds rate and the monthly stimulus, unemployment isn't responding as quickly or dramatically as expected. Although the desired results haven't been obtained yet, there appears to be no indication that either action is likely to be reversed anytime soon. This creates a certain amount of anxiety within the business community since a high persistence of unemployment supports the continuation of stimulus packages during recession recovery beyond pre-crisis output levels (Calvo, Coricelli, & Ottonello, 2012). A stimulus is only intended to help a country rebound from low crisis output levels to those from before the crisis. With the exception of unemployment, the recovery from the Great Recession looks fairly normal: profits, productivity and GDP, gross domestic product, have all risen.

Unemployment is the lasting effect from the Great Recession in an otherwise normal recovery. Unemployment peaked at 10% in 2009, but has since gone down to 7.0%, as of the latest data released on Friday December 6, 2013. Although this looks like progress, Krugman (2013) warns that these numbers may be deceiving, especially since he believes that the majority of this decrease results from discouraged workers. He warns that to obtain target unemployment numbers, we may have to cover a lot more ground than anticipated as workers who left the labor force in 2007 are likely to reenter the workforce at some point. Whether or not the unofficial unemployment rate is completely representative of the unemployment reduction task at hand, the slow progress we are experiencing isn't typical. Following a normal recession, employment numbers are just three or four months behind the business cycle recovery, but we are currently years behind (Freeman & Rogers, 2005). Despite the Federal Reserve's use of conventional and unconventional tools of monetary policy, we still have a high unemployment rate,

leading many to seek another explanation. Uncertainty has been emphasized as a key driving factor in the 2007-2009 recession according to the Federal Open Market Committee minutes (Bloom et al., 2012). It appears that economic policy uncertainty deters businesses from investing despite the incentive from low federal funds rate to do so.

The unusually high levels of economic uncertainty also influence business confidence, another keyword in explaining the slow movement of the unemployment rate. The expectation of profits is one of the deciding factors when it comes to investment decisions for a firm according to Keynes (Gelissen, 2010). If firms are uncertain what to expect for profits or from the economy in general, their confidence would decrease. When firms are being presented with great uncertainty, many are choosing the more conservative option and delaying investment. In her Washington Post article, Ghei (2012) presented the report by investment bank Credit Suisse that almost a third of businesses were delaying investing in planned projects because of economic uncertainty. Current Federal Reserve chairman Ben Bernanke, in 1993, indicated that if firms are reluctant to invest, an economy can slow down (as cited in Sum, 2013). This currently appears the case, as economic uncertainty has increased, business confidence has decreased just like the amount of investments have, which in turn has led to fewer job creations.

The unemployment rate hasn't been decreasing as quickly as expected, and low business confidence as a culprit is not a novel idea. Bernanke (2010) reflected on the beginning of a recovery from the recession based on restored business confidence, represented by stabilized demand, increases in production and slower inventory liquidations. He asserted that expansion is dependent on the expectations of future demand increases, not financing costs. This appears to be true following the Great Recession. The Federal Reserve lowered the federal funds rate to make it cheaper for businesses to finance expansion projects. Under circumstances with high confidence in future demand, firms would have quickly seized the opportunity to expand; under circumstances with lower confidence in future demand firms are more hesitant about expansion. Bernanke explained that firms have been reluctant to expand, or add permanent employees, because of elevated economic uncertainty. This brings the argument full circle. Firms, faced with elevated

economic uncertainty, have low confidence in future demand thus deterring expansion projects despite the tempting financing options presented by a low federal funds rate.

Prior research has established the ability of the federal funds rate to influence future employment. Research has also looked at the impact of uncertainty on the unemployment rate. This study's contribution is to show the role that business confidence plays on the federal funds rate's ability to influence future unemployment. It was hypothesized that low levels of business confidence would lessen the federal funds rate's influence on the unemployment rate. Similarly, high levels of business confidence would strengthen the federal funds rate's ability to influence the unemployment rate.

Data

The majority of the data used in this research was compiled from an array of electronically published data sets. One of the major contributing sources of data was the Federal Reserve Bank of Saint Louis which provided employment and federal funds rate data. The Organization for Economic Cooperation and Development database was used to establish Business Confidence data. Macroeconomic uncertainty data was derived from the Economic Uncertainty Index used in Baker, Bloom and Davis (2013). Monthly data between the years 1960 and 2013 was used in the analysis. The descriptive statistics of the data set are shown in table 1.

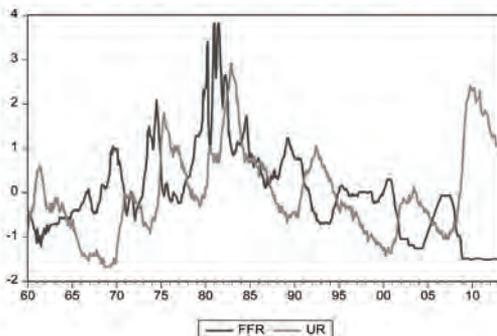
Variables	Mean	Std. Dev.	Observations
Federal Funds Rate	4.1926	2.7086	343
Business Confidence	99.7703	1.0513	343
Economic Policy Uncertainty	107.5665	32.8409	343
Unemployment Rate	6.1303	1.5095	343
Employment Population Ratio	61.9667	1.7542	343
Inflation	2.8309	1.1059	343

The federal funds rate is the interest rate at which depository institutions lend reserves to one another overnight. The variable Business Confidence indicates how managers feel about their

companies' prospects given the outlook of the overall economy. The index is centered around the value "100", representing the long term average. A value of less than this indicates higher pessimism, while a value greater than 100 indicates optimism. A similar measure is economic policy uncertainty, defined as periods of time where uncertainty surrounds future government policy. Both business confidence and economic policy uncertainty measure similar variables. Low business confidence is positively correlated with high economic policy uncertainty. The unemployment rate is the ratio of unemployed workers to the labor force at any given point in time. The unemployment rate doesn't account for discouraged workers, thus is arguably not always the best measure of joblessness in the economy. To accommodate for this weakness, the employment population ratio, or ratio of employed workers to the total working age population, was also considered in the regression. Inflation measures the increases in the general price level within an economy.

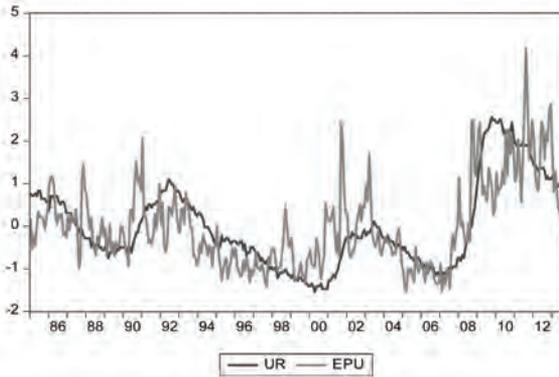
The unemployment rate and federal funds rate have a negative contemporaneous relationship as shown in figure 1. When the unemployment rate is at its highest, we expect the federal funds rate to be at its lowest. It is not uncommon to see a lower federal funds rate in a weak economy. The limitation to this graph is that it only shows the present relationship between the two variables, not taking into account any lagged effects. The graph is unable to capture the influence of the current federal funds rate on future unemployment. The analysis was able to accommodate for this type of relationship however by using a lagged federal funds rate.

Figure 1. The Contemporaneous Relationship between the Federal Funds Rate and the Unemployment Rate. This figure illustrates the negative contemporaneous linear relationship.



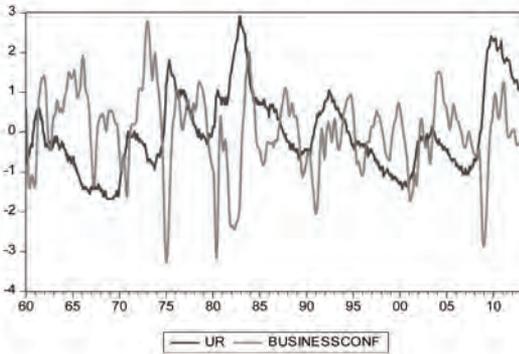
The main purpose of this paper was to look at the role of business confidence and economic uncertainty played on the relationship between the federal funds rate and the unemployment rate. High economic policy uncertainty leads to lower business confidence. For the sake of simplicity, business confidence was used in the regression analysis to account for business sentiment. However, the relationship between economic uncertainty and the unemployment rate is shown in figure 2.

Figure 2. The Contemporaneous Relationship between Unemployment and Economic Policy Uncertainty. This figure illustrates the positive contemporaneous linear relationship between the variables.



These two variables have a strong positive relationship: normally when uncertainty increases, there is also an increase in the unemployment rate, except during 2008-2010. When there is a high level of economic uncertainty, firms don't know what to expect from the future and as a result are faced with layoffs or are hesitant to hire new positions. Business confidence moves in the opposite direction of the unemployment rate, as demonstrated in figure 3. When business confidence is high the unemployment rate is low; firms are more confident about the economic conditions of the future and are willing to hire new employees. On the other hand, when business confidence is low the unemployment rate is high because of their negative relationship.

Figure 3. The Relationship between Unemployment and Business Confidence. This figure illustrates the negative contemporaneous linear relationship between the two variables.



Methodology

In order to investigate the relationship between unemployment rate, federal funds rate and business confidence, the regression equation below (equation 1) was estimated using an ordinary least square method. Since the time series variables used are not stationary, the first difference was used to correct for possible autocorrelation. It is also assumed that the explanatory variables are exogenous.

$$\Delta UR_t = \beta_0 + \beta_1 \Delta FFR_t + \beta_2 \Delta FFR_{t-4} + \beta_3 \Delta BC_t + \beta_4 \Delta (BC * FFR)_{t-4} + \beta_4 \Delta \text{Infl}_t + \epsilon_t \quad (1)$$

In the above equation a change in an unemployment rate at a time t is represented by ΔUR_t . The changes in federal funds rate and business confidence are denoted by ΔFFR_t and ΔBC_t respectively. A four month lagged value was also included since it takes some time for policy measures to affect the unemployment rate. Moreover, the interaction term, $\Delta (BC * FFR)_{t-4}$ was included to see how the federal funds rate changed for a given level of business confidence.

It was expected that federal funds rate and unemployment would be contemporaneously negatively related (i.e. β_1 is expected to be negative). In other words, a period of low unemployment is associated with high level of federal funds rate. However, past federal funds rate is positively associated with the current level of unemployment rate (i.e. β_2 is expected

to be positive). I also expect that business confidence is negatively associated with unemployment rate (β_3 is expected to be positive). We expect a negative relationship between unemployment and inflation as suggested by the Phillips curve.

Results

To test the hypothesis that the change in the unemployment rate is a function of a federal funds rate, business confidence, a business confidence and federal funds rate interaction, and the inflation rate, a least squares regression analysis was performed. Regression coefficients are shown in table 2.

Table 2 Regression Output (Dependent variable: Unemployment Rate)

Variables	Coefficients
Constant	0.0033 (0.0066)
ΔFFR_t	-0.0603*** (0.01247)
ΔFFR_{t-4}	1.3371*** (0.2651)
ΔBC_t	-0.1246*** (0.0230)
$\Delta(BC * FFR)_{t-4}$	-0.0139*** (0.0027)
$\Delta infl$	-0.0529* (0.0256)
R-squared	0.1258
Robust standard errors in parentheses	
*** p<0.001, ** p<0.01, * p<0.05	

Each of the predictor variables had a strong significant ($p < 0.0001$) relationship with the unemployment rate with the exception of inflation whose relationship was not as strong but still significant ($p < 0.05$). As predicted, there exists a negative relationship between the federal funds rate and unemployment rate ($\beta_1 = -0.0603$). While they have a negative contemporaneous relationship, there exists a positive relationship between the unemployment rate and the lagged federal funds rate ($\beta_2 = 1.3371$). The third prediction was also confirmed, a negative association exists between business confidence and the unemployment rate ($\beta_3 = -0.1246$). This model was able to explain 12% of the variability in the unemployment rate ($R^2 = 0.1258$, $F = 19.3363$, $p < 0.001$).

The same regression was run using the employment

population ratio in lieu of the unemployment rate to accommodate for the discussed flaw in the unemployment rate statistics. The results of the least squares regression using the employment population ratio is shown in table 3.

Table 3 Regression Output (Dependent variable: Employment Population Ratio)

Variables	Coefficients
Constant	0.0040 (0.0065)
ΔFFR_t	0.0439*** (0.0123)
ΔFFR_{t-1}	-0.9870*** (0.2651)
ΔBC_t	0.0584* (0.0227)
$\Delta(BC \cdot FFR)_{t-1}$	0.0104*** (0.0026)
$\Delta \ln fl$	0.0157 (0.0252)
R-squared	0.0609

Robust standard errors in parentheses
 *** p<0.001, ** p<0.01, * p<0.05

Similar significant results were found using this measure of employment. The federal funds rate, lagged federal funds rate, and the federal funds rate and business confidence interaction were all still highly significant ($p < 0.001$). Business confidence was also significant ($p < 0.05$). The second model indicates that 6% of the variability in the employment population ratio is explained by changes in the explanatory variable ($R^2 = 0.0609$, $F = 9.2557$, $p < 0.001$).

Discussion

Historically a change in the federal funds rate was able to influence future employment in the same direction. Following the Great Recession, there hasn't been as significant decrease in the employment rate from the dramatic lowering of the federal funds rate as was expected. In this research, it was hypothesized that low levels of business confidence were deterring firms from expansion and hiring for permanent positions despite the low federal funds rate's incentive to do so.

The least squares regression analysis results confirmed my hypothesis. There is a significant relationship between business confidence and the federal funds rate's ability to impact future unemployment. Today's federal funds rate isn't intended to

influence today's unemployment rate but that of tomorrow, hence a negative contemporaneous relationship ($\beta_1 = -0.0603$). When the federal funds rate is low, the unemployment rate is high, and vice versa. While this relationship is significant, it produces a small coefficient; that is, the change in the unemployment rate as a result of a change in the federal funds rate in the same period is limited. Today's federal funds rate is intended to influence future unemployment, as demonstrated by the lagged federal funds rate ($\beta_2 = 1.3371$). A low federal funds rate today will result in a lower unemployment rate in the future because of the time delay of policy action. The lagged federal funds rate produces a much larger coefficient than the current federal funds rate, thus a change in the federal funds rate will have a larger impact on future unemployment than current unemployment.

The unemployment rate doesn't always respond as predicted however, and business confidence has been used to explain these variations. Business confidence and the unemployment rate have a negative relationship ($\beta_3 = -0.1246$). When business confidence levels are low, we expect to see high unemployment; when business confidence levels are high, we expect to see low unemployment. The interesting result is what happens as a result of the interaction between business confidence and a lagged federal funds rate ($\beta_4 = -0.0139$). Given the negative relationship between these variables, when business confidence and the federal funds rate increase, we expect that the unemployment rate will decrease slightly. Similarly, when business confidence and the federal funds rate decrease, we expect the unemployment rate to increase slightly.

Following the Great Recession, the decrease in the federal funds rate should have brought down the unemployment rate, holding all other factors constant. When business confidence isn't held constant, but is allowed to fluctuate, we see a different result. The decrease in the federal funds rate in the presence of low business confidence actually raised the unemployment rate slightly instead of lowering it. This is consistent with the slight increase in the unemployment rate that was found by Leduc and Lui (2012). So not only was this policy action ineffective in lowering the unemployment rate, but it actually worsened the situation. The same relationship exists when the employment population ratio is used in lieu of the unemployment rate.

The interaction between business confidence and the federal funds rate has a statistically positive impact on the employment population ratio ($\beta_4 = 0.0104$), indicating that a decrease in business confidence and federal funds rate will result in a slight decrease in the employment population ratio. A lower federal funds rate is intended to raise the employment population ratio, but when done in the presence of low business confidence, it actually results in a decrease instead of an increase in employment.

Recent literature has looked into why this occurs. Leduc and Lui (2013) have demonstrated through their actual and fitted Beveridge curve that for a given level of job openings we are currently experiencing a higher level of unemployment than we traditionally would have. They suggest that under conditions of higher economic policy uncertainty that firms are reducing their recruitment efforts. This is consistent with the findings from this research: when companies are more pessimistic about their prospects, they are more reluctant to hire. This is why the unemployment rate remains stubbornly high despite everything that the Federal Reserve has done, through both conventional and unconventional monetary tools.

A better understanding of this relationship will allow for more accurate predictions of future unemployment rates. Instead of strictly looking at how a change in the federal funds rate will affect the unemployment rate, business confidence can be taken into consideration as to how it will strengthen or lessen the change in unemployment. Specifically, it can be used to explain the slow reduction in the unemployment rate following the Great Recession. The low levels of confidence are inhibiting the federal funds rate's ability to lower future unemployment rate, and are actually causing it to rise slightly. This demonstrates business confidence's ability to hinder progress in lowering the unemployment rate when the federal funds rate is targeting unemployment. This is not always the case; sometimes the federal funds rate is used to control inflation. Under these circumstances, we expect business confidence to be high since the economy is doing well. As the federal funds rate increases to influence inflation, we expect to see an increase in the unemployment rate only considering the relationship between business confidence and the unemployment rate. When this increase occurs in the presence of high business confidence,

we actually expect to see a decrease in unemployment not an increase. In this situation, business confidence actually helps maintain a lower unemployment rate.

While the results of this study provide valuable information regarding business confidence's influence on unemployment, there are also limitations to the study. Within the study all of the predicting variables had to be assumed as exogenous variables coming from outside the model. This is not necessarily true in the real economy. Just as the current federal funds rate is able to influence future unemployment, the current unemployment rate also influences the future federal funds rate. This relationship was not taken into account using this model. There is also a bi-directional relationship between business confidence and the unemployment rate, but this wasn't accounted for in the model either. Future studies may loosen the assumptions in this model to accommodate for these directional relationships.

Conclusion

After the financial crisis and onset of the Great Recession, one of the ways the Federal Reserve attempted to lower the unemployment rate was by drastically lowering the federal funds rate, which is actually one of the conventional tools of monetary policy. Given the positive relationship between the federal funds rate and unemployment rate, it was expected that the decrease in the federal funds rate would produce a reduction in the unemployment rate. This was not the case however, and this paper looked at the role business confidence may have played. It was hypothesized that low levels of business confidence would hinder the ability of the federal funds rate to lower unemployment. The results confirmed this hypothesis. The interaction term between the federal funds rate and business confidence has a negative relationship with the unemployment rate, indicating that a decrease in business confidence and the federal funds rate would actually produce an increase in the unemployment rate. While the goal of lowering unemployment was meant to be achieved by lowering the federal funds rate, its decrease in the presence of low business confidence actually led to an increase in the unemployment rate. This seemingly startling result is confirmed by the second specification model where the employment ratio was used in lieu of the unemployment rate. The ineffectiveness of using the federal funds rate to stimulate the economy during

the Great Recession has led the Federal Reserve to experiment with the nonconventional monetary policy tools such as the Quantitative Easing and Term Auction Facility. The findings of this paper highlight the limit of using conventional monetary policy when business confidence is low. A better understanding of this interaction and its implications will help direct future policy and predictions about changes in the federal funds rate.

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