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The Federal Reserve’s Management of the Financial Crisis through Quantitative Easing and Currency Swap Agreements¹

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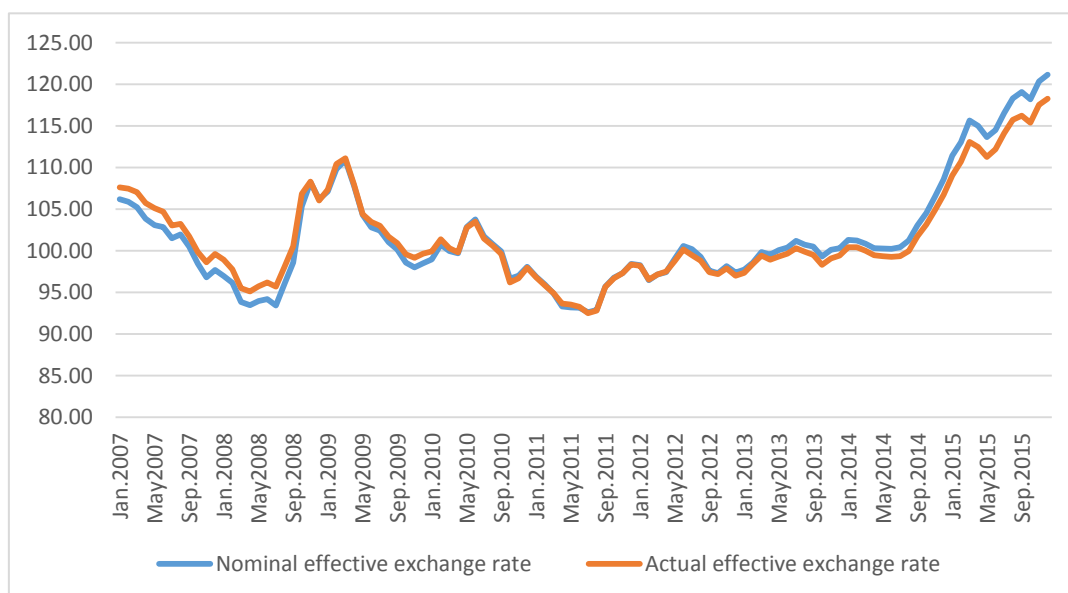
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1. Introduction

The subprime mortgage crisis, a disaster that resulted from the collapse of the US housing bubble, was, by all rights, a US financial crisis. However, this crisis spread almost instantaneously throughout the global economy, resulting in a global financial crisis. Global financial liquidity dried up due to counterparty risk and an insufficient supply of US dollars. Consequently, demand for the US dollar grew rapidly, even though it had triggered the crisis, and the value of the dollar subsequently increased, as illustrated in Figure 1. Such a crisis unfolding in any other nation around the world would not necessarily lead to such an outcome. This phenomenon once again demonstrates the extremely significant role of the US in the world economy, both as the nation that issues a dominant invoice currency and a nation that accounts for a considerable part of the current account deficit in the world.² Simultaneously, this event also clarified that international financial markets are extremely complex and multilayered and that all nations participating in the global financial markets must ensure the liquidity of the US dollar, the currency that underpins these markets.

Figure 1 : USD Effective Exchange Rate



Source: Drafted from International Financial Statistics

² For more information on the international currency system in which the US dollar is the de facto key currency, see Dooley, Falkerts-Landau and Garber (2004a, 2004b), Caballero (2006), and Caballero, Farhi and Gourinchas (2008).

To manage this situation, the US Federal Reserve (Fed) implemented untraditional monetary policies domestically, such as quantitative easing (QE), and globally entered into currency swap agreements to provide liquidity. This paper focuses on the role of the QE policy and currency swap agreements, which have been in effect since 2008, from the perspective of crisis management in global financial systems. To that end, Section 2 describes the three rounds of QE implemented by the US and provides details thereof. Section 3 presents data-based observations on the external role of QE rounds with regard to supplying liquidity. Section 4 describes the currency swap agreements, which functioned as a more direct method for supplying liquidity, and discusses the role of these Fed swap agreements in financial crisis management and the issues involved. The paper then presents its conclusions.

2. Quantitative Easing in the US

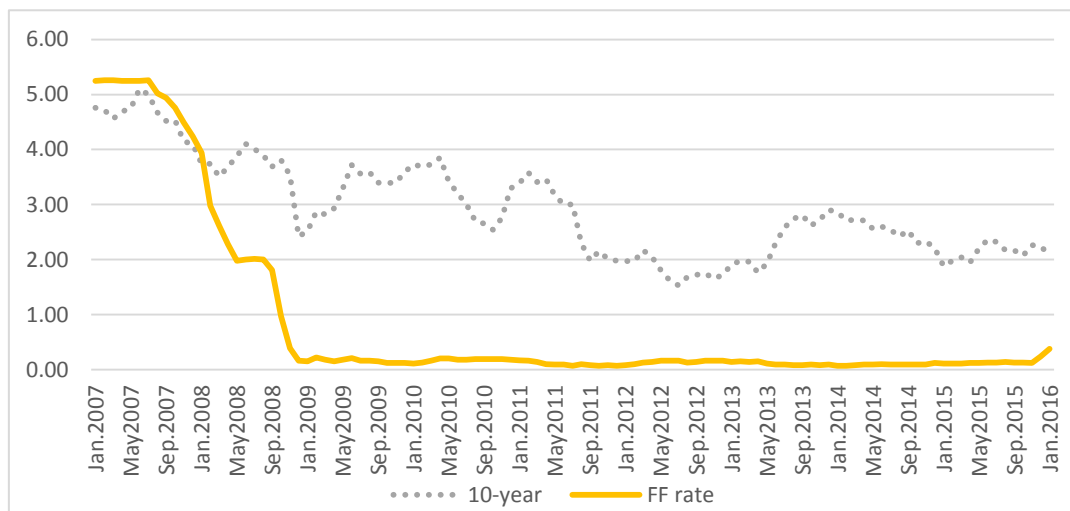
Because nominal interest rates cannot be negative, traditional monetary policy that adjusts interest rates through open market operations fails to function when markets fall into a liquidity trap. “Untraditional monetary policy” refers to monetary policy to achieve further monetary easing in a liquidity trap. Therefore, as the federal funds (FF) rate, the Fed’s policy interest rate, approached the near-zero level after a gradual ratcheting down, the Fed then adopted untraditional monetary policies. These untraditional policies are implemented as a combination of time line policies,³ QE, and credit easing. Although QE and credit easing should be differentiated from each other,⁴ as per Fukuda (2013), most papers and articles discuss them both as QE, so this paper will do likewise.

³ Although not discussed in detail in this paper, this term is similar to forward guidance, in that, by making a pre-commitment to a deadline and policy termination terms for the current monetary policy stance, it alters/guides expectations on future inflation and short-term interest rates and thereby uses the term structure of interest rates to influence current inflation and longer-term interest rates. Inflation targeting is one example of a time line policy.

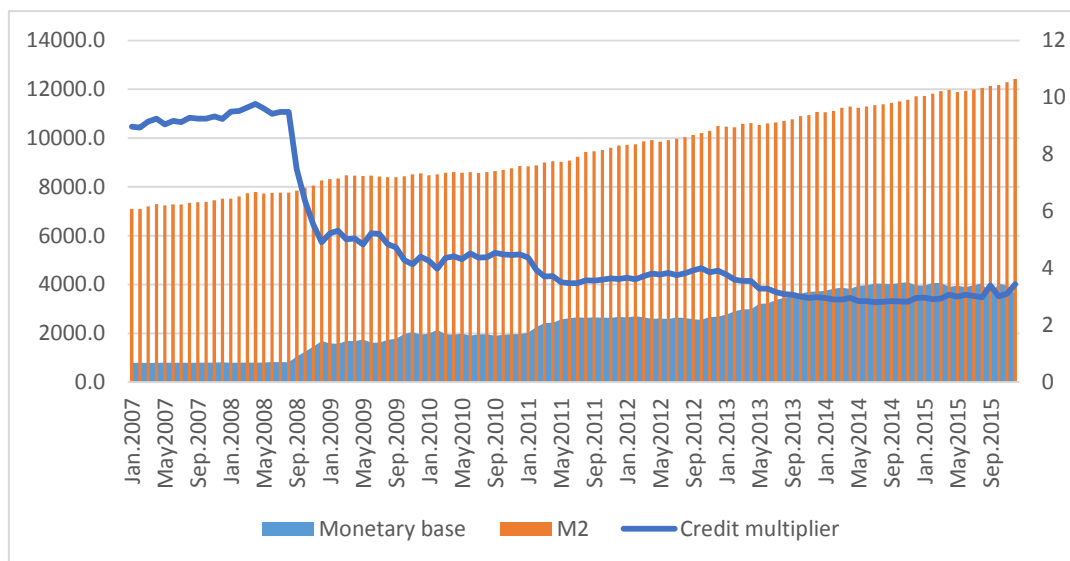
⁴ Credit easing policies reduce the risk premiums on risk assets (financial assets other than short-term government debt). They should be essentially distinguished from QE because they can be implemented without QE, such as in Operation Twist. However, since credit easing is usually accompanied by QE, we treat them both as QE.

Figure 2: Interest Rates and Money Supply in the US (Units: %, Billions of USD)

(a)



(b)



Source: Drafted from International Financial Statistics

Credit multiplier follows right-hand axis

In response to the global financial unrest that grew out of the August 2007 BNP Paribas incident, the Fed decided to supply liquidity to the market that month by both lowering the discount rate from 6.25% to 5.75% and lending unlimited Fed financing up to the value of collateral posted. The Fed then lowered the federal funds rate the following month from 5.25% to 4.75%. As illustrated in Figure 2(a), this was followed by a successive ratcheting down of the discount and FF rates through the outbreak of the global financial crisis. While this initiative temporarily

resulted in visibly calming the financial markets, chaos re-emerged after Standard & Poor's (S&P) downgraded Ambac and MBIA in June 2008⁵ and after the bankruptcy of Lehman Brothers on September 15, 2008, thereby intensifying the situation into a global financial crisis.

As the crisis developed, the Fed began to lower the discount and FF rates again on October 8 of the same year, announced an interest rate policy on December 16 that lowered the discount rate to 0.5%, and allowed the federal funds rate to float between 0% and 0.25% (see Figure 2(a)). Confronting the restriction against negative interest rates, on November 25, the Fed introduced the term asset-backed securities loan facility (TALF)⁶ and launched what came to be known as QE1 in which they would purchase agency securities and mortgage-backed securities (MBS) issued by government-affiliated financial institutions. Table 1 presents the composition and scale of each QE round, and Figure 2(b) outlines the changes in money supply and monetary base provided by the past three QE rounds.

Table 1 : Breakdown of US Quantitative Easing Policies

	QE1	QE2	QE3 *
	Nov 2008–Jun 2010	Nov 2010–Jun 2011	Sep 2012–Dec 2013
US gov't debt	\$300Bn	\$600Bn	\$540Bn
MBS	\$1,250Bn		\$640Bn
Other	\$175Bn		
Total	\$1,725Bn	\$600Bn	\$1,180Bn

Source: Drafted from Federal Reserve Board data

* Figures for QE3 do not include the drawdown period in 2014 (Jan–Nov)

To observe the particulars of each QE round in more detail, let us observe trends in major funding supply instruments,⁷ as outlined in Figure 3. QE1 lasted until June 2010, supplying \$1.725 trillion

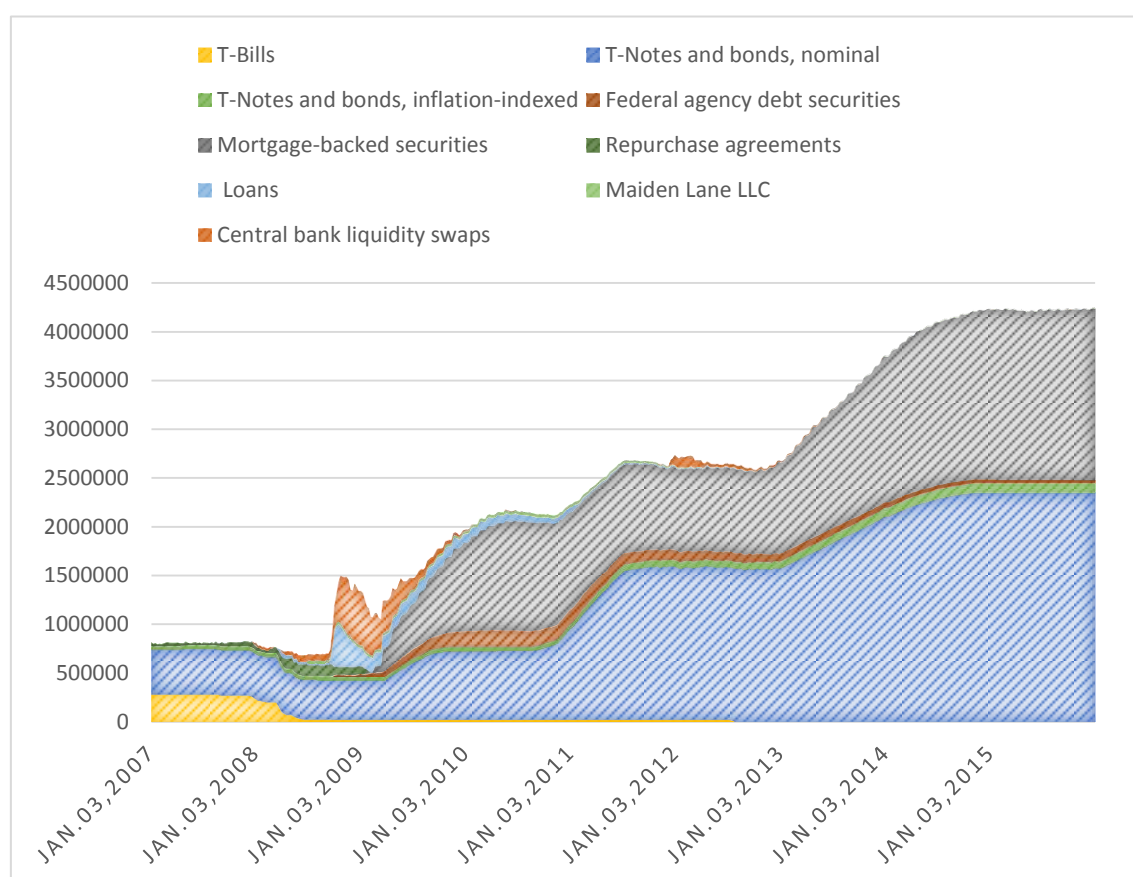
⁵ Monoline insurers (financial guarantee companies) specializing in guaranteeing securities payments.

⁶ A program wherein the Fed provided loans against asset-backed securities collateralized by student, auto, credit card, and government-guaranteed small business loans.

⁷ T-bills (short-term US government debt securities) are discount bonds with maturities ranging from a few days to 52 weeks. T-notes (medium-term US government debt securities) are interest-bearing bonds with maturities of 2, 3, 5, 7, or 10 years. T-bonds (long-term US government debt securities) are 30-year interest-bearing bonds.

comprising \$300 billion in US government obligations, \$1.25 trillion in MBS, and \$175 billion in other assets. From late 2008 through 2009, the program primarily aimed at helping the financial system recover from its crisis-induced paralysis, supplying loans to bond dealers and financial institutions that were spiraling toward bankruptcy, and providing liquidity to the credit markets. Figure 3 illustrates how the simultaneous jump in lending balances and repurchase transactions⁸ by the Fed expanded the pool of funding for stabilizing short-term financial markets under this policy.

Figure 3: Trends in the Fed’s Major Funding Provision Methods (Weekly average)
(Unit: Millions of USD)



Source: Drafted from Federal Reserve Board data

For example, the March 2008 introduction of the Primary Dealer Credit Facility, a Federal Reserve lending program for primary dealers

⁸ A securities loan transaction, whereby the securities serve as the funding medium, is referred to as a repo transaction.

that also applied to investment banks, strengthened the Fed's role as the lender of last resort; the use of this facility dramatically increased during QE1. Furthermore, the aforementioned TALF began lending operations in March 2009 following a total shutdown of the credit markets (including the securitization markets). The Fed's purpose in establishing TALF was and continues to be to reduce risk in the credit markets and restore liquidity by ultimately underwriting certain loans. In contrast, the expansion of the supplied volume of funds starting in 2010 was due to the purchase of MBS and medium- to long-term government obligations, which were intended to facilitate economic recovery by lowering long-term interest rates. Thus, the Fed served as the lender of last resort during QE1 in response to the financial crisis as well as prevented the crisis from spreading by providing liquidity directly to the credit markets, thereby succeeding in stabilizing the financial system.

On November 3, 2010, the Federal Open Market Committee voted to implement QE2 as a means of promoting economic recovery, preventing deflation, and averting declining long-term interest rates. The program comprised the Fed's purchasing of \$600 billion of long-term government bonds by June 2011 as well as continuing to reinvest the proceeds of maturing securities holdings, such as agency debt and MBS, into government obligations. Figure 3 illustrates that long-term government debt holdings grew sharply during this period. Although QE2 concluded as scheduled in June 2011, interest rates and risk premiums were being pulled up by liquidation sales of US government debt in response to the deepening Euro crisis and S&P's downgrading of the US sovereign debt rating. In response to these events and to strengthen the effects of the easing, the Fed announced Operation Twist on September 21, 2011, in which it would sell short-term government bonds to the market and purchase an equivalent amount of longer-term government debt. This was intended to reduce liquidity premiums in the term structure of interest rates. This initiative reduced the long-term interest rate from 3.5% to 2% (Figure 2(a)).

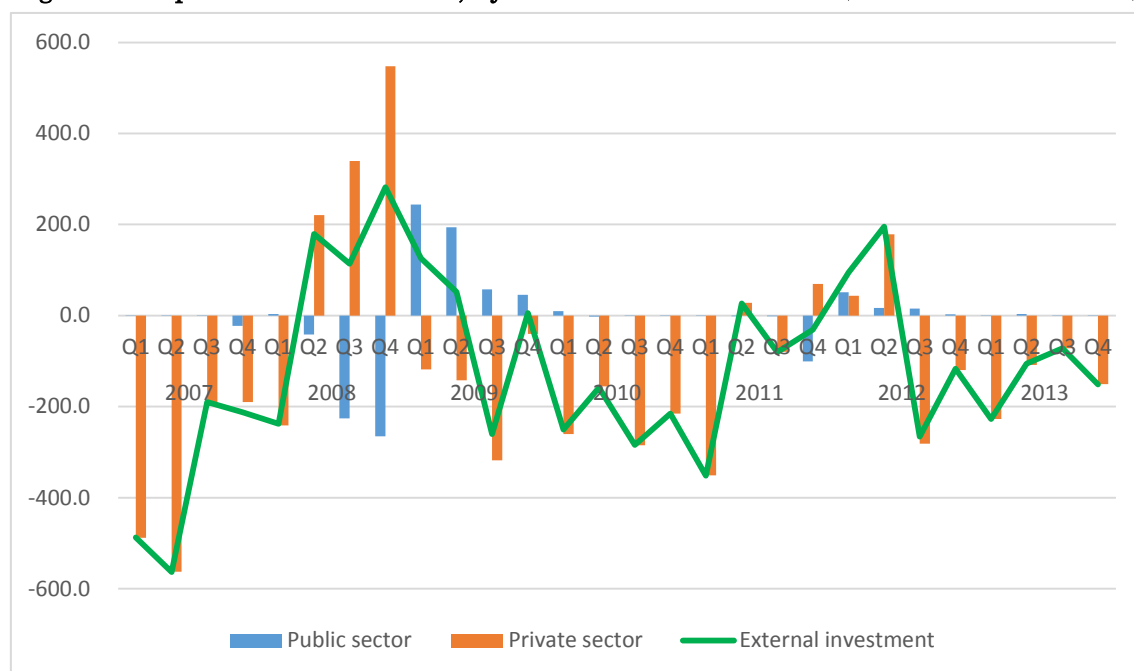
As a result of QE1 and QE2, the Fed was able to achieve some visible recovery in consumption and production, but the labor market was not so fortunate. Unemployment failed to improve as expected, still trending between 8% and 9%. Therefore, the Fed launched QE3 in September 2012 by implementing further MBS purchases, expanding its bond purchases to include US Treasury securities in January 2013, and

purchasing \$45 billion bonds on a monthly basis for an unspecified period of time. This spurred investments in risk assets due to portfolio rebalancing. These purchases continued until December 2013, after which they were gradually reduced so that easing was phased out by the end of October 2014. As illustrated in Figure 2(b), the outcome of these QE policy rounds was that the monetary base increased to approximately four times its pre-crisis level, with M2 growing to approximately double its pre-crisis level.

3. Quantitative Easing Programs and Their Spillover Effects

The effects of these QE policies were not limited to the US; these actions were considered to have strong spillover effects on international capital flows. This section focuses on capital outflows from the US, particularly after the global financial crisis, and examines the changes with each QE round.

Figure 4: Capital Flows in the US, by Sector (Unit: Billions of USD)



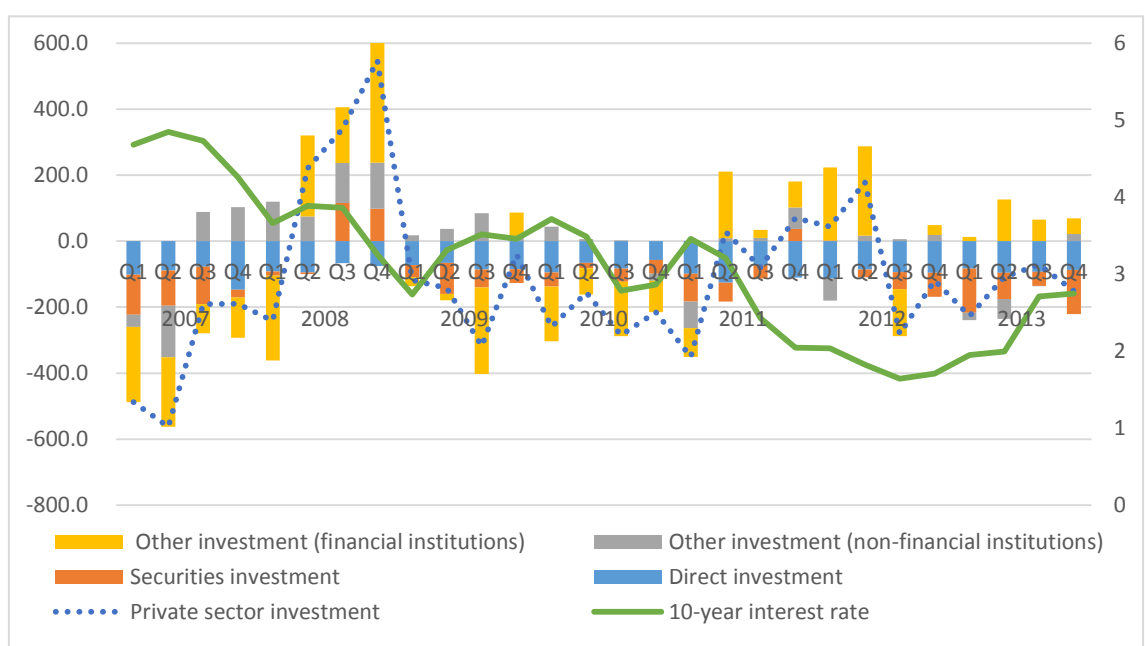
Source: Drafted from US Bureau of Economic Analysis data

Let us first observe the trends in capital flows by sector in the US, illustrated in Figure 4. This indicates that the private sector is the primary source of external investment originating in the US. Notably,

private sector capital flows became net inflows as the global financial crisis and Eurozone crisis worsened and then became US private sector capital outflows during QE.

Let us now look at the private sector's investment targets. Figure 5 gives a breakdown of the cross-border investments made by the US private sector. Although direct investment is a net outflow, the direction of other types of investment varies over time.

Figure 5: US Private Sector External Investment (Unit: Billions of USD)



Source: Drafted from US Bureau of Economic Analysis data

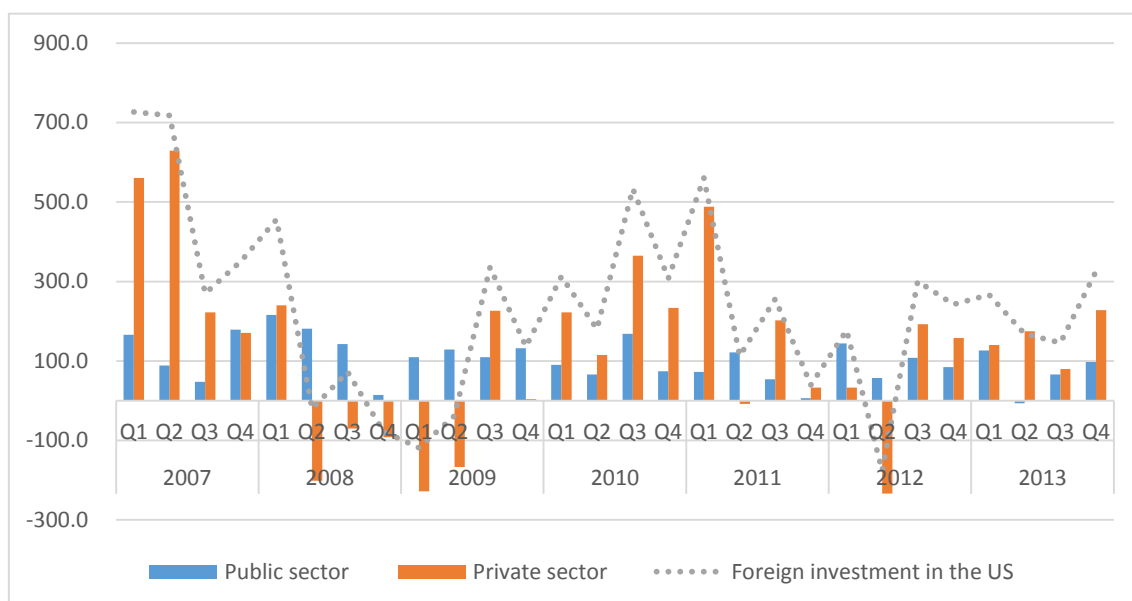
10-year interest rate follows right-hand axis

Starting with movements of financial institutions that received large volumes of liquidity from the Fed, we can see a dramatic pull back in providing external credit at the beginning of the global financial crisis; while the situation returned to a net outflow during QE1, the outbreak of the Eurozone crisis around late 2011 and the period thereafter largely coincided with a return to net capital inflows. The US Treasury Department's Treasury International Capital data also indicates that US financial institutions were not actively investing in securities during QE. The fact indicates that the portfolio rebalancing effect, whereby financial institutions rebalance their portfolios by investing in riskier assets, did not function effectively, particularly during QE2. Furthermore, we can see this indirectly from the rapid decline in the

credit multiplier in Figure 2(b). Therefore, it is not conceivable that the spillover effects were significant in the sense that Fed-provided currency flowed out of the US to other nations.

In the securities investment area, however, we can see that net outflows prevailed throughout the entirety of the QE periods. One reason for this is that risk assets became relatively more profitable after QE caused a decline in long-term interest rates. The same situation occurred in the US domestic stock markets; The QE program influenced investor behavior in a way that led to the spillover effect of bolstering the liquidity of securities markets, particularly those in emerging nations, after the crisis.

Figure 6: Capital Flows into the US, by Sector (Unit: Billions of USD)



Source: Drafted from US Bureau of Economic Analysis data

However, there is no empirical consensus regarding the overall effect of various QE measures on exchange rates. This is because the QE policies affected both capital outflows from and inflows to the US. As indicated in Figure 6, the flow reversal that occurred when the crisis hit reverted to a net inflow after the implementation of QE. The data indicate that the public sector outside the US consistently purchase US government debt. Meanwhile, the private sector withdrew capital at the beginning of the global financial crisis and the worsening of the Eurozone crisis. After the subsequent implementation of the QE rounds, capital inflows into the US resumed although not on the same scale as

before.

Since capital outflows from and inflows to the US occur ex post facto, the direction in which the QE program pushed exchange rates is unclear. Discussion on this topic continues to this day. For example, in an event study utilizing intraday data from 2008 to 2013, Glick and Leduc (2013) argue that QE announcements significantly negatively impacted USD exchange rates vis-a-vis other nations' currencies. On the other hand, Chen et al. (2015) use monthly data from 1995 to 2012 to demonstrate that this untraditional monetary policy shock on the part of the US positively influenced the USD/JPY rate while negatively influencing some exchange rates with other advanced nations and emerging Asian nations.

4. Currency Swap Agreements and the Global Financial Crisis

One set of policies that has not yet been discussed in this paper is the Fed's expansion of currency swap agreements with major central banks worldwide, conducted in tandem with the QE program. These agreements provided liquidity to the markets around the time of the global financial crisis. In contrast to the spillover effects that indirectly provided liquidity to the global financial markets, these agreements served to provide direct US dollar liquidity to financial systems worldwide.

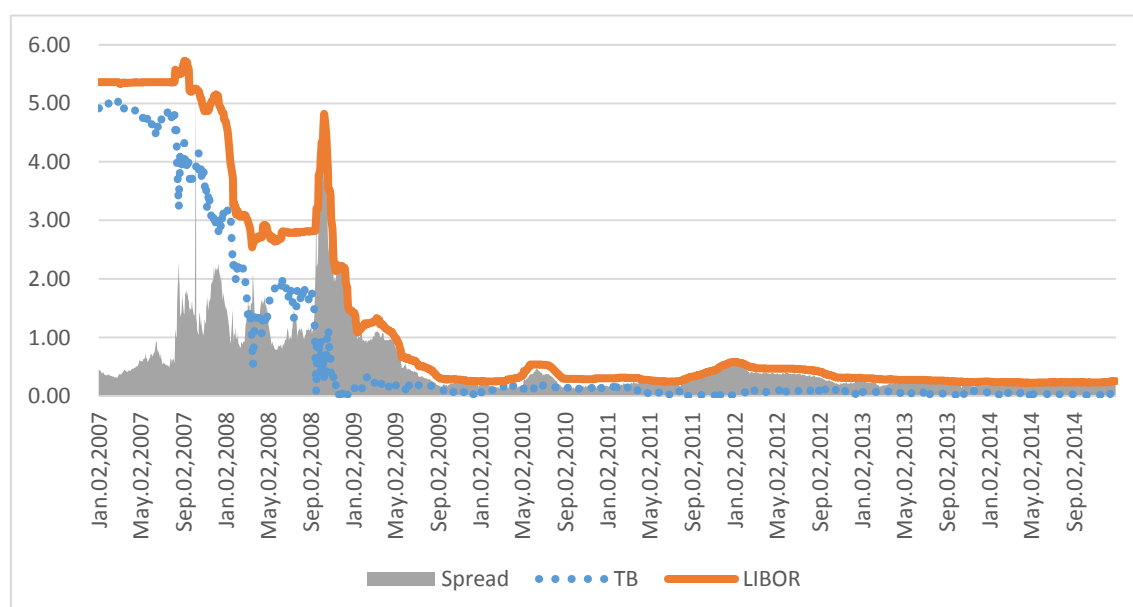
The context behind this is the US dollar's special position as a key international currency. Financial institutions in the US and worldwide need US dollars for payment clearance. Before the global financial crisis, the US dollar enjoyed extremely high liquidity in international financial transactions, and credit spreads remained at low levels. However, as the crisis unfolded, a sudden credit crunch and the ensuing illiquidity of the US dollar worldwide rapidly widened credit spreads (see Figure 7), the point at which international short-term money markets were on the verge of shutting down.

These Fed-led currency swap agreements began with exchange swap arrangements⁹ established with the December 12, 2007, execution of dollar liquidity swap lines with the European Central Bank (ECB) and

⁹ For more detail on the background to establishing these agreements and the discussions involved, see Allen and Moessner (2010). Note that the actual entity supplying dollars in these swap agreements is the Federal Reserve Bank of New York.

Swiss National Bank (SNB). In this case, the Fed would exchange up to a certain amount of US dollars for those nations' currencies over a certain period. These were established in response to the continued rapid widening of credit spreads since August of that year. However, since the Fed was not contractually obligated to pay interest under this swap mechanism, it was, in effect, a system wherein other countries' central banks could borrow US dollars using non-US currencies as collateral. In other words, the Fed provided US dollar liquidity to other countries' central banks while financial institutions in those countries could in turn obtain dollar liquidity from their respective central banks, thereby creating a mechanism for eliminating illiquidity in financial systems outside the US. This mechanism thus made it possible for European financial institutions to procure US dollars from the ECB and SNB.

Figure 7: US Dollar Credit Spread (three-month LIBOR T-bills) (Unit: %)



Source: Drafted from Nikkei NEEDS Financial QUEST data

However, since the initial contracts set upper limits of \$20 billion and \$4 billion for the ECB and SNB, respectively, they were unable to manage the deterioration of the crisis after the September 2008 bankruptcy of Lehman Brothers. Counterparty risk led to severe cutbacks in financial institutions' credit limits, credit spreads skyrocketed (Figure 7), and assets were dumped to obtain liquidity. According to Fleming and Klagge (2010), at this point, the ECB's overnight dollar auction rate was 800bps higher than the Fed's

overnight rate. Liquidity therefore dried up in the interbank markets, and the world's financial institutions fell into severe cash flow problems with respect to dollar funding.

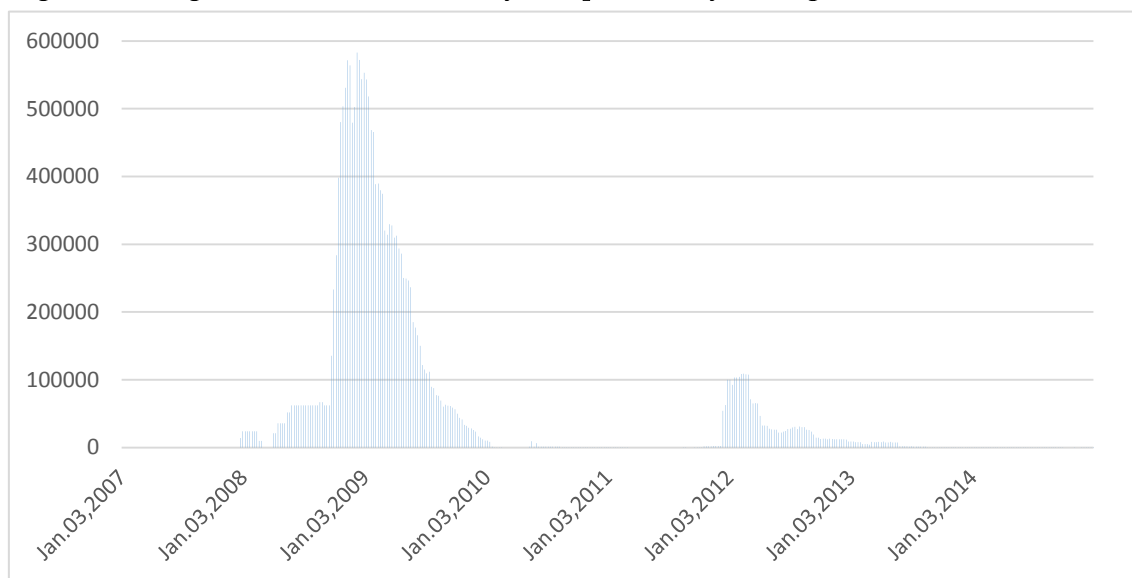
At that point, the Fed launched successive rounds of expanding the scale and scope of its currency swap agreements. On September 18, 2008, it expanded the scale of its swap agreements with both the ECB and SNB, set up new swap lines with the Bank of Japan (BOJ), Bank of England (BOE), and Bank of Canada (BOC), and clarified its position on supplying dollar funds to short-term money markets in other countries and regions. The following week (on September 24), the Fed announced more swap agreements with the central banks of Australia, Denmark, Norway, and Sweden and doubled its swap limits with each country on September 29, thus significantly expanding the maximum supply of dollar funding to \$620 billion. Finally, on October 13, it fixed interest rates with the ECB, SNB, BOE, and BOJ and abolished the swap limits so that financial institutions would be able to borrow as many dollars as they needed as long as they could post enough collateral in their own currencies. On October 29, to hold down increases in emerging markets' sovereign debt yields and enhance US dollar liquidity, the Fed also entered into bilateral swap agreements with 14 central banks, including the Central Bank of Brazil, the Bank of Korea, Banco de Mexico, the Reserve Bank of New Zealand, and the Monetary Authority of Singapore.

Figure 8 illustrates the scale of dollar funding provided by these currency swap agreements. A significant portion of this is taken up by the ECB; given that the swaps peaked at a level of over \$580 billion shortly after the occurrence of the global financial crisis, we can see how dollar illiquidity spread throughout the international financial markets at the time. Furthermore, the May 9, 2010, decision to resume dollar swaps when the Eurozone crisis deepened and the augmented use of currency swaps in late 2011 and 2012 provide evidence that the Fed-provided dollar swaps functioned for managing the global financial crisis as well as other global crises.

After numerous extensions to these agreements, the BOC, BOE, BOJ, ECB, Fed, and SNB announced the normalization of liquidity swap arrangements on October 31, 2013. The supply of US dollar liquidity made it possible for the respective countries' central banks to enter into whatever volume of swaps they deemed necessary at the given market conditions. These moves on the part of the Fed indicate the Fed's function as the "lender of last resort" for the world's central banks by

providing liquidity for the global currency that is the US dollar. These currency swap agreements have functioned effectively as a crisis management tool for the global financial system.

Figure 8: Usage of US Dollar Currency Swaps (Weekly average) (Unit: Millions of USD)



Source: Drafted from US Bureau of Economic Analysis data

However, why would the Fed, tasked with maximizing the well-being of the US, go to such lengths to seek international financial system stability? The answer corresponds with the purpose of QE. When the US dollar has insufficient liquidity, unless central banks can obtain a supply of dollars via swaps, they may need to draw down their dollar-denominated foreign reserves, which would increase the interest rates on US sovereign debt. Illiquidity of the dollar in global financial markets, where it is a key currency, can also suppress the US economy and create concerns over deflation.

This seemingly wonderful function of the Fed as the global lender of last resort also presents a problem. For example, if a country's economic cycle was asymmetrical to that of the US, then such a currency swap agreement could work against the Fed's monetary policy. This raises the concern that swaps executed through agreements among central banks may not function. There is yet another issue. Prasad (2014) emphasizes the Fed's execution of currency swap agreements with a few select nations at the time of the global financial crisis. Furthermore, he voices concerns about the political nature of the decisions made to use the Fed's swap limits. It is conceivable that the act of placing the onus of providing

liquidity to the global financial system on a single nation's central bank is, in itself, a problem inviting uncertainty.

5 . Conclusion

This paper employed data from 2008 through 2013 (the term of the QE program in the US) to explain and observe the impact of the Fed's QE program and currency swap agreements on liquidity in the global financial markets. In doing so, we showed that the currency injected into the US domestic markets by the QE policy did not sufficiently stimulate the portfolio rebalancing effect. Furthermore, the QE program's indirect effect on the global financial system was limited. This paper has also showed that, on the other hand, the Fed's currency swap agreements were a mechanism for providing liquidity directly, which led to the Fed's functioning as a literal "lender of last resort" in the global financial markets, where the dollar reigns supreme. This system thus worked effectively as a crisis management tool for the global financial system. However, we noted that this type of crisis management system is not a panacea as it invites uncertainty itself. The Fed is, at the end of the day, the US central bank, and it cannot be the social planner for the world economy. This is also the case for bilateral currency swap agreements espoused by China. In preparing for the next crisis, the world must consider a new, more neutral method for securing liquidity.

References

- [1] Allen, William A., and Richhild Moessner, (2010) ,“Central Bank Co-operation and International Liquidity in the Financial Crisis of 2008-9,” BIS working papers, No. 310.
- [2] Caballero, Ricardo J. (2006) , “On the Macroeconomics of Asset Shortages,” *NBER Working Paper*, No.12753.
- [3] Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas (2008) , “An Equilibrium Model of“ Global Imbalances” and Low Interest Rates,” *American Economic Review*, 98 (1) , pp.358-393.
- [4] Chen, Qianying, Andrew Filardo, Dong He, and Feng Zhu, (2015) , “Financial Crisis, US Unconventional Monetary Policy and International Spillovers,” BIS working papers, No. 494.
- [5] Dooley, M., Falkerts-Landau, D., and Garber, P. (2004a) , “An Essay on the Revised Bretton Woods System,” *International Journal of Finance and Economics*, 9, 307-313.
- [6] Dooley, M., Falkerts-Landau, D., and Garber, P. (2004b) , “The revived Bretton Woods System: The effects of periphery intervention and reserve management on interests & exchange rates in center countries,” *NBER Working Paper*, No.10332.
- [7] Fleming, Michael J. and Nicholas J. Klagge, (2010) ,“The Federal Reserve’s Foreign Exchange Swap Lines,” *Current Issues in Economic and Finance*, 16 (4) .
- [8] Glick, Reuven and Sylvain Leduc, (2013) , “The Effects of Unconventional and Conventional U.S. Monetary Policy on the Dollar,” Federal Reserve Bank of San Francisco working paper 2013-11.
- [9] Prasad, Eswar S. (2014) , *The Dollar Trap: How the U.S. Dollar Tightened Its Grip on Global Finance*, Princeton Univ. Press.
- [10] Fukuda, S., (2013), *Money and Banking: Financial Markets and Economic Policy*, Yuhikaku Publishing.

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“The Relationship Between Global Imbalances and Macroeconomics,” ed. Eiji Ogawa, *Global Imbalances and International Monetary System*, Toyo Keizai, pp. 1-39, March. 2013.

“Currency Mismatch, Balance Sheet Effect and Monetary Policy.” *Journal of International Economic Studies*, vol.25, pp.103-128, March 2011.