# Correlation between the US Federal Funds Rate and Unemployment Rate

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**Despite low interest rates, the US inflation rate is within the Federal Reserve's 2% target range and the unemployment rate remains high at around 8%. In order to achieve the Federal Reserve's monetary policy goal of price stability and maximum employment, employment conditions have to improve. The result of our correlation analysis shows that while the US federal funds rate is closely related to inflation and the unemployment rate, it has a stronger correlation with the unemployment rate in recent years. The result implies that the Federal Reserve will put more emphasis on labor market conditions than price stability when making monetary policy decisions.**

## I. Introduction

The US Federal Open Market Committee (FOMC) reaffirmed its commitment to maintain a highly accommodative monetary policy at a recent FOMC meeting in September. The committee decided to keep the target range for the federal funds rate at 0 to 1/4% at least through mid-2015, and agreed to purchase mortgage-backed securities (MBS) at a pace of $40 billion per month. FOMC announced that it will continue to purchase mortgage-backed securities and employ other policy tools as appropriate until the labor market improves substantially. This decision is based on an outlook of a slow job market recovery and moderate inflation over the medium term.

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The federal funds rate, which was around 5% before the global financial crisis, was lowered to 0 to 1/4% in late 2008, following the 2007 subprime mortgage debacle and Lehman Brothers' bankruptcy. Recovery of the US economy and concern over the side effects of prolonged low interest rates has raised questions about when the Federal Reserve will normalize its policy rates.

When a central bank makes monetary policy decisions, it mainly focuses on inflation. Whether actual inflation exceeds the target level is the central bank's main concern. This is because a prolonged low interest rate environment brings excessive liquidity to financial markets, and this excess liquidity can create an asset price bubble and prompt commodity price increases, causing upward pressure on inflation. Thus we can say that preemptive measures to raise policy rates are necessary when inflation expectations increase due to higher asset and commodity prices. The pace of economic recovery and direction of major economic indicators also affect the central bank's monetary policy decisions. Labor market indicators, in particular, play an important role in determining the policy stance.

Central banks of the US and other developed countries tend to emphasize the importance of the labor market in conducting monetary policy. The US Federal Reserve, for example, is committed to a long-run monetary policy goal of price stability and maximum employment. And in recent years, the Fed seems to focus more on employment expansion than price stability. Thus, in order to predict when the US will normalize its policy rates, it is important to observe movements in the unemployment rate along with the inflation rate.

From that perspective, this article provides a survey of major US economic indicators to understand why the Fed is maintaining the current accommodative monetary policy stance and presents implications regarding the timing of monetary policy normalization based on correlation analysis between the federal funds rate and the two key economic variables, the CPI and the unemployment rate.

# II. Trends in Major US Economic Indicators

## 1. GDP growth rate

The US real gross domestic product (GDP) grew at an annualized rate of 1.5% in the second quarter of 2012. Although the US economy showed somewhat slower growth in the second quarter than in the first quarter, modest growth continues. By major spending category, private consumption rose 1.5% in the second quarter thanks to robust consumption in non-durable goods and services despite a decline in durable goods consumption. In the same period, investments in plant and equipment increased by 5.3% while residential investment rose 9.7%, showing fast recovery in private investments. Exports and imports increased 5.3% and 6.0%, respectively, in the second quarter, which is higher than in the first quarter. Government expenditures in the second quarter decreased 1.4%, a decrease of eight consecutive quarters, implying that the recent economic recovery is driven by the private sector.

**Table 1. US real GDP and related measures: percent change from preceding period**

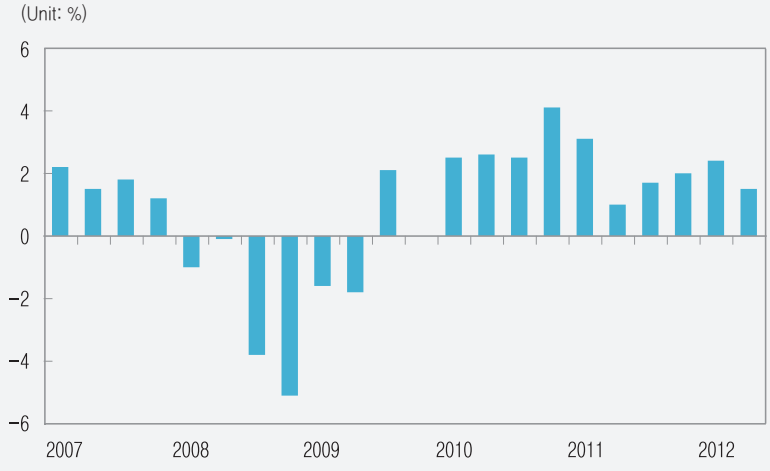
(Unit: %)

| | 2009 | 2010 | 2011 | 2011 | | | 2012 | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2/4 | 3/4 | 4/4 | 1/4 | 2/4 |
| GDP | -3.1 | 2.4 | 1.8 | 2.5 | 1.3 | 14.1 | 2.0 | 1.5 |
| Personal Consumption | -1.9 | 1.8 | 2.5 | 1.0 | 1.7 | 2.0 | 2.4 | 1.5 |
| Private Investment | -24.8 | 13.7 | 5.2 | 12.5 | 5.9 | 33.9 | 6.1 | 8.5 |
| Nonresidential | -18.1 | 0.7 | 8.6 | 14.5 | 19.0 | 9.5 | 7.5 | 5.3 |
| Residential Investment | -22.4 | -3.7 | -1.4 | 4.1 | 1.4 | 12.1 | 20.5 | 9.7 |
| Government Expenditures | 3.7 | 0.6 | -3.1 | -0.8 | -2.9 | -2.2 | -3.0 | -1.4 |
| Export | -9.1 | 11.1 | 6.7 | 4.1 | 6.1 | 1.4 | 4.4 | 5.3 |
| Import | -13.5 | 12.5 | 4.8 | 0.1 | 4.7 | 4.9 | 3.1 | 6.0 |

Source: BEA

The US economy is expected to grow 2.2% to 2.4% in 2012 according to economic forecasts from the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD). While economic growth in 2010 was largely due to the technical rebound effect from the prior-year's negative growth, the moderate and sustained recovery since 2010 has been mainly driven by an increase in consumption and investment in the private sector. The US economy appears to have recovered from recession since the second half of 2009 and has been showing slow but steady recovery.

**Figure 1. Growth rate of US personal consumption expenditures**



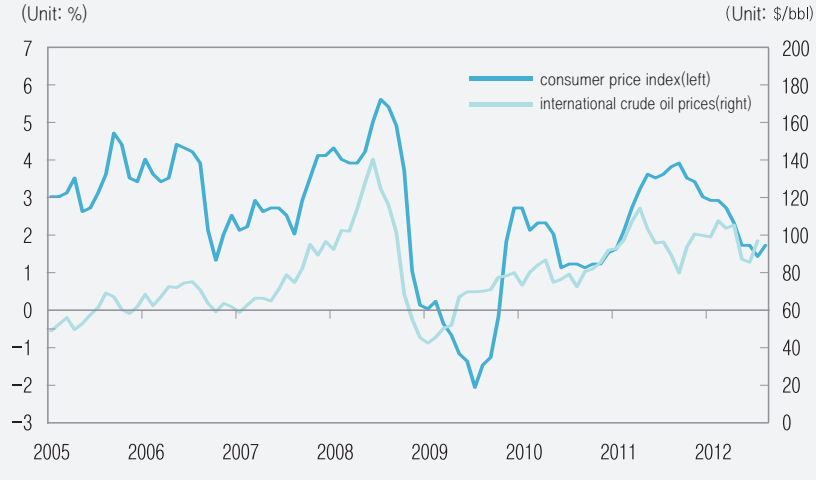

Source: BEA

## 2. Consumer price index

The growth rate of US consumer price index (CPI), which remained at 1% level during the second half of 2010, reached 3% in the second quarter of 2011, leading to higher inflation expectations. Demand-side inflationary pressure from the economic recovery and supply-side pressure from a sharp rise in international crude oil prices pushed the inflation rate up. Since the fourth quarter of 2011, however, inflationary pressures remain subdued due to a slowdown in economic activities following the

fiscal crisis in Europe, and the CPI growth rate remains around 2% level. Except for volatile oil prices, inflationary pressures appear modest due to idle labor and spare production capacity. The predominant outlook for 2012 is that the CPI growth rate will remain within the FRB's 2% target range. The IMF and OECD predict the US CPI growth rate to be 2.0% and 2.3% respectively in 2012.

**Figure 2. US consumer price index and international crude oil prices**



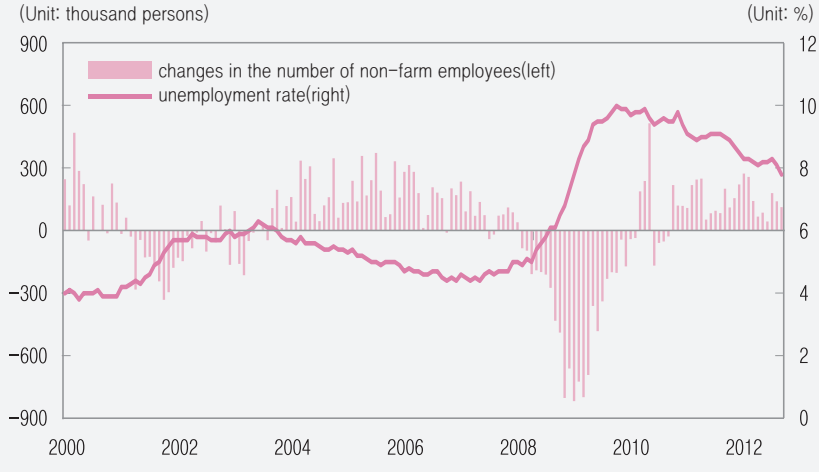

Source: BLS, BOK

## 3. Unemployment rate

The US unemployment rate, which remained in the upper 9% range in the second half of 2009 dropped to around 9% in early 2011 and declined further to around 8% in recent months. The number of non-farm employees has been increasing continuously since the second half of 2011, thanks to increased employment in manufacturing and service industries in the private sector. The public sector employment, on the other hand, has been declining due to a decrease in employment in the federal and state government. Nevertheless, the jobless rate is still higher than the pre-crisis level. The Federal Reserve's view is that despite overall progress of the US economy, labor market conditions have been improving rather slowly. Given the moderate but

steady improvement in economic conditions, however, the downward trend in the unemployment rate is likely to continue in the future.

**Figure 3. US unemployment rate and changes in the number of non-farm employees**




Source: BLS

## III. Correlation between the Federal Funds Rate and CPI/ Unemployment Rate

Considering the fact that the Federal Reserve tends to regard improvements in labor market conditions along with inflation to be an important factor when making monetary policy decisions, a correlation analysis is performed between the US federal funds rate and the CPI and the unemployment rate. Figure 4 displays the statistical dispersion between each of the two variables. It shows roughly the correlation between the federal funds rate and the CPI, and the federal funds rate and the unemployment rate during the period from January 1990 to June 2012. The growth rate of CPI appears to move in the same direction as the federal funds rate. When the CPI growth rate is high, the federal funds rate is also high, and when the CPI growth rate is low, the federal funds rate tends to be low in general.

The US unemployment rate and the federal funds rate, however, move in opposite directions. When the unemployment rate is high, the federal funds rate is generally low, and when the unemployment rate is low, the federal funds rate tends to be high. As the high unemployment rate is associated with low policy rates, and the low unemployment rate with high policy rates, we can see that the two variables have a negative correlation.

**Figure 4. Correlation between federal funds rate and CPI/unemployment rate**

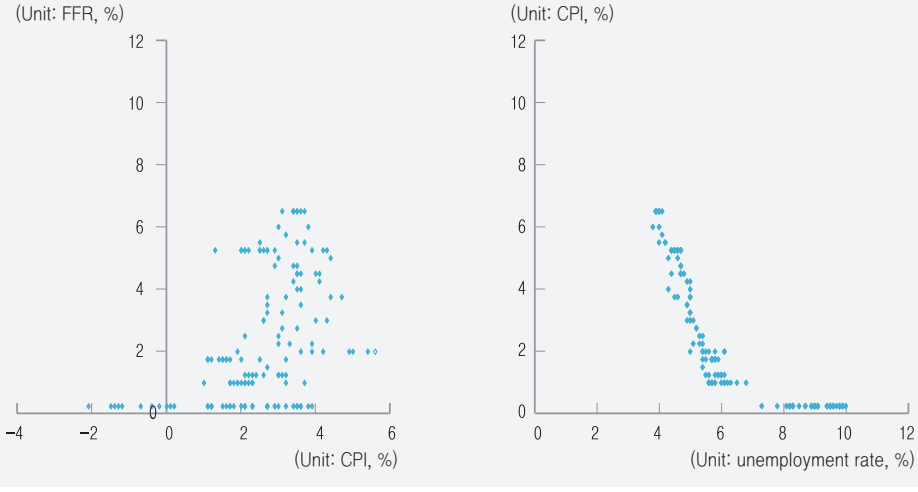


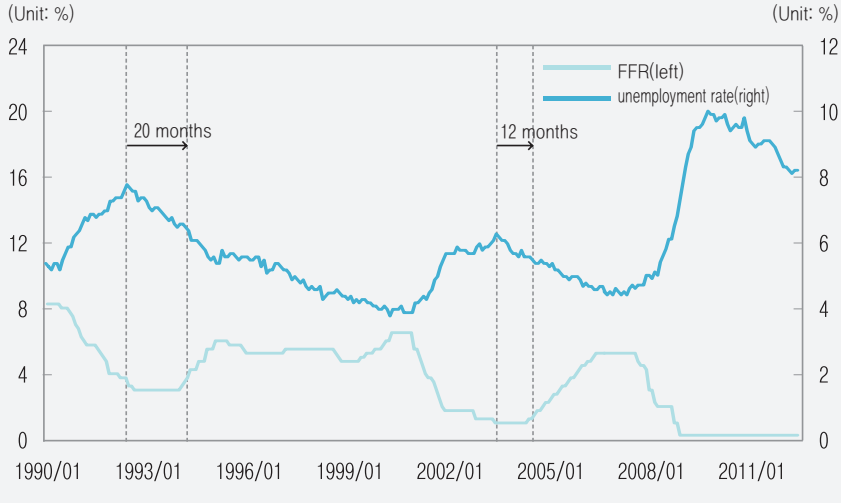

Table 2 shows the results of the correlation analysis between the federal funds rate and the two economic variables during the period from January 1990 to June 2012. We can see that the federal funds rate is more closely related to the unemployment rate than the inflation rate. The correlation coefficient between the federal funds rate and the unemployment rate is -0.68, whereas the correlation between the federal funds rate and the CPI growth rate is 0.48. The difference is more pronounced when we look at more recent data. While the correlation coefficient between the federal funds rate and the unemployment rate rose to -0.84 during January 2000 to June 2012, the correlation coefficient between the federal funds rate and the CPI growth rate stayed around 0.45 for the same period. The findings suggest that while the federal funds rate is closely related to both inflation and unemployment, it has a stronger correlation with the unemployment rate in recent years.

**Table 2. Correlation coefficient between federal funds rate and CPI/unemployment rate**

| | FFR-CPI | FFR-Unemployment rate |
|---|---|---|
| Jan. 1990 - June. 2012 | 0.48 | -0.68 |
| Jan. 1990 - Dec. 1999 | 0.51 | -0.47 |
| Jan. 2000 - June. 2012 | 0.45 | -0.84 |

When we look at the two important policy rate increase periods since 1990, we can see that the Federal Reserve raised its policy rate after verifying the trend of declining unemployment over a 12-month period. Figure 5 shows the number of months between a decline in the unemployment and a federal fund rate increase. The time lag between the peak of the unemployment rate and the start of the policy rate increase shows that policy rates began to increase 20 months after the unemployment rate peaked in June 1992, and 12 months after the unemployment rate hit the ceiling in June 2003. And in these two policy rate increase periods, the Federal Reserve started to raise its policy rate when the unemployment rate was around 6%. The 6% unemployment rate is a meaningful benchmark since it is the average monthly US unemployment rate for the last 20 years (during period from January 1991 to December 2011).

**Figure 5. Federal funds rate and US unemployment rate**



Results of the correlation analysis show that the US federal funds rate is more closely related to the unemployment rate than the inflation rate. This implies that the Federal Reserve will put more emphasis on labor market conditions than price stability when deciding on monetary policy.

## IV. Conclusion

Despite low interest rates, inflation in the US is within the FRB's 2% target range, while the unemployment rate still remains high at around 8%. Thus, in order to achieve price stability and maximum employment, it is essential that employment conditions improve. Results of our correlation analysis showed that while the US federal funds rate is closely related to inflation and unemployment, it appears to have stronger correlation with the unemployment rate. This result implies that the Federal Reserve will put more emphasis on labor market conditions than price stability when deciding on monetary policy. Moreover, the correlation between the federal funds rate and the unemployment rate has increased since 2000, implying that labor market conditions have become an important factor in determining monetary policy in recent years.

Considering these findings, changes in the US unemployment rate should be watched closely in order to predict when the FRB will normalize its policy rate. The current economic conditions require the US to normalize the exceptionally low interest rates implemented during the crisis, rather than pursuing a contractionary monetary policy as a preemptive response to inflation. Therefore it is highly likely that monetary policy decisions will be based on whether the US recovers from the crisis which forced the US to take unconventional actions. In this regard, improvements in economic indicators such as the unemployment rate would be the most important consideration in determining monetary policy in coming months. More specifically, the Federal Reserve is likely to begin discussions about normalization of monetary policy when the unemployment rate falls to at least around 6%, the monthly average US unemployment rate for the last two decades.

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