Friedman, Monetarism and Quantitative Easing

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1.-Introduction

Many economists and other analysts have pointed out that Milton Friedman's remarks on the necessity of an expansive monetary policy in Japan after its 1991 financial crisis, is a prima facie evidence that he would have supported the Quantitative Easing (QE) schemes implemented by the Federal Reserve (Fed) and other major central banks since the 2008 financial crisis. This unqualified extrapolation of Friedman's comments to the QE programs put in practice since 2008, however, ignores completely the monetary policy framework that Friedman developed specially during the sixties. In contrast to the loosely supported connections between Friedman's ideas and the 2008-2014 QE programs, Nelson (2011) and Bernanke (2012) argue formally that Friedman's monetarist portfolio balance theory provides a solid theoretical link between its monetary framework and the most recent QE operations developed by the Fed and other major central banks.

This paper argues that the theoretical origin of QE programs as a general concept clearly links to Friedman's (and monetarist) ideas, but that the specific implementation of QE operations to cope with the 2008 financial crisis does not comply with key principles developed by Friedman. Based on Friedman's work, I contend that his monetary framework links to QE through what he (and Anna Schwartz) called the "monetary" effects of monetary policy and not the portfolio balance effect highlighted by Nelson (2011) and Bernanke (2012). The "monetary" effects should consider Friedman's concern with the use of monetary policy as an important tool for the stabilization of the economy. The "monetary" effects emphasizes the capacity of monetary policy of providing enough high-powered money to maintain M2 growing during periods of financial distress at rates similar to those registered in "normal" times. In contrast, the portfolio balance effect focuses on the capacity of monetary policy to affect the structure of interest rates.

The combination of the "monetary" effects with the stabilizing role of monetary policy should produce QE programs with a path of the monetary base (central bank assets) and M2 very different to what we have seen under the 2008-2014 QE programs based on the portfolio balance effect.

The paper is organized as follows: Sections 2 and 3 discuss briefly the role of monetary policy based on large expansions of the monetary base (central bank assets) in the currently dominant schools of thought, New Classical and New Keynesian; Section 4 revises some of Friedman's and other monetarist economists ideas that provide a theoretical support for Quantitative Easing; Section 5 uses the elements supplied by section 4 to analyze the QE programs put in place by the Federal Reserve (Fed), the Bank of England (BOE), the European Central Bank (ECB) after 2008, and the Bank of Japan (BOJ) after 2001; Section 6 presents some concluding remarks.

2.-New Classical economics and QE

New Classical (NC) economics have developed several neutrality propositions whose central theme is that economic agents are basically indifferent among the financial instruments they could employ to finance their operations. Wallace (1981) extends the Modigliani – Miller theorem (1958) to open market operations. The Wallace-Modigliani-Miller (W-M-M) theorem states that open market operations between money and another asset, with government consumption held constant, will not exert any real effects, or even change the price level (Handa, 2009).

The W-M-M theorem is developed in the context of an overlapping generations model in which two assets, money and a stored commodity are used as to transfer purchasing power from period t to $t+1$. To ensure a positive demand for money, it is assumed that the stored

commodity has a stochastic gross return that just compensates the risk anticipated by a risk-averse individual. A government's open market purchase is represented as the exchange of dk_t of the stored commodity against dm_t of money balances. Since the open market operations do not alter the budget constraints of the old or the young, neither their utility functions, the optimal paths of consumption and saving are unchanged. In the money market, money demand increases by the amount dm_t equivalent to the increase in the money supply, so that the price level will also not be affected by the open market operations.

To adapt the W-M-M theorem to an economy with bonds, we can introduce a central bank that issues fiat money and bonds and puts these liabilities into circulation by purchasing commodities which it stores (Handa, 2009). It is assumed that the central bank uses the return obtained from the stored commodities to pay interests on bonds. As in the previous case if the stochastic gross return on the stored commodity (bonds) just compensates the risk assumed by a risk-averse individual, there will be a positive demand for money. Since fiat money and bonds are equivalent in terms of being a medium of saving with the same expected return, the public will be indifferent between them. The aggregate demand for money and bonds relative to their aggregate supply will determine the price level. The composition of this aggregate, however, is irrelevant in the determination of the price level. Therefore, an open market operation between fiat money and bonds would have no effect on the price level and on real variables.

Also in the vein of the Modigliani-Miller theorem, Williamson (2014) points out that modern theory of banking and financial economics consider that financial assets are malleable objects. In contrast with goods and services, financial assets can be transformed in various

ways by banks and other financial intermediaries. “For example, a bank can transform long-maturity, risky, and illiquid assets into short-maturity, safe, and liquid liabilities which are then held in the private sector.” From this perspective, QE operations may have little impact in a liquidity trap.

Thus, it is not surprising that New Classical economists will put little faith in the capacity of QE schemes to have any meaningful effect on economic performance, at least if they believe that the aseptic conditions under which their theories are derived provide a good approximation to the real world.

3.-New Keynesian economics and QE

The standard New Keynesian (NK) model is composed of an IS equation, an expectations-augmented Phillips equation, and a Taylor-type interest rate rule. Woodford (2007) argues that this model is consistent with a world in which there is no special role for money in facilitating transactions, and hence, money is perfectly substitutable for any other nominal asset of similar risk. According to Woodford, the derivation of the standard model without frictions is a way to clarify that its basic relationships do not have an intrinsic connection with the evolution of the money supply. Woodford, however, holds that the model does not require assuming that open market operations are irrelevant, or that there is not a uniquely defined trajectory for the money supply associated to the policy rule. The model is still consistent with a well-defined demand for money function which gives rise to an equilibrium in the money market. But this additional equation is not necessary for the model to determine the evolution of inflation, the price level, output, and the interest rates under a given interest rate rule.

In addition, there is the zero lower bound problem associated with monetary policy conducted with an interest rate instrument. As discussed in Walsh (2010), Benhabib, Schmit-Grohé and Uribe (2001a, 2001b, 2002) and Schmit-Grohé and Uribe (2000) hold that simple and reasonable monetary policy rules that follow the Taylor principle changing the nominal interest rate more than proportionally in response to changes in inflation, could generate macroeconomic instability that would drive the economy toward a liquidity trap. In this context, there is a stationary equilibrium with the inflation rate equal to π^* (the inflation target of the central bank). For inflation rates that start below π^*, however, the inflation rate decreases. Absent a zero lower bound for the nominal interest rate, $\pi \to -\infty$, but this trajectory should be discarded as it violates a transversality condition necessary for the optimizing behavior of the representative agent. If the deflation rate is bounded from below, because the nominal interest rate cannot be less than zero, the economy converges to a liquidity trap with a nominal interest rate equal to zero and a stable deflation rate π^{**} [1]

There have been several proposals to deal with the zero lower bound problem in the context of the NK model. Taylor and Williams (2010) point out that the zero lower bound of the nominal interest rate has implications for the settings of the parameters in the interest rate rule. For example, Reifschneider and Williams (Taylor and Williams, 2010) find that an increase in the response to the output gap in the interest rate rule helps to reduce the effects of the zero lower bound of the nominal interest rate. Taylor and Williams (2010) point out, however, that this approach can increase the variability of inflation and the interest rate. Additionally, a general result from the literature is that the optimal coefficient of the output gap in the policy rule declines in the presence of measurement errors in the

[1] See Walsh (2010) and Olivo (2011) for more details.

gap. Given the limitations of the approach of responding more aggressively to the output gap, Reifschneider and Williams (Taylor and Williams, 2010) suggest other modifications to the policy rule. One of the proposals consists in reducing the interest rate more aggressively than normal in the vicinity of a liquidity trap. This approach, however, is based on an atypical behavior of the central bank when is confronted with the zero lower bound, and this could confuse economic agents and, in turn, generate unforeseen consequences. An alternative approach promoted by Eggertsson and Woodford (Taylor and Williams, 2010) is to adopt an explicit price level target instead of an inflation target when the economy approaches a liquidity trap. A price level target promises a stronger monetary stimulus and more inflation in the future than an interest rule with an inflation target. On the other hand, a liquidity trap provides an argument to use a higher inflation target than the one that would be used absent this restriction. Taylor and Williams (2010) hold that if the target inflation rate is sufficiently high, the liquidity trap will rarely affect monetary policy and the macro economy.

The previous discussion suggests that open market operations and monetary base expansions are not, at least directly and explicitly, in the range of options considered by New Keynesian economists to deal with the zero lower bound problem.

4.-Friedman, Monetarism and QE

Friedman (1960) and Friedman and Schwartz (1963b) have argued cogently that the reduction in the quantity of money by a third from 1929 to 1933 made the depression much longer and more severe. In a Program for Monetary Stability (1960), Friedman states:

"All told, from July 1929 to March 1933, the money stock fell by over a third, with over two-thirds of the decline coming after England's departure from the gold standard and the accompanying deflationary action by the system.

I have described this episode in some detail because it has played such an important role in forming –or should I say deforming– opinions about monetary policy. It was interpreted to mean that monetary policy is an ineffective instrument for stemming deflation. In fact it is a tragic testament to the harm that inappropiate policy can do. It may well be that a different policy might not have prevented a severe contraction; it certainly could have made it much less severe that it was and could have prevented the collapse of the banking system. It is noteworthy that every country that followed Britain in going off gold experience revival in 1931 or shortly thereafter; every country that followed the U.S. in accepting monetary deflation saw the contraction drag on to 1933 or later."

In the *Monetary History of the United States, 1867-1960*, Friedman and Schwartz (1963b) characterize the monetary policy during the critical period 1929 – 1933 as "inept". In fact, the following paragraph of the book is very illuminating on the intellectual atmosphere outside and inside the Fed during that time:

"One can read through the annual Proceedings of the American Economic Association or of the Academy of Political Science and find only an occasional sign that the academic world even knew about the unprecedented banking collapse in process, let alone that it understood the cause and the remedy.

That climate of intellectual opinion helps to explain why the behavior of the Federal Reserve System from 1929 to 1933 was not checked or reversed by vigorous and informed outside

criticism. But neither the climate of opinion nor external financial pressures nor lack of power explains why the Federal Reserve System acted as it did. "

After 1933, Friedman (1960) points out that the Fed followed "a policy of almost complete inactivity." Friedman attributes this to a defensive reaction to the failure to counteract the contraction during the critical years, and to the shift in the intellectual climate of opinion which assigned the main countercyclical role to fiscal policy.

In fact, as many economists have pointed out, Friedman made several explicit assertions before passing away about the active role that monetary policy should play during financial crisis. For example, in his 1996 interview with Snowdon and Vane (2005), Friedman makes the following statements:

"Take Japan right now. They are wasting their time and money in trying to have an expansive fiscal policy without an expansive monetary policy."

"It is a very interesting phenomenon because the behavior of the Japanese central bank in the past five years duplicates the behavior of the Federal Reserve after 1929."

In a very frequently cited interview with David Laidler in 2000, Friedman touched upon again on the case of Japan, insisting in the necessity to go beyond low interest rate and expanding vigorously the money supply.

However, these clear statements of Friedman in favor of an active monetary policy during periods of financial turmoil should be balanced against other arguments advanced in connection to the role of money and monetary policy in the economy. They cannot be extrapolated as an unqualified support to the kind of QE operations implemented after 2008

by the FED and other central banks. In The Role of Monetary Policy, Friedman (1967) also makes the following interesting assertions:

"*Experience suggests that the path of wisdom is to use monetary policy explicitly to offset other disturbances only when they offer a "clear and present danger."*

"The first and most important lesson that history teaches about what monetary policy can do – and it is a lesson of the most profound importance – is that monetary policy can prevent money itself from being a major source of economic disturbance."

These statements from Friedman are in line with Nelson's (2011) interpretation that by stabilizing and enhancing the money stock, monetary policy could limit the damage that credit market disturbances could inflict to the economy. The stabilization of the money stock, however, is a secondary issue in Nelson's (2011) paper.

Nelson's (2011) and Bernanke's (2012) core argument in favor of the idea that QE programs after 2008 have followed Friedman's guidelines is based on the monetarist portfolio balance effect. Nelson (2011) focuses on the short-run non-neutrality of monetary policy in general, and open market operations in particular. Such non-neutrality follows from a transmission mechanism that relies on a wide-spectrum portfolio effect. This is a point extremely important in Friedman's analysis and for Monetarist economists in general. Monetarists hold that money is a close substitute of an ample variety of assets: bonds, equities, physical assets, durable and semi-durable goods (see Friedman and Schwartz Money and Business Cycles, 1963a).

I claim, however, that Friedman's main argument in favor of QE operations during a period of financial turmoil does not rest on his belief in the portfolio balance effect, but in what he

(and Anna Schwartz) called the "monetary" effects of monetary policy. Friedman and Schwartz (1963b) in their discussion about the impact of the "bills only" doctrine on the open market operations, argue that from the point of view of the Federal Reserve action on the stock of money what really counts is the amount of high-powered money created, which is determined by the size of open market operations, not by the kind of securities exchanged. Here Friedman and Schwartz (1963) highlight the crucial distinction between the "monetary" effects of monetary policy from the "credit" effects:

"If the bills only policy has nonetheless aroused considerable controversy, it is largely because of the tendency we have noted on the part of economists and others to emphasize the "credit" effects of monetary policy rather than the "monetary" effects, which is to say, the effects on the structure of interest rates rather than on the stock of money. The major criticism levied against the bills only policy was that the System was denying itself an instrument, considered potent by the critics, for affecting economic activity, namely, affecting the relative yields on long- and short-term securities."

Nelson (2011) enters into some detail in Friedman's conception of the portfolio effect of a money increase to explain why, his original view of open market operations as exchanges between money and short-term debt, could be extended to allow for the possibility of operations in long-term government debt.

Other Monetarists as Meltzer (2001), however, have been more explicit in explaining how open market operations in assets different to Treasury bills could work to avoid a liquidity trap:

"The liquidity trap, by assumption, makes short-term Treasury bills (or similar securities) a perfect substitute for base money or bank reserves. Exchanging one for the other does nothing of interest. Exchanging either money or Treasury bills for some other asset such as foreign money, domestic or foreign long-term bonds, equities, or commodities changes relative prices and real wealth. In this hypothetical case, base money plus bills is a composite good. The composite good is a gross substitute for other assets; increasing either component, or both, is expansive.

For a full liquidity trap to be effective, the composite asset – money plus bills – must be a perfect substitute for all other assets. When the marginal rate of substitution of money for bonds goes to zero, all marginal rates of substitution must go to zero. All assets are part of a single composite good.

If assets other than bills and money remain gross substitutes, a liquidity trap means only that one row and one column in the matrix of marginal rates of substitution has been eliminated. All other marginal rates of substitution remain. Monetary policy remains effective. The standard class of models gives the wrong answer about policy. It implies that a liquidity trap is possible and, for some, is a reality, (Krugman, 1988, Ito, 1998). The alternative denies that a liquidity trap is possible except in the limit when all prices are zero."

Here I contend that, though Friedman did not directly address the issue of using open market operations in long-term bonds during periods of financial market distress, he was not explicitly opposed to this kind of operations. In *A Program for Monetary Stability* Friedman (1960) comments on the "bills only" policy adopted by the Open Market Committee of the Reserve System in 1953. He considers it, in principle:

"a device for allocating responsibility among different government agencies and imposes hardly any limits whatsoever upon the monetary actions that the Federal Reserve and the Treasury together can undertake."

Some paragraphs below, he further expresses the following:

"Let us suppose that is desired to add high-powered money by reducing the amount of long-term securities in the hands of the public. In the absence of the "bills only" policy, the Federal Reserve could do this itself simply by buying long-term securities. Given the "bills only" policy, the same result can be accomplished by cooperation between the Federal Reserve and the Treasury."

Thus, it is highly possible that in an environment of short-run interest rates close to zero, Friedman would have recognized that outright purchases of long-term securities could be a more effective mean to achieve the "monetary" effect than the traditional open market operations through the purchase of short-term Treasury bills.

From the previous discussion, there is little room for doubt that Friedman would have supported some kind of QE scheme to face the major disturbances that the US and other developed countries economies have been experiencing since 2008, or Japan after its 1991 financial crisis. This statement could reasonably be extended to those economists that still follow Monetarists ideas. But Friedman's view about the usefulness of an expansive monetary policy during financial crisis does not rest on the portfolio balance effect, though he certainly believed in the relevance of this transmission channel.

Therefore, an important question is how these monetary policy interventions should be designed and implemented in order to comply with Friedman's standards. I argue that those

standards are grounded in the "monetary" effects and the idea that monetary policy should aim to be a stabilizing force. The emphasis in the stabilization properties of monetary policy may explain why Friedman was less concerned with the composition of the open market operations and their potential "credit" effects, than with their influence on the overall quantity of high-powered money (the "monetary" effects). Thus a QE scheme based on Friedman's views should principally aim to provide sufficient high-powered money to guarantee a stable growth of a broader monetary aggregate such as M2, at annual rates similar to those observed in "normal" times. In order to achieve this, the emphasis should be placed on the "monetary" effects of monetary policy and not on its "credit" effects, which by the way are subjected to long and variable lags (Friedman, 1961).

From an operational point of view, the central bank should rely exclusively on open market operations through outright purchases of financial assets. Open market operations should be conducted mainly through purchases of long-term securities that are more effective than operations in short-term securities to expand high-powered money in an environment of near zero short-run interest rates. Open market operations via outright purchases should provide the means to increase the monetary base at rates significantly higher than those observed at "normal" times but, in a way that these increases can be sustained for a relatively long period. Repeated cycles of sudden and enormous increases in the rate of growth of the monetary base (central bank assets) that can only be maintained for short periods and are followed by sharp reductions or even negative rates, will cause vast volatility that opposes to the basic idea of promoting stability.

5.- Evaluation of Quantitative Easing experiences from Friedman's perspective

This section examines the QE experiences of the United States, the United Kingdom, the Eurozone, and Japan, from what I claim would have been Friedman's perspective. The paper employs monthly data of the monetary base (or central bank assets) and M2, in levels and year to year (yty) percentage changes. I try to use relatively long series of more than thirty years, when possible, in order to assess the magnitude of the QE operations in a historical dimension. The paper also examines the volatility of the relevant time series by using 12-month moving standard errors of the year to year percentage changes (12MMSE).

As pointed by Fawley and Neely (2013)[2], QE programs in response to financial crisis should be distinguished from temporary increases in the monetary base that are occasionally used to provide liquidity for short-periods. In general, a QE program can be defined as a deliberate attempt of the central bank to increase the monetary base (or alternatively its stock of assets) at a rate substantially higher than that observed during "normal" times, for a relatively long period of time (six months or more).

The central bank can increase high-powered money (its stock of assets) through open market operations and lowering the interest rate of its lending programs. But some qualitative measures, as extending the maturity of the lending programs or the variety of assets accepted as collateral, can also have a quantitative impact on the monetary base/central bank assets. Thus, qualitative measures can be considered as part of a general definition of QE programs. As was discussed in the previous section, however, a QE program

[2] This paper contains one of the best descriptions and chronology of the QE programs of the countries analyzed in the paper for the period 2008-2012.

that accords to Friedman's views should be based almost exclusively on outright purchases of short-run and long-run securities.

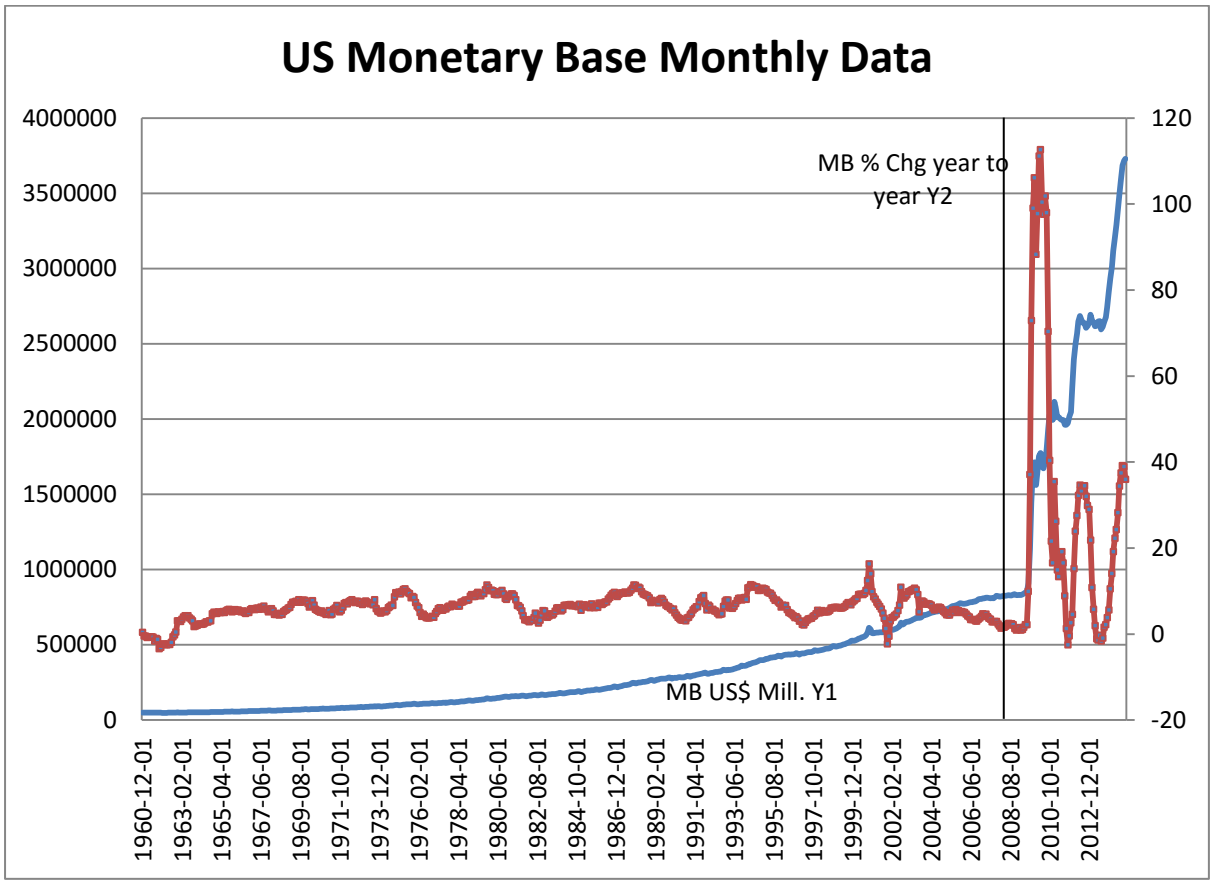
a) QE in the United States

Analysis of QE in the United States is based on monthly data of the Monetary Base and M2 for the period 1959.01 – 2014.12. The data was obtained from the St. Louis' FRED data base.

In the US the first stage of QE operations was introduced between October 2008 – May 2009 in response to the bankruptcy of Lehman Brothers (Fawley and Neely, 2013). Between mid-2007, when the first signs of the financial crisis appeared and the Lehman Brothers collapse, the Fed concentrated in lowering the Federal Funds rate.

Figure 1 shows the evolution of the monetary base in levels and growth rates yty from 1960.01 until 2014.12. In the first eight months of 2008, the monetary base grew mostly below 2 % on a yty basis (Figure 1). In September 2008 the pace accelerated to 9.94 %, 37.08% in October, 72.87 % in November, and 99.04 % in December. The peak in the yty growth of the monetary base was reached in May 2009 (112.67 %), and then it started to decrease unevenly showing negative values in November and December 2010.

Figure 1

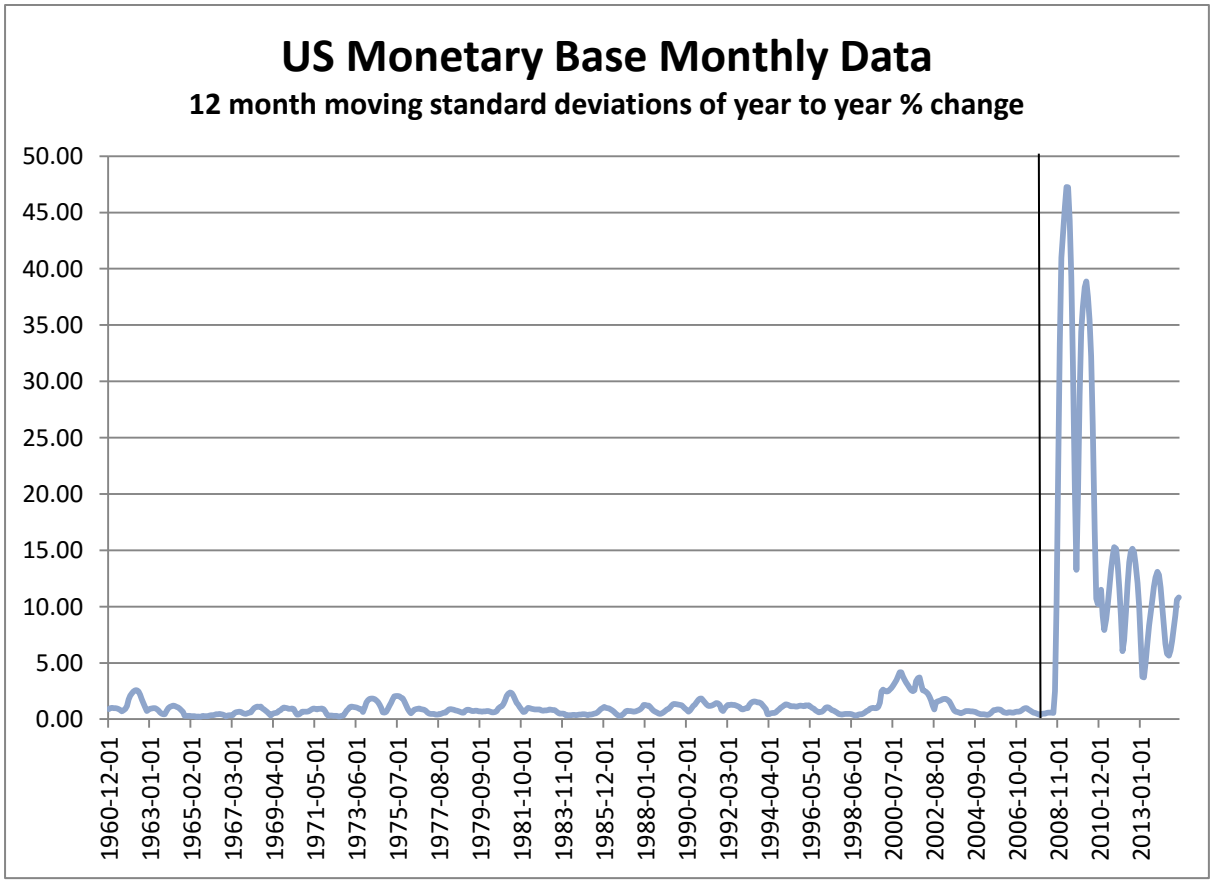


Although QE2 was officially announced in November 2010, the monetary base only began to grow significantly again since March 2011 (15.18 % yty), stabilizing over 30 % (yty) between June 2011 – November 2011. In December 2011, it started to fall rapidly until reaching negative values for the period June 2012 – October 2012.

QE3 was announced in September 2012, but high-powered money only grew above 10 % (yty) again since March 2013. From that moment on the rate of growth of the monetary base accelerated gradually until reaching a peak in November 2013 (39.21 %). Then, it began to fall gradually until growing below 10 % in the last two months of 2014.

This strong but uneven growth in the monetary base is reflected in a drastic increase in its volatility as shown in Figure 2. From 1960.11 to 2008.09, the maximum value attained by the 12-month moving standard error (12MMSE) of the yty percentage changes was 4.17. This value jumped to 10.35 in October 2008, and reached its peak value of 47.27 in April 2009. The 12MMSE falls to 13.25 in October 2009, and then starts to climb up again up to 38.88 in April 2010. The ups and downs continue until the end of 2014, with smaller peaks: September 2011, 15.29; August 2012, 15.14; November 2013, 13.09.

Figure 2



The data for M2 in levels and yty percentage changes for the period 1960.01 – 2014.12 is shown in Figure 3. During 2007, when the first signs of the financial crisis appeared and September 2008 just before QE1 kicked off, M2 was growing between 5.5 % and 7 % yty.

Beginning in October 2008, M2 growth accelerated above 7 % yty, and kept growing well above that level (close to 10 %) until June 2009.Starting in July 2009, the yty rate of growth of M2 started to slow down substantially, reaching values below 2 % during the period 2010.03 – 2010.07. M2 continued growing less than 5 % yty until March 2011. The pace of M2 picked up again in April 2011, growing close to 10 % yty between 2011.08 and 2012.06. From 2012.07 until 2013.05 M2 expanded, most of the time, above 7 % yty. From 2013.06 until 2014.12 M2 grew below 7 % yty.

Figure 3

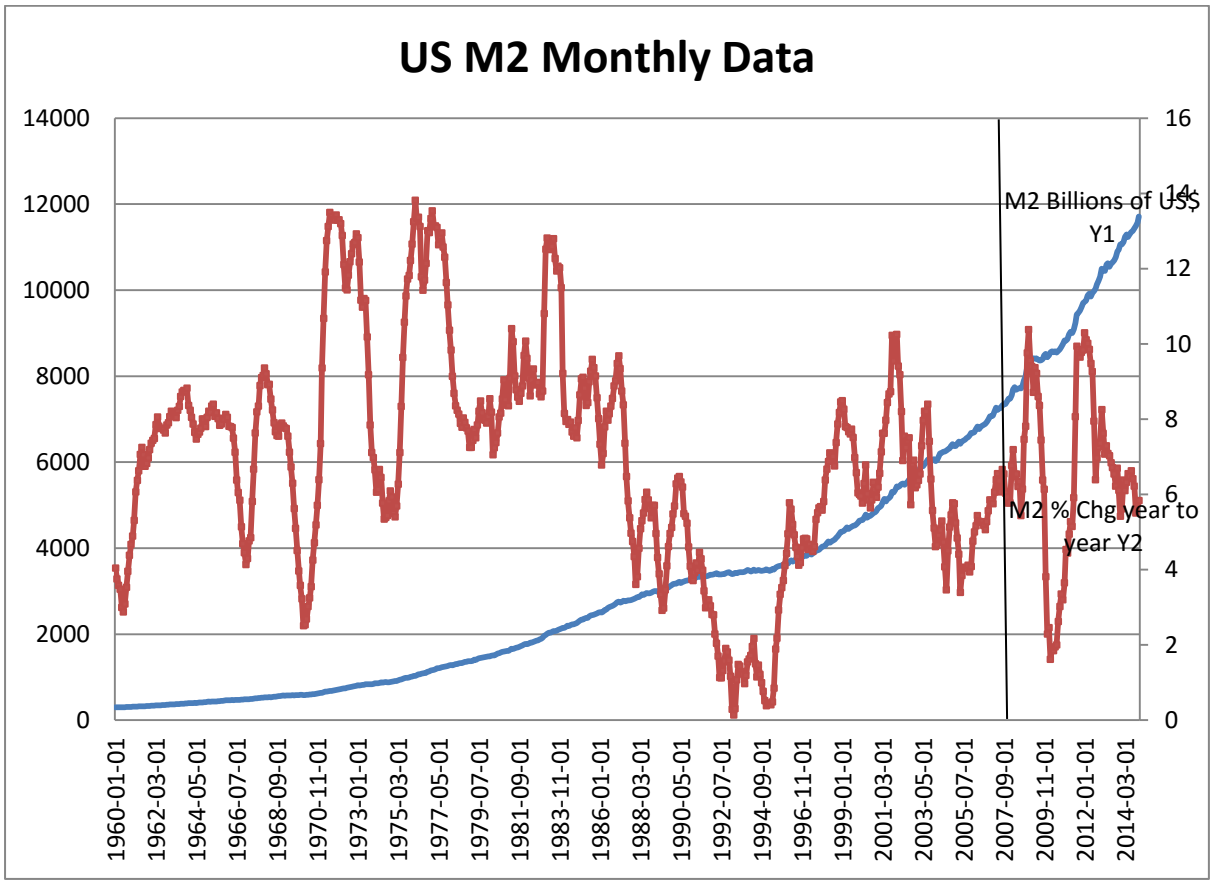
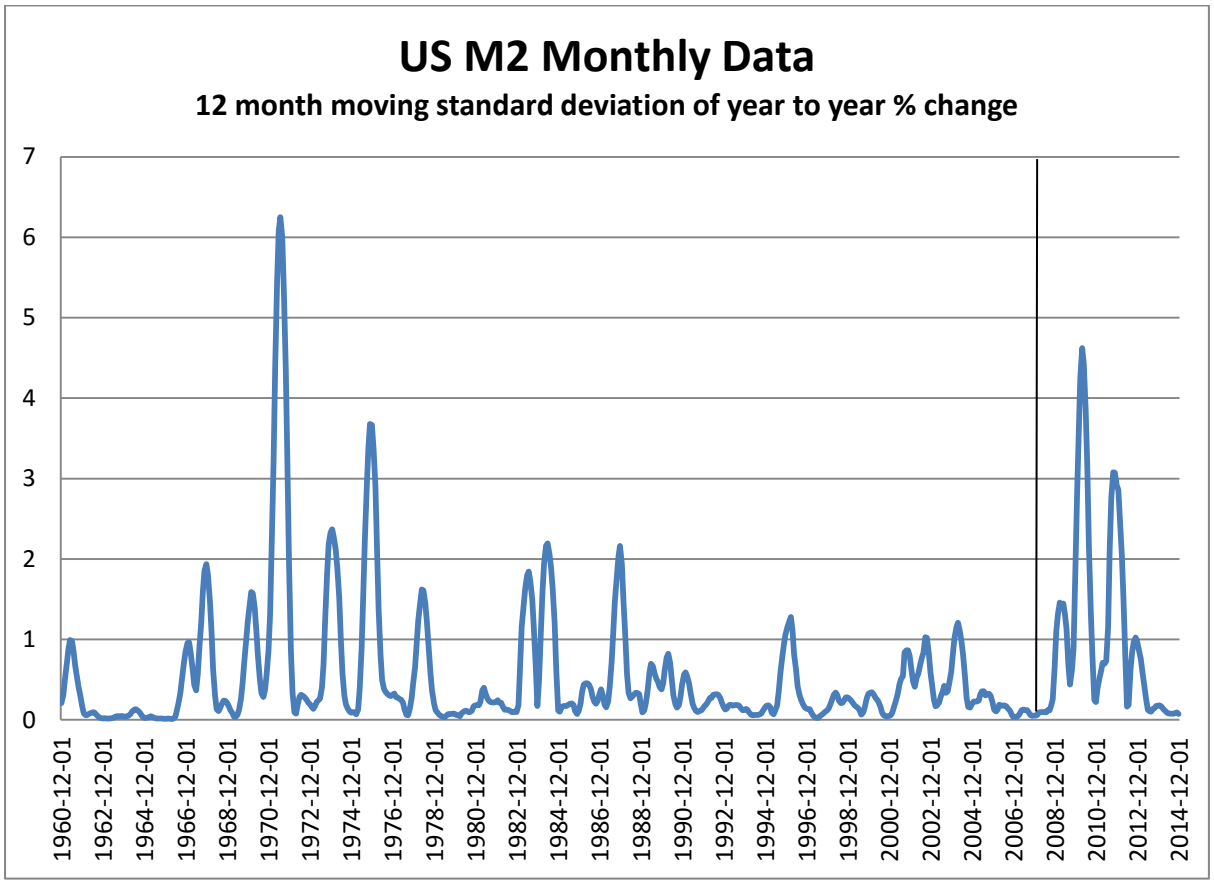


Figure 4 graphs the 12 month moving standard errors of yty percentage changes of M2. Many of the values observed for this volatility indicator after QE1 are among the highest in the complete sample (1960.01 – 2014.12). Of the 77 observations of the 12MMSE since QE1 (2008.10), 16 observations were above 2.

Thus, the Fed QE programs were able to avoid a fall in the level of M2 after 2008 as pointed by Nelson (2011), but they did not maintain its rate of growth, which in fact fell drastically during part of the implementation of QE, and increased substantially its volatility to levels only observed during the seventies. It seems that part of the extreme volatility of the monetary base was transmitted to the broader aggregate.

Figure 4



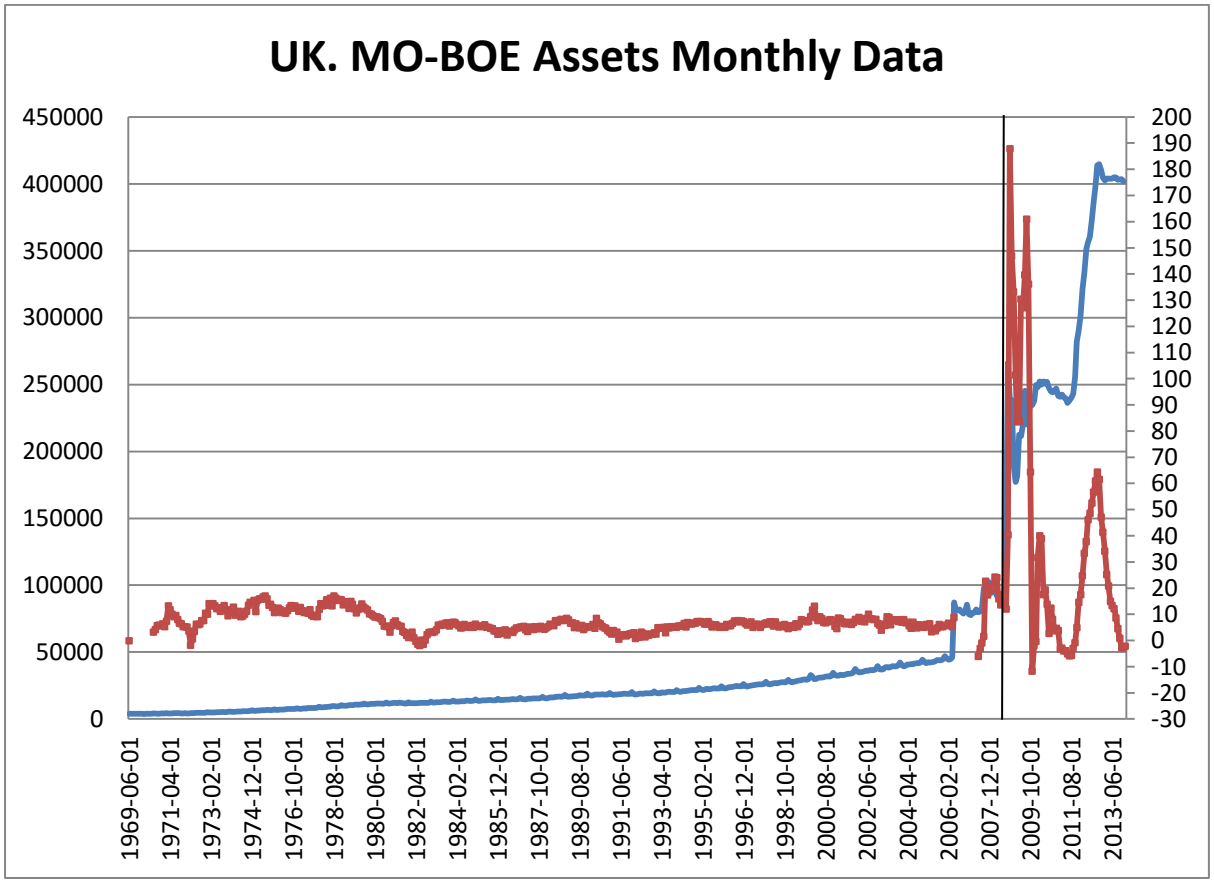
b) QE in the United Kingdom

The analysis of QE operations in the UK uses data for a hybrid series of the monetary base (M0) and the Bank of England (BOE) assets from 1969.06 to 2013.12. The MO series that starts in June 1969 was discontinued in April 2006. From May 2006, the BOE began to publish a series of its monthly assets that also was discontinued in September 2014. The series for M2 is available from 1982.07 to 2013.12. All information was obtained from the Federal Reserve of St. Louis (FRED) database.

QE programs in the UK began formally in March 2009. Purchases of private assets announced and conducted in January 2009, were offset by selling short-term assets (Fawley and Neely, 2013). The BOE figures, however, indicate that a substantial expansion of its total assets began several months before the official announcements. As shown in Figure 5, the yty rate of growth of M0 was generally below 10% since the beginning of the 80s until the data was discontinued in April 2006. The yty rate of growth of BOE assets was negative in May, June and July of 2007, and expanded just 1.66% in August. But in September 2007, there was an important jump in the BOE total assets, that started to grow (yty) between 12% and 25% until August 2008. Then, the yty rate of growth of the BOE assets jumped to 40.38% in September 2008 and to its maximum value of 187.89% in October 2008. BOE total assets continued growing above 100% on a yty basis until January 2009, slowdown to around 80% in 2009.02 – 2009.03 and then accelerated again above 100% from 2009.04 – 2009.08. Since September 2009, BOE assets exhibited a marked but erratic deceleration up to October 2011. In September 2011, coinciding with official announcements to extend QE (Fawley and Neely, 2013), the BOE started a new round of expansion of its balance sheet. BOE total assets began to grow at double digits rates (yty) in November 2011, reaching

progressively a peak of 64.38% in September 2012. In October 2012 started a fairly gradual reduction in the yty rate of growth of the BOE assets, until reaching negative values between 2013.10 – 2013.12.

Figure 5



The massive increase in the BOE total assets translated into tremendous volatility as shown by the 12 month moving standard errors (12MMSE) of the yty rates of growth reported in Figure 6. For the monetary base (M0), the 12MMSE since the mid-eighties until 2006.04, rarely surpassed the value of 2. In contrast, the 12MMSE of the BOE total assets jumped from values close to 10 in the period 2008.04 – 2008.09 to 48.95 in October 2008. It reached its highest value of 63.37 in January 2009, just when the first official announcement of a QE like program was made. A clear reduction of this volatility indicator was observed in

September 2010, and continued until December 2011. In January 2012, the 12MMSE indicator of the BOE assets started to climb up again reaching a peak of 21.08 in June 2012. Double digit values of the 12MMSE were observed until the end of the sample period (2013.12).

Figure 6

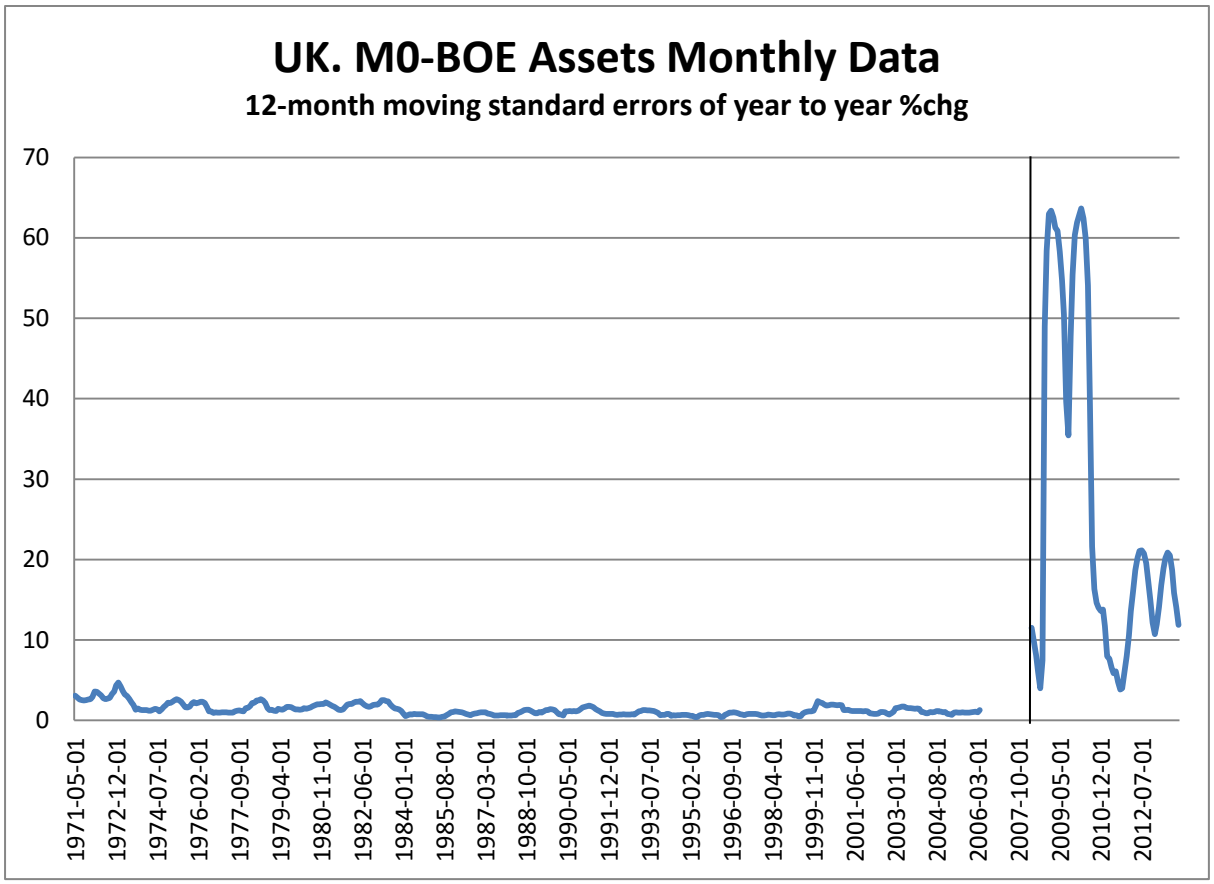


Figure 7 shows the evolution, in levels and yty growth rates of M2, for the period 1982.07 – 2013.12. Between 2001.01 and 2006.12, M2 was growing fairly steadily in the range of 7 - 10% yty. It decelerated below 7% for the period 2007.01 – 2007.11, and then returns to rates over 7% during 2007.12 – 2008.08. But in September 2008, M2 started to decrease its pace gradually, reaching a low value of 1.9% yty in April 2009. From then on, it recovers slowly, but keeping yty growth rates that barely surpassed 5% between 2010.02 – 2010.04.

From May 2010 until August 2011, M2 was growing on a yty basis below 5%. Beginning in September 2012, M2 resumed its growth around 5-6% until November 2013, falling to 4.55% in 2013.12. Thus after September 2008 until the end of 2013, M2 never recovered its yty rate of growth above 7% observed in the first six years of the current century.

Figure 7

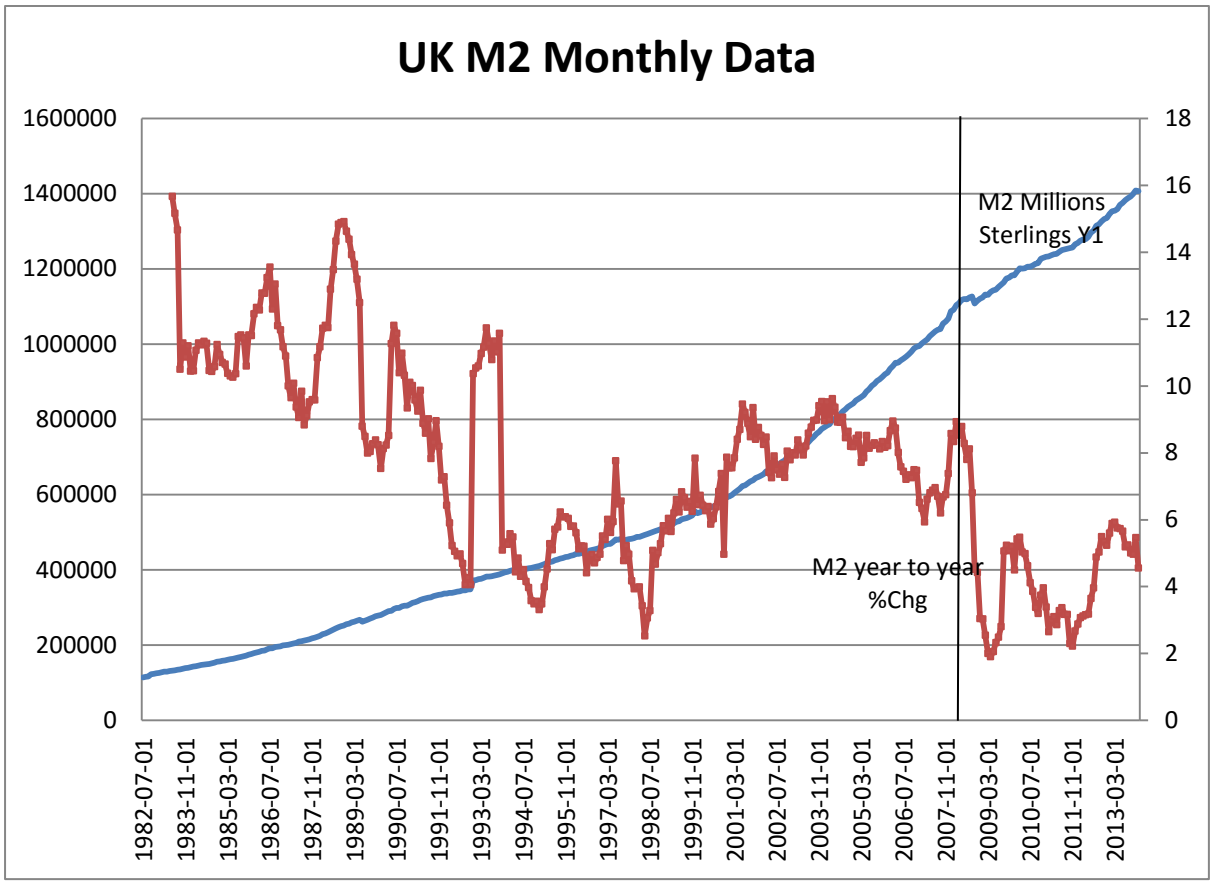
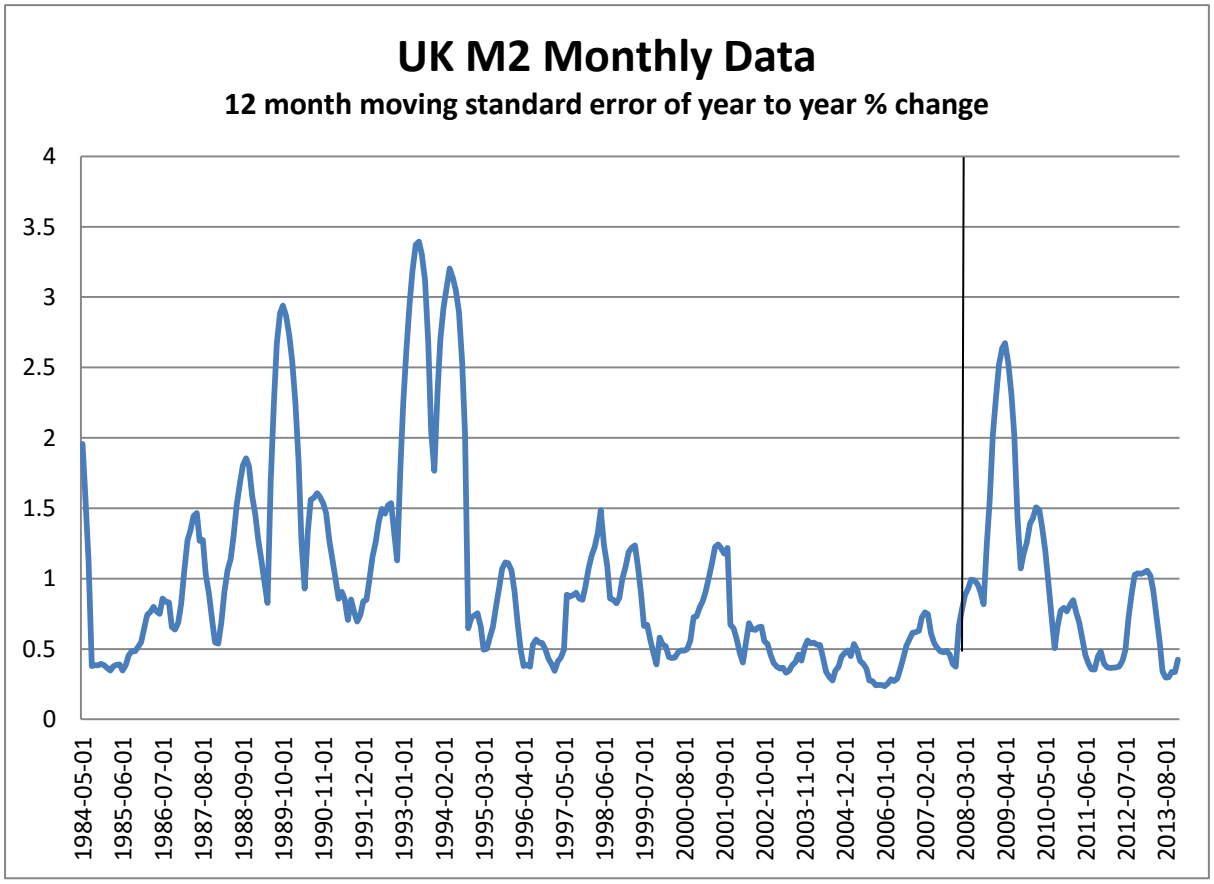


Figure 8 shows that the reduction in the rate of growth (yty) of M2 observed after September 2008 until December 2013.12, was accompanied by a noticeable increase in its volatility (the 12MMSE of the yty % change of the rates of growth) compared to that registered in the period 2002.01 – 2007.12.

Therefore, the enormous expansion in the BOE total assets that began in September 2008 was very erratic, did not maintain the pace of growth of M2 and increased the volatility of this broader monetary aggregate.

Figure 8



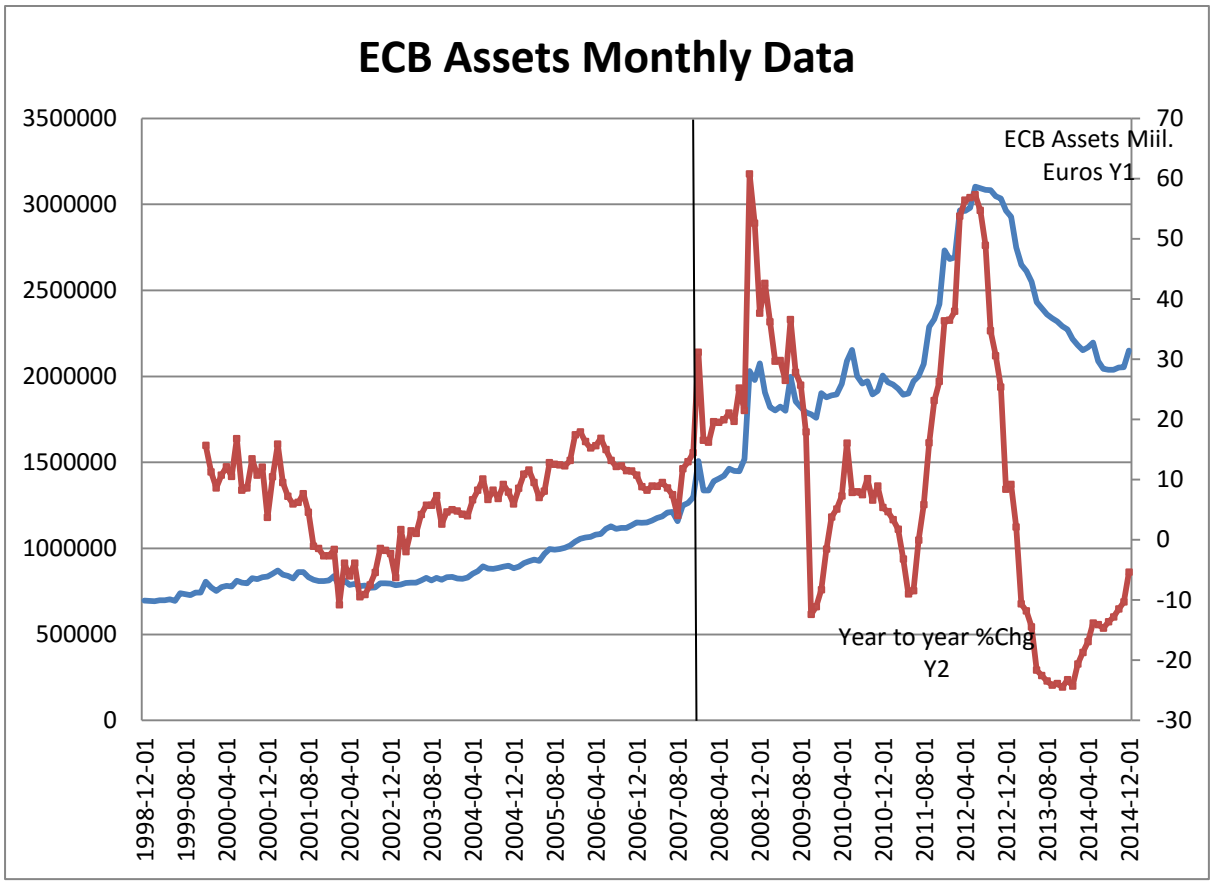
c) QE in the Euro Zone

The analysis of QE for the Euro Zone employs data from 1998.12 to 2014.12 for the European Central Bank (ECB) assets, and from 1980.01 -2014.12 for M2. Both series are obtained from the Federal Reserve Bank of St. Louis (FRED) database.

Before the financial crisis, between 2000.01 and 2006.12, the balance sheet of the ECB exhibited a rather unstable behavior, growing frequently above 10% (yty), but also registering a period of marked and continuous contraction between September 2001 and January 2003 (Figure 9). July 2005 – December 2006, was a period of straight growth of the ECB assets above 10% (yty), with several observations higher than 15%. Then from 2007.01 until 2007.08, ECB assets grew below 10%, and then accelerated again from 2007.09 to 2008.09 to rates around 20% (yty). In October 2008, the ECB announced its first QE measure: to lend as much as banks wanted at a fixed-rate tender with an expanded list of collateral accepted (Fawley and Neely, 2013). This measure produced a jump in the yty rate of growth of the ECB assets to 60.78% in October 2008, 52.56% in November 2008, 37.61% in December 2008, 42.57% in January 2009, and 36.17% in February 2009. ECB assets continued growing close to 30% (yty) from 2009.03 to 2009.08. Additional impulse to the ECB assets came from new measures announced in May 2009, including asset purchases (Fawley and Neely, 2013). But in November 2009, December 2009 and January 2010, ECB total assets contracted. Growth resumed in February 2010, but generally below 10% with another short period of contraction (2011.04 – 2011.07). This happened despite new measures announced by the ECB in May 2010.These measures, however, were mainly based on sterilized operations (Fawley and Neely, 2013). In October 2011, the ECB announced a second round of asset purchases and a new extension of credit facilities. These actions

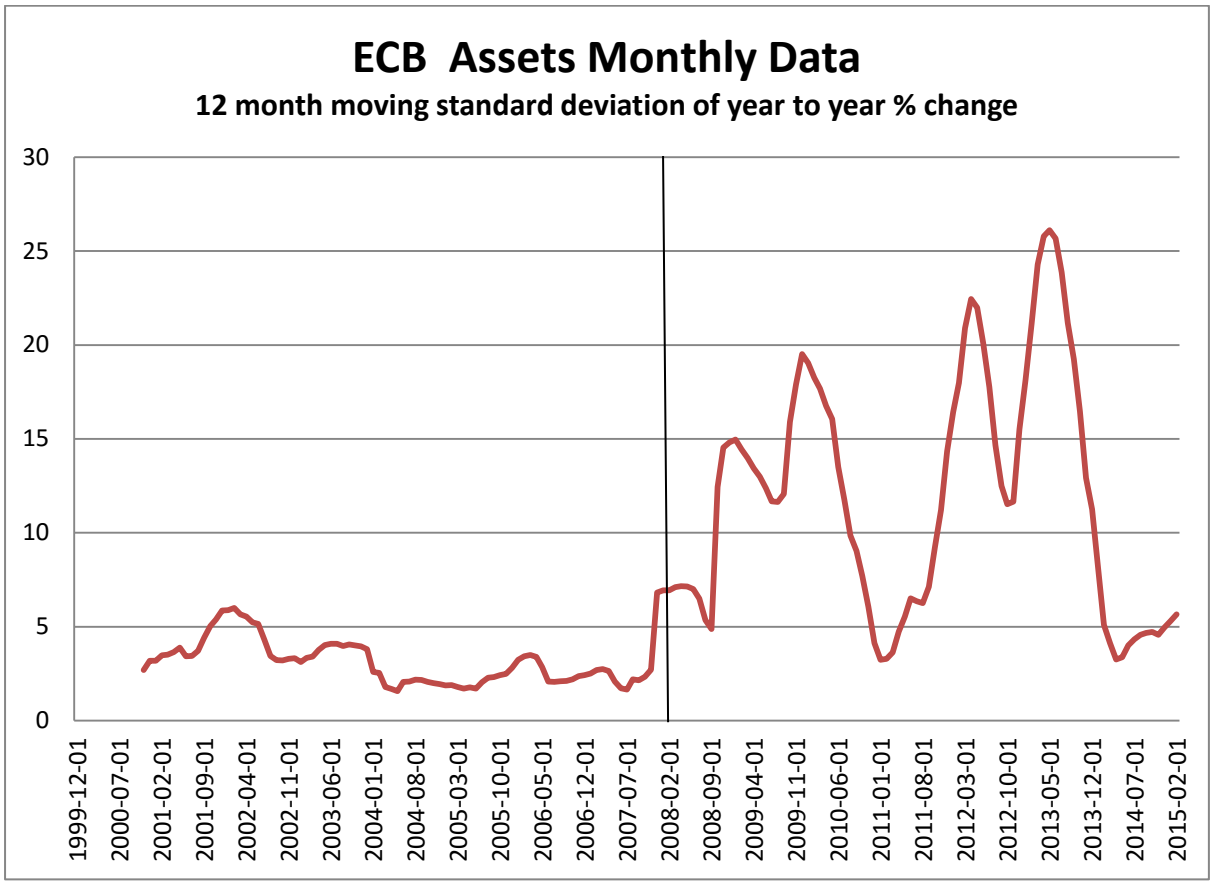
stimulated a new period of rapid expansion of total ECB assets from 23.09% (yty) in October 2011 to a peak of 57.3% (yty) in June 2012. Growth of ECB assets continued strong until November 2012. But from 2013.03 to 2014.12 the ECB assets contracted continuously and at double digit rates.

Figure 9



The previous account of the behavior of the ECB total assets is reflected clearly in the volatility indicator of this series (Figure 10). The 12-month moving standard errors of the yty rate of growth of the ECB assets were under the value of 6 between 2000.11and 2007.11. But after 2007.12, the 12MMSE frequently overshoot the value of 10, and in many occasions registered values above 15 and 20.

Figure 10



As shown in Figure 11, M2 in the Euro Zone grew well above 5% on a yty basis since January 2001 until August 2009. In fact, during the period 2007.07 – 2008.11, it grew most of the time above 10% (yty). But in September 2009, its rate of growth was 4% (yty), and from then on it started to reduce its pace to values under 2% (yty) during the period 2010.01 – 2010.06. In July 2010, it returned to growth rates above 2%, but it never reached the 5% level again in the sample period that ends in 2014.12.

Figure 11

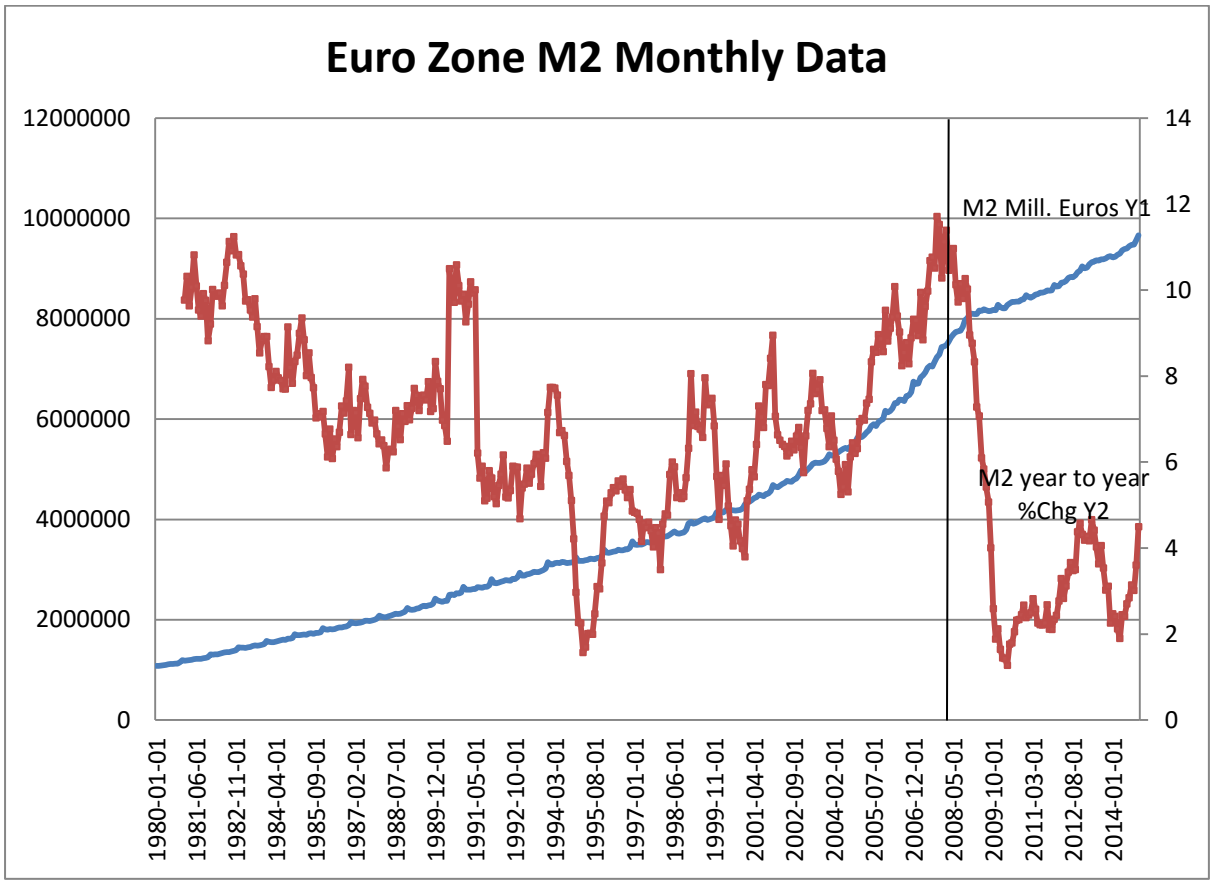
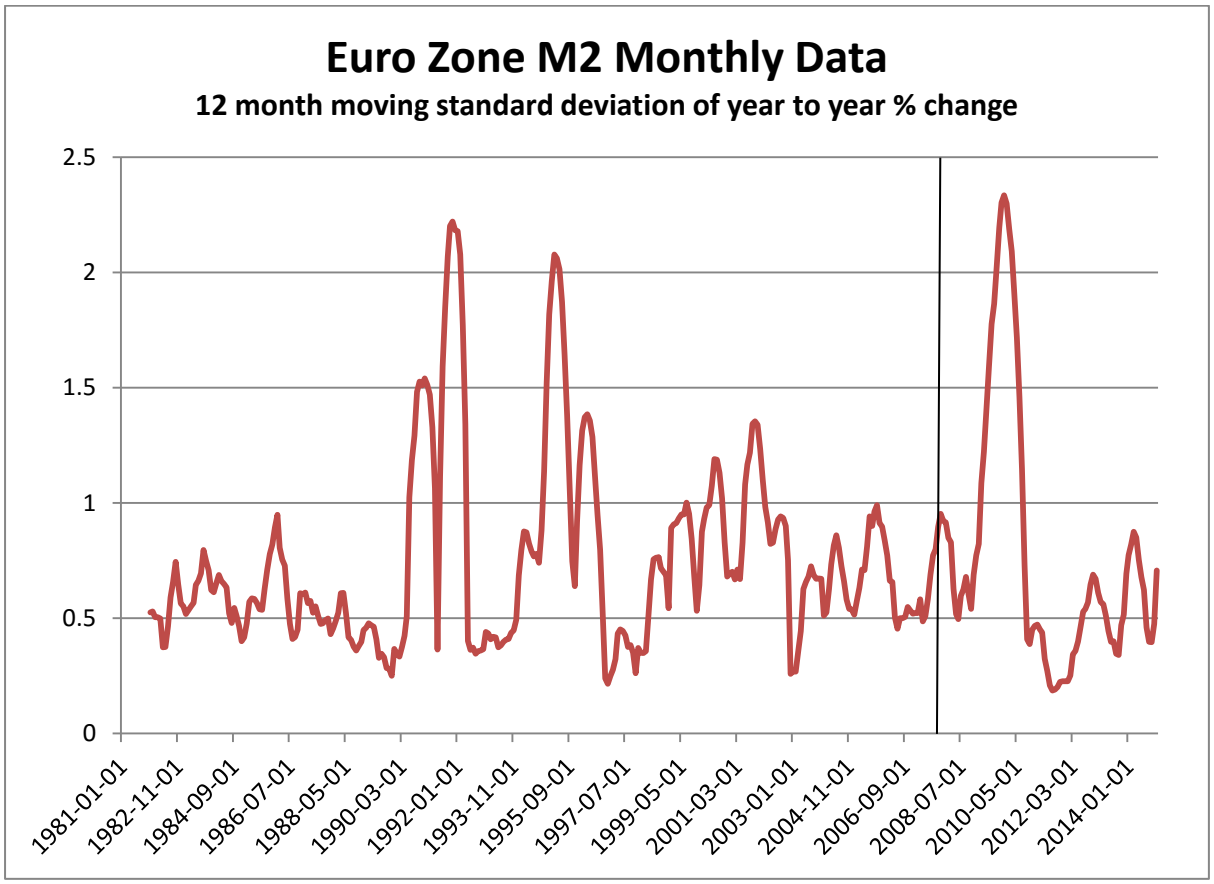


Figure 12 shows that the volatility of the M2 series of Euro Zone increased substantially during the period of acute deceleration of its yty rate of growth. The 12MMSE of the yty rates of growth of M2 were below one from February 2002 until February 2009. In contrast, this volatility measure of the yty rate of growth of M2 was above 2 from 2009.09 until 2010.03, and well above 1 from 2010.04 until 2010.07. In fact the maximum value of the 12MMSE series (2.33) was reached in December 2009.

Thus, in the Euro Zone, QE programs did not result in a contraction in the level of the broad aggregate M2, but the strong expansion and uneven behavior of the ECB total assets did not translate in a stabilization of its rate of growth around pre-crisis values, and a substantial increase of its volatility was observed during part of the implementation period.

Figure 12



d) QE in Japan

The case of Japan is very particular, because it economic woes are not entirely the product of the 2008 international financial crisis, but the legacy of its 1991 domestic financial crisis that up to date remains unresolved.

The analysis of Japan's QE programs is based on monthly average data of the monetary base from 1970.01 to 2014.12. This time series is obtained from the Bank of Japan database. The end of period series of the monetary base is only available since July 1996, and the Bank of Japan total assets starts in April 1998. Because we want to take account of the 1991 financial crisis, these last two series are not adequate.

The M2 series extracted from the Federal Reserve of St. Louis FRED database covers the period 1967.01 – 2014.11.

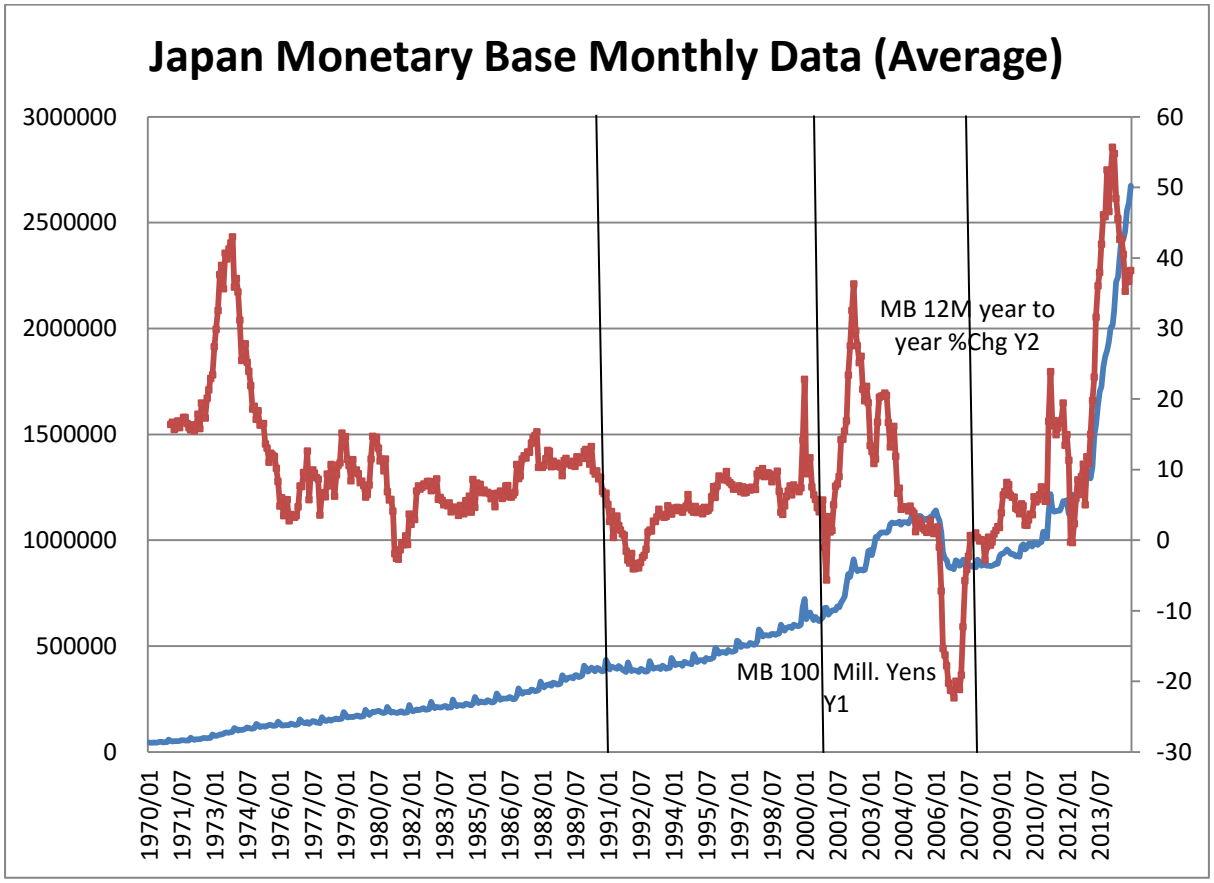
Greenwood (2006) points out that the attempt of the Bank of Japan (BOJ) to coordinate policy internationally after 1985, and the abandonment of monetary targeting undermined the conduct of domestic monetary policy. In particular, Greenwood (2006) considers that the extended monetary easing from 1985 - 1989 was central to the strong increase in assets prices. The average monetary base rate of growth (yty) data (Figure 13) indicates November 1986 as the point from which monetary policy turned more expansive relative to values observed since mid-1979. This period of mostly double-digit growth ends in 1990.09.

In order to reverse asset inflation, the BOJ started rising interest rates in May 1989 (Greenwood, 1989). But the BOJ underestimated the impact on GDP growth and non-assets prices of its "bubble-busting" policy. The initial response to the deceleration of the Japanese economy was completely on the fiscal side (Greenwood, 2006). From 1991 to 2001 the BOJ continued conducting monetary policy using the interest rate strategy in place before the financial crisis (1985), lowering the official discount rate from 2.5% progressively to 0% in February 1999 (Greenwood, 2006). In March 2001the BOJ officially abandoned its interest rate strategy and formally adopted a QE strategy (Greenwood, 2006).

The average monetary base data (Figure 13) shows an increase in the yty rates of growth around August 2001 (9.03% yty), reaching a peak of 36.34% yty in April 2002. It kept growing above or close to 20% yty until December 2002. Between 2003.01 – 2003.04 the monetary base slowed down to yty rates close to 10%, but picked up pace growing slightly above 20% during the period 2003.06 – 2003.10. From then on, it started to slow down rapidly, exhibiting straight negative values between 2006.03 and 2007.07. The average

monetary base continued growing yty under 10% until February 2011. From March 2011 to February 2012, the average monetary base grew mostly in the 10% - 20% range, with a peak value of 23.9% yty in April 2011. A new stage of slow growth was observed in the period 2012.03 – 2013.01. The first formal announcement of a QE program based on asset purchases as part of the economic plan of Prime Minister Shinzo Abe, was made on April 2013. An extension of the program was announced in October 2014. From February 2013 until 2014.12, the average monetary base exhibited a rapid pace, growing well above 30% yty. Until 2014.12, the peak yty value was 55.68% in February 2014.

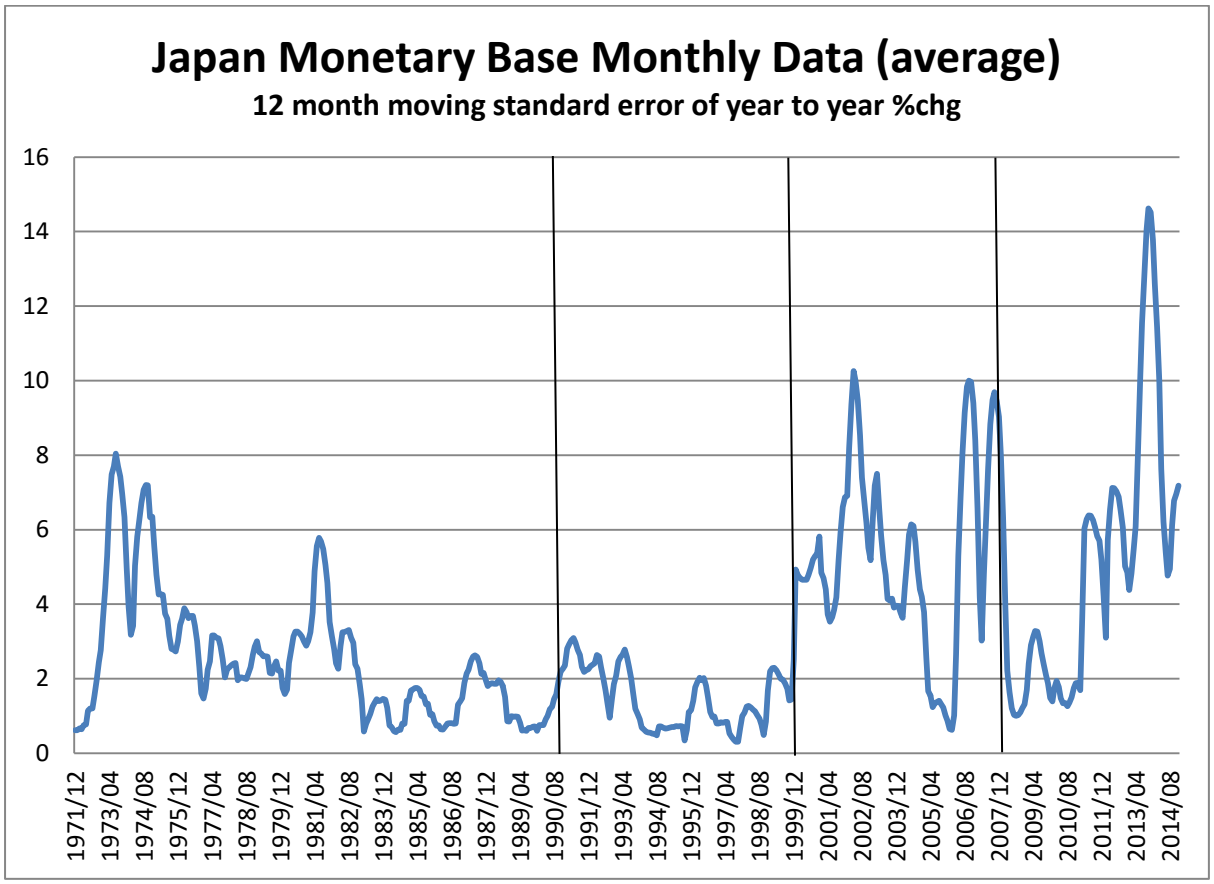
Figure 13



As shown in Figure 14, after a period of relatively high volatility since the beginning of the 70s until the early 80s, the 12-month moving standard error of the yty rate of growth of the

average monetary base was generally below 2 from 1983.03 to 1999.11. During the period of the financial crisis, between 1990.11 and 1993.08, there was a slight increase in the volatility indicator with values frequently above 2. But, in general, the financial crisis did not have a noticeable effect on the volatility of the monetary base. In contrast, the period around the application of the first QE program (March 2001), presents an evident increase in the 12MMSE of the rate of growth of the average monetary base. From 2000.01 until 2005.01, the 12MMSE always registered values above 3, with a peak of 10.26 in April 2002. The period of strong deceleration of the monetary base, 2006.03 - 2007.07, also elevated substantially the volatility of the series. There is a new period of relative low volatility between 2008.04 – 2011.02, but in March 2011 this indicator started to climb again, reaching the highest value of the sample employed, 14.52 in November 2013, a few months after the beginning of prime Minister Abe's expansionary program. Thus, as the experiences previously described in the US, the UK, and the Euro Zone, Japan's QE operations have produced a substantial increase in the volatility of the monetary base.

Figure 14



The evolution of the monthly values of M2 is presented in Figure 15. Before the 1991 financial crisis, M2 grew vigorously. From 1967.01 until 1979.12, M2 rate of growth on a yty basis was generally above 11%. It slowed down to a range between 7% - 11% during the period 1980.01 – 1987.08. During the period 1987.09 – 1988.10, M2 growth rate yty kept hovering 11%. From 1988.11 to 1989.12 the yty rate of growth moved around 10%, and then again from 1990.01 to 1990.10, the yty rate registered values over 11%. But since the beginning of 1991, M2 started to grow at a much slower pace, presenting consecutive values under 1%, and six negative values yty, in the period 1992.06 – 1993.04. Since February 1991 until November 2014, M2 only grew once, in February 1998, at 5% yty. During the period of rapid growth of the monetary base under the first QE program

(2001.08 – 2002.12), the rate of growth yty of M2 was mostly above 3%. The implementation of the second QE program under Abe's administration has produced a modest acceleration in the yty rate of growth of M2. The yty rate of growth of M2 from 2013.02 until 2014.11 has been mostly above 3%, with some values higher than 4% between 2013.10 and 2014.01.

Figure 15

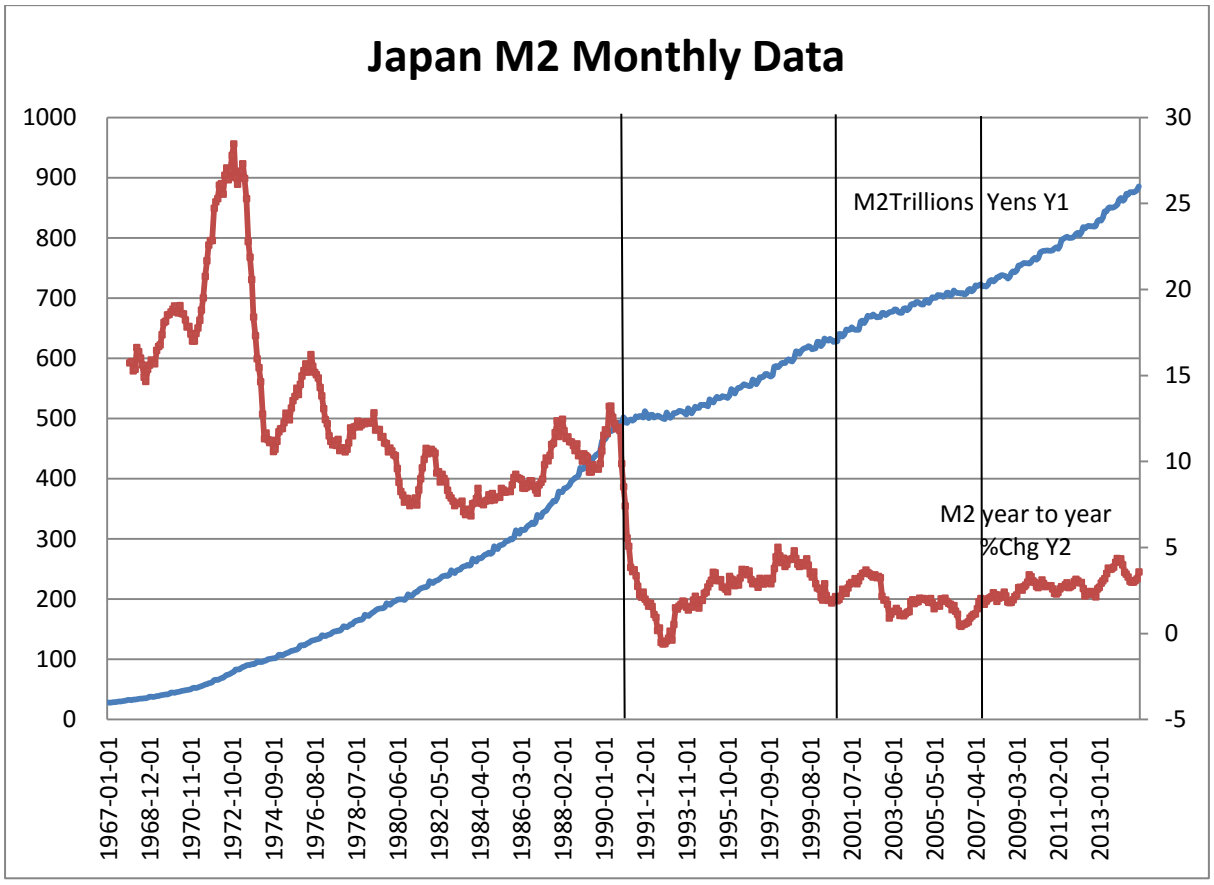
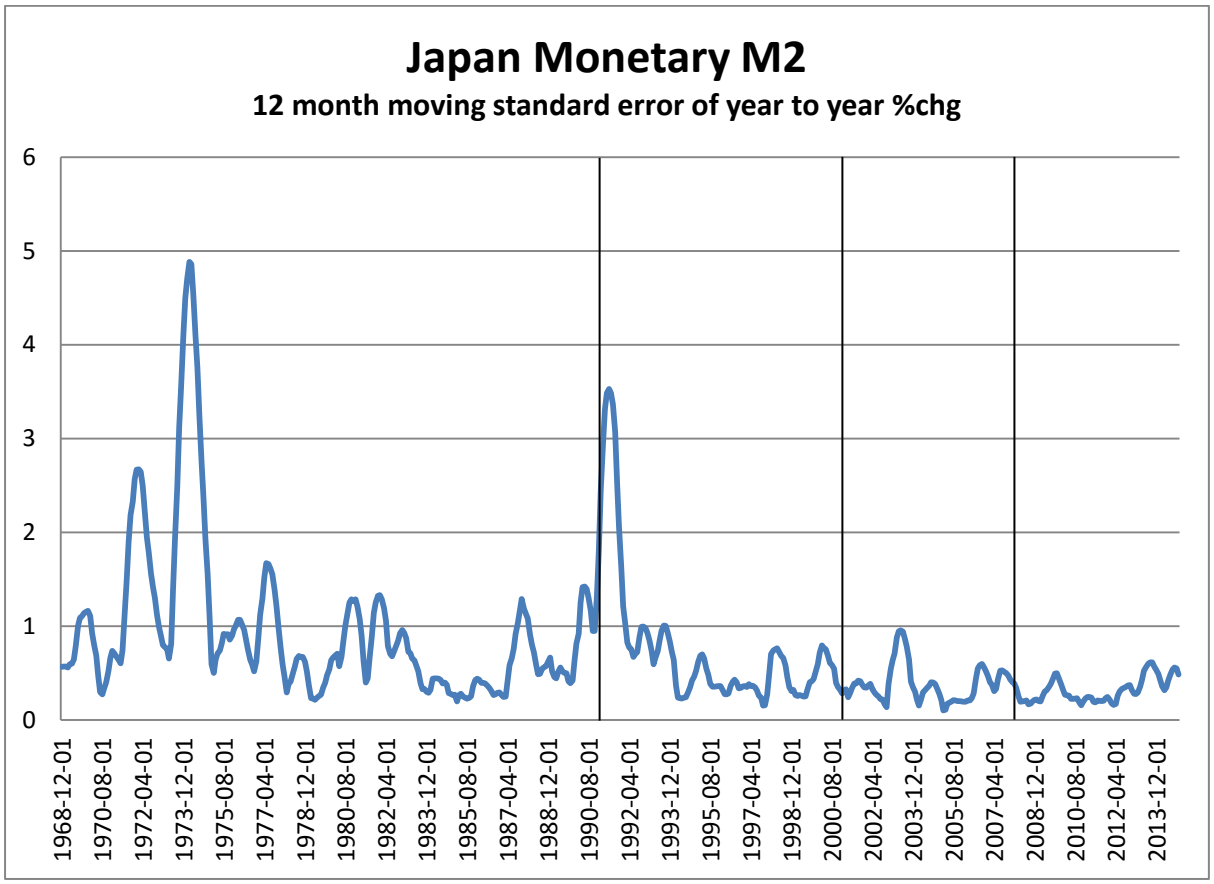


Figure 16 displays the 12-month moving standard errors of the yty rate of growth of M2. The sharp fall in the rate of growth of M2 that started during the 1991 financial crisis, increased notably the volatility of the series, registering values above 2 between 1991.02 – 1991.11 However, the M2 series exhibits a relatively low volatility since the beginning of

1992 until the end of the sample period (2014.11). For most of this period, the values of the 12MMSE of the yty rate of growth of M2 have been below 1.

Hence, in the case of Japan, the QE1 (2001.08 – 2004.02) and the ongoing QE2 have produced strong and erratic expansions in the monetary base with little effects on the rate of growth of M2.

Figure 16



6.- Conclusion

This paper main argument is that Quantitative Easing (QE), as a general concept, is consistent with Friedman's core views about the role of monetary policy during financial

crisis, but the specific way in which QE have been implemented by the Fed and other major central banks since the 2008 does not comply with Friedman's basic principles.

From a doctrinal point of view, QE can be traced back to Friedman's works during the sixties and some comments on Japan's situation after its 1991 financial crisis. Other monetarists such as Allan Meltzer have explained in detail how open market operations in long-term debt could make monetary policy effective in a zero interest rate environment. Support for QE cannot be found in the current dominant schools of thought in economics (New Classical and New Keynesian), that have minimized the role of monetary aggregates as a tool of economic policy.

Friedman's remarks on the necessity of an expansive monetary policy in Japan after the 1991 financial crisis cannot be taken as an open support to any type of QE arrangement. The paper presents evidence that Friedman backing of QE programs during episodes of financial turmoil rests mainly on what he (and Anna Schwartz) called the "monetary" effects of monetary policy and the requirement that monetary policy actions should be an stabilizing force in the economy. A QE program consistent with Friedman's tenets can be achieved through the use of outright open market operations to produce a significant (relative to "normal" times), and sustained increased in high power money capable of stabilizing the behavior of broader monetary aggregates such as M2.

Though Nelson (2011) is a very serious and academically solid work, I consider that its attempt to connect Friedman's views to QE through the monetarist portfolio balance theory is misguided. The monetarist portfolio balance theory centers on the capacity of monetary policy to affect the path of the long-run interest rate relative to the short-run interest rate, but this is not the main theme in Friedman's argument in favor of QE operations. The

portfolio balance theory is neither necessary to establish a link between Friedman's ideas on QE and the intensive use of open market operations in long-term securities in the implementation of the QE programs since 2008. In his discussions on the "bills only" doctrine, Friedman makes clear that open market operations in long-term government debt are a valid instrument to expand high-powered money in order to attain the "monetary" effects.

From an empirical perspective, the paper examines the QE experiences in the United States, the United Kingdom, the European Union and Japan. In all these cases, the QE programs have been implemented through enormous jumps in the rate of growth of the monetary base/central bank's assets that cannot be sustained for long and rapidly revert to low or negative rates. When a new round of QE is approved this cycle repeats again. This modus operandi translates into a huge increase in the volatility of the rate of growth of high-powered money/central bank assets. Moreover, the QE programs have been ineffective in terms of maintaining the rate of growth of M2 at the levels observed in "normal" times, and in all cases, except for Japan, has raised the volatility of this monetary aggregate. From this analysis I conclude, that the type of QE programs put in practice by the Fed and other major central banks since the 2008 financial crisis (Japan since 2001), do not comply with Friedman's views about the role of monetary policy during periods of financial distress.

Fawley and Neely (2013) detailed analysis illustrates an important point that contributes to explain why QE programs implemented since the 2008 financial crisis were not able to sustain a stable rate of growth of the monetary base/central bank assets. The Fed and the BOE that operate in economies where bond markets are relatively more dominant, executed their QE programs mainly through bond purchases, but in many occasions,

especially the Fed, offset the effects of these purchases on the monetary base/central bank assets using different types of sterilization operations. On the other hand, the ECB and the BOJ that operate in economies that rely relatively more on banks, implemented their QE operations mainly through loans to the banking system, and also sterilized some of their asset purchases.

Fawley and Neely (2013) also note another aspect of the QE programs of these four major central banks that separate them from Friedman's principles: they were initially centered in reducing financial market distress, but they were soon deviated to a variety of purposes, including hitting inflation targets, stimulating the real economy, and containing the European sovereign crisis.

Fawley and Neely (2013) corroborate an important empirical finding of this paper: that while the monetary expansion policies of all four central bank examined led to sharp increases in the monetary base, none led to sharp increases in broader monetary aggregates.

From some of Friedman's arguments previously reported, I think that he would have coincided with Taylor's (2015) position that even during a period of financial instability, monetary policy should preserve, as much as possible, a rule-like predictability.

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