

The Effects of Quantitative Easing on Inflation Rate: A Possible Explanation on the Phenomenon

Ho-Yin Yue

*School of Finance, Shanghai University of Finance and Economics
Shanghai, China
E-mail: willyyue@gmail.com*

King-Tai Leung

*Hang Seng Management College, Hong Kong
E-mail: jackyleung@hsmc.edu.hk*

Abstract

Two years has passed since the release of the first quantitative easing (QE). Yet, our economy remains weak. Recently, whether QE3 should be released is under heated discussion. Some economists suggested that huge amount of extra money supply created by QE will cause high inflation or hyperinflation. This paper examines the relation between QE and inflation rate in the United States. Although typical quantity theory of money predicts a relation between QE and high inflation, empirical data reveals that there is no direct relationship between the two. A possible explanation on the question “Why QE will not cause high inflation?” will be discussed in the following, by making use of the amount of money for the banking system lent to private section of the United States and the Dow Jones Industrial Average.

Keywords: Quantitative Easing, Inflation

JEL Classification Codes: E31, E50, E51, E52

1. Introduction

The housing market in the United States collapsed in 2007. As a result, many financial institutions faced a great loss due to the default in housing mortgage. The period from 2007 - 2010 is called the credit crunch or credit crisis. During the worst time of the credit crunch, central banks in different countries loosened their monetary policy and cut the interest rate to nearly zero. In 2008, the Federal Reserve of the United States expanded its balance sheet dramatically by adding new assets and new liabilities. In late November, 2008, the Federal Reserve started buying \$600 billion of Mortgage Backed Securities (MBS). This action increased the total amount of treasury notes and MBS on the Federal Reserve from \$700 - \$800 billion before the credit crunch to \$2.1 trillion in June, 2010. This was the first round of quantitative easing (QE). In late 2010, the Federal Reserve enforced the second round of quantitative easing (QE2) since the economy was not growing robustly. As part of the measures in the second round of quantitative easing, the Federal Reserve announced that it would buy \$600 billion of treasury securities by the end of the second quarter of 2011.

There is considerable debate surrounding the issue of effectiveness of two rounds of quantitative easing. According to International Monetary Fund (IMF), the first round of quantitative easing contributed to the stabilization of world economy, reduction of systemic risks in the world financial system and improvement in the market confidence (Klyuev, Imus, & Srinivasan, 2009).

Feldstein (2011) focused on the way that the second round of quantitative easing affected the real economy. He suggested that the second round quantitative easing led to a rise in the stock market in the second half of 2010, which contributed to the increase in consumption and strong economic performance in late 2010.

On the other hand, some economists disagreed that quantitative easing helped improve U.S. economy. Rodríguez and Rowe (2007) suggested that although nearly all economists would agree money supply and economy are related, money supply in the United States may not affect its economy but other economy areas such as Hong Kong.

Quantitative easing may also cause higher inflation rate. Many studies have found a strong relationship between the growth of money supply and the inflation rate. In recent studies, Lucas (1980), Lucas (1986), Dwyer and Hafer (1988), Barro (1993), McCandless and Weber (1995), Dewald (1998), and others have found evidence to show that the nominal quantity of money and the price level are closely related.

This article examines the relationship between quantitative easing and the inflation rate in the United States. According to empirical results, extra money supply created by the quantitative easing does not raise the inflation rate of the United States. I also provide a possible explanation on this phenomenon by making use of the money amount that the banking system lent to private section and the Dow Jones Industrial Average.

This paper will be organized as follows: a background review will first be given on the relation between money supply and inflation rate. Expectations on inflation rate being affected by quantitative easing as derived from some typical models will then be given. In the third part, historical data of money supply and inflation rate in the United States will be used to examine the relation between quantitative easing and inflation rate. The finding is that extra money supply from the quantitative easing will not rise the inflation rate in the United States. An explanation on the weak correlation between quantitative easing and inflation rate follow before drawing the conclusion.

2. Inflation and Money Supply

Sometimes, inflation is defined informally as “too much money chasing after too few goods.” This statement can be interpreted as money supply exceeding money demand. In short, inflation is determined by the equilibrium between money supply and money demand in the economy. There are many theories trying to explain the relationship among money supply, money demand and inflation. Among them, the most famous one is the “Quantity Theory of Money” .

Quantity Theory of Money was first suggested by Jean Bodin (1568) who followed the idea of Jean Bodin, David Hume (1748), Irving Fisher (1911) and other economists (Mill (1848) and Newcomb (1885)). The equation of exchange mathematically defined the quantity theory of money. The equation of exchange has the form:

$$MV = PT$$

where

M is the total amount of money in circulation on average in the economy.

V is the velocity of money .

P is the general price level.

T is the real value of aggregate transactions.

Typically, the velocity of money and the real value of aggregate transactions are assumed to be constants in the quantity theory of money. Therefore, it is trivial that the total amount of money in circulation is positively related to the general price level. In other words, from quantity theory of money’s point of view, the money created in the quantitative easing will cause inflation in the general price level as well.

A.C. Pigou (1917) and Alfred Marshall (1923) who were economists associated with Cambridge University took a slightly different approach to the quantity theory of money to explain the relationship between the amount of money and general price level. Since they were both associated

with Cambridge University, their school of thought was called “Cambridge approach”. Rather than considering the money supply as in quantity theory of money, Cambridge approach focuses on the demand side of money. The mathematical form of Cambridge approach is:

$$M^d = kPY$$

where

M^d is the amount of money demanded.

k is the portion of money not being used in transactions over the total wealth.

P is the general price level.

Y is the nominal output.

Normally, k is assumed to be constant in short run and Y is always a constant. When the economy is at its equilibrium, money demand equals to money supply. Replacing M^d with M (money supply), we get the following equation:

$$M \frac{1}{k} = PY$$

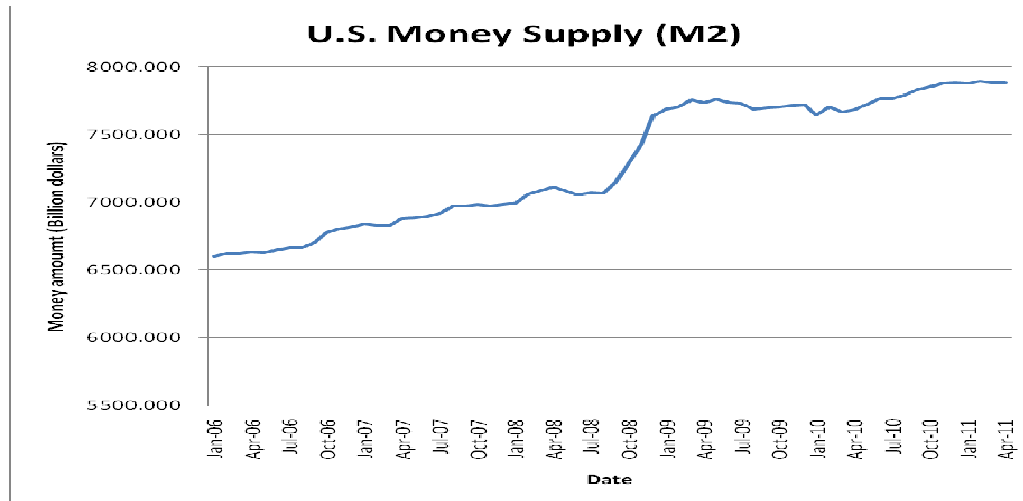
Because k and Y are assumed to be constant, we can draw a similar conclusion to the quantity theory of money from the Cambridge approach. There is a positive relation between the increase in money amount and inflation.

In short, both theories suggest that the growth rate of money supply is related to inflation and nominal output. Assuming the supply of money is exogenous; central bank is able to control inflation and nominal output of the economy. Although both theories share similar equations and conclusions, differences still exist between them. Firstly, their definitions of money are slightly different. In the traditional quantity theory of money, the amount of money represents the money in circulation in the economy, which is dynamic. On the other hand, the Cambridge approach focuses on the money being held by individuals in the form of cash, which is much static. Secondly, the traditional quantity theory of money focuses on money supply, not money demand. In the theory, the amount of money demand is just adapting the amount of money supply passively. Compared with the traditional approach, the Cambridge approach focuses on money demand instead of money supply. Here, the portion of money which are held by individuals for the reason of convenience and security of having money on hand is much more important. Thirdly, the theories emphasize on different functions of money. In the first case, money is used for transactions and payments, while in the other case, money is not only used for transactions and payments, but also for storing its purchasing power.

3. Effect of Quantitative Easing on Inflation

In this section, the relation between money supply and the general price level in the United States will be examined. According to the monthly data of money supply¹ (M2) in the United States, there is a sharp increase in money supply after the first round of quantitative easing started. Before quantitative easing, M2 of the United States was \$6,600 billion only. The amount of M2 rose to around \$7,740 billion in the January of 2009, with a total increase of 17.3%.

¹ Data of money supply (M2) of the United States were retrieved from The Conference Board, Inc.

Figure 1: U.S. Money Supply (M2)

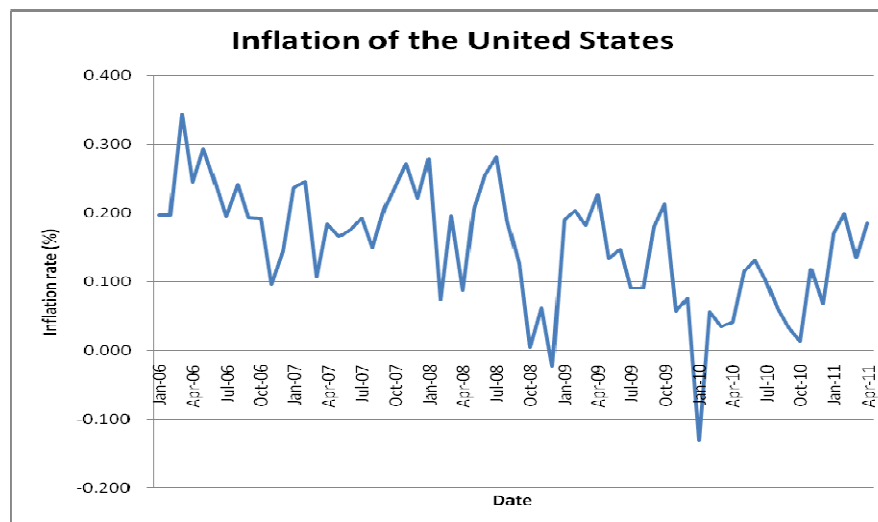
The core CPI² of the United States is used to calculate the inflation of the United States according to the following equation.

$$\text{inflation}(t) = \frac{\text{CPI}(t) - \text{CPI}(t-1)}{\text{CPI}(t-1)} \times 100\% \quad (1)$$

Where

$\text{inflation}(t)$ is the inflation rate at time t $\text{CPI}(t)$ is the core CPI at time t

Figure 2 showed the inflation rate calculated by equation (1). According to figure 2, there is no increasing trend in inflation before and after the first quantitative easing. In order to examine the relation between money supply and inflation more closely, paired t-test and ANOVA are used. The aim of the test is examining whether the increase in money supply due to the quantitative easing affect the magnitude of inflation rate of the United States. In the test, the data is divided into two parts corresponding to the period before and after the first round of quantitative easing. The general statistics are shown in table 1.

Figure 2: Inflation of the United States

² Core CPI of the United States and CPI of Hong Kong were retrieved from U.S. Bureau of Labor Statistics and Hong Kong Census and Statistics Department respectively.

Table 1: General statistics of inflation in the United States.

	Monthly inflation rate before quantitative easing	Monthly inflation rate after quantitative easing
Period	From Jan, 2006 to Aug, 2008	From Sep, 2008 to Apr, 2011
Number of observations	32	32
Mean	0.204375	0.102906
Median	0.197000	0.108500
Maximum	0.344000	0.226000
Minimum	0.073000	-0.131000
Std. Dev.	0.061548	0.079333
Skewness	0.213938	-0.657491
Kurtosis	2.991084	3.576343

In table 1, significant increase in the inflation rate of the United States after the shock in money supply due to quantitative easing could not be found. Actually, according to the results of t-test and ANOVA which are shown in table 2, the inflation rates after the release of the quantitative easing are lower than the inflation rates before the quantitative easing at 1% significant level. Evidence suggests that increase in money supply does not necessarily cause a rise in inflation rate.

Table 2: T-test and ANOVA results of inflation in the United States.

Method	Df	Statistic Value	Probability
t-test	62	5.716584	0.0000
ANOVA F-statistic	(1, 62)	32.67933	0.0000

4. Discussion

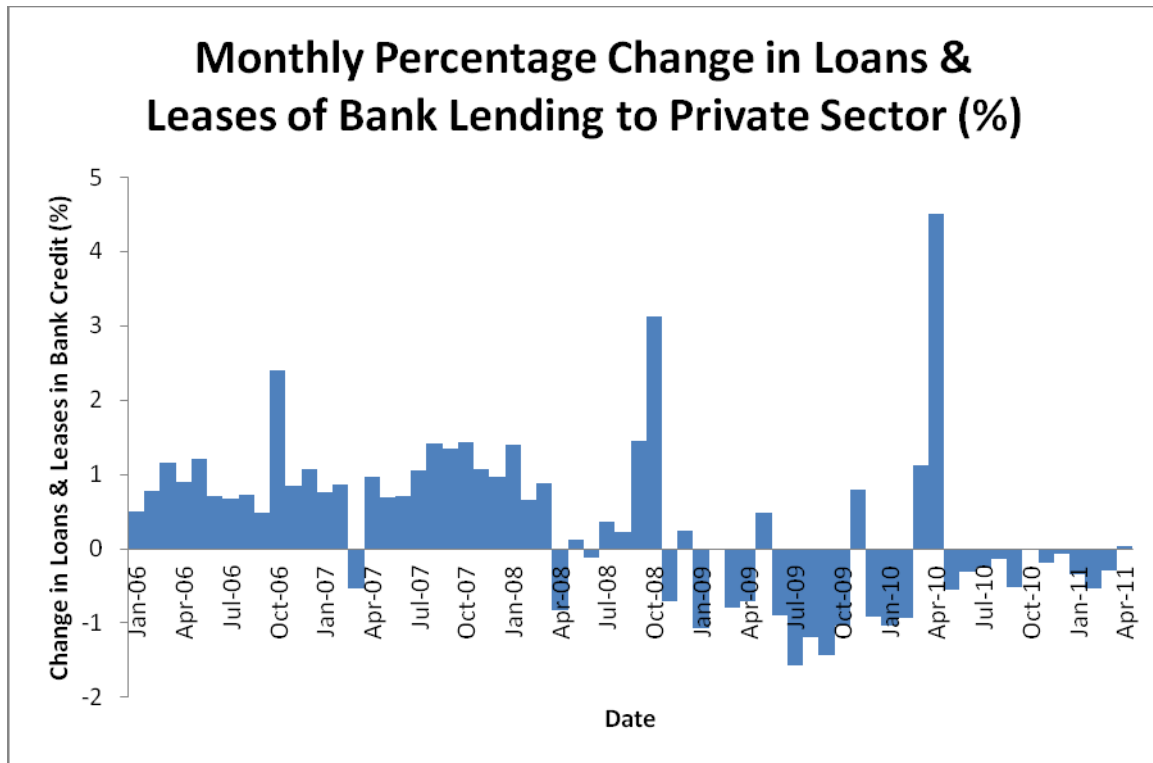
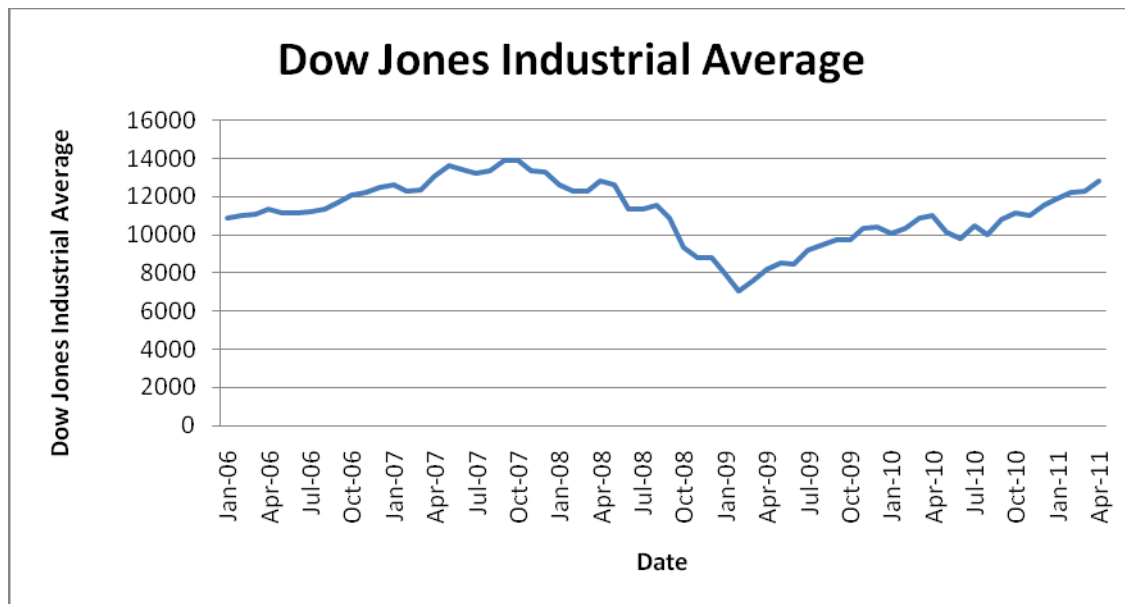
In this section, explanation on the phenomenon that extra money supply created by quantitative easing and inflation rate being uncorrelated in the United States will be given. The amount of loans that private sector lent from banks is considered as the factor responsible for the phenomenon.

Figure 3 shows the overall loans and leases that the private sector borrowed from the banking system in the United States³. According to figure 3, it is obvious that the loans and leases the banking system lent to private sector kept increasing before the credit crisis. However, the loans amount fell to a down track afterwards. There are several months in which the amount of loans was positive, but the main trend has been decreasing since April, 2008.

Several facts can be found from in the United States. Firstly, money supply increases steadily after credit crisis with a huge increase in late August, 2010 due to quantitative easing. Moreover, inflation rate after the release of it is significant lower than the inflation rate before the quantitative easing at 1% significant level. Thirdly, the extra money created by quantitative easing does not increase the loans and leases for the banking system lent to the private sector. In contrast, the amount of loans keeps decreasing.

According to the facts mentioned, it seems like although money supply in the United States was increased by quantitative easing, these extra money created cannot go into the real economy in the United States. Consequentially, inflation rate of the United States is not affected by QE.

A question related to the above hypothesis is “Where has the money created by QE gone?” This amount of money should have only stimulated the investment market, not the real economy in U.S.. Figure 4 shows the Dow Jones Industrial Average from January, 2006 to April, 2011. According to the figure 4, the Dow Jones Industrial Average fell after the credit crisis and reached the bottom in February, 2009. Then it started increasing again. It suggests that the extra money created by QE improved the atmosphere of the investment market.

Figure 3: Monthly percentage change in loans and leases of bank lending to private sector**Figure 4:** Dow Jones Industrial Average

5. Conclusion

In this paper, the effect of quantitative easing on the inflation rate of the United States was examined. According to historical data, the release of quantitative easing did not increase the inflation rate. On top of that, the inflation rate after the release of quantitative easing was significantly lower. Explanation on the decrease in inflation rate was given by using the amount of money banking system lent to the private sector. The amount of money that the banking system lent to private sector keeps on decreasing after the credit crisis and quantitative easing. The data suggests that money created from quantitative

easing cannot reach the real economy in the United States. From the Dow Jones Industrial Average, only the investment atmosphere of the investment market was improved. Recently, debates over whether the third round of quantitative easing should be released or not attract a lot of attention. But before that, one should give serious consideration to the effectiveness of quantitative easing on improving the real economy.

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