

## **Banks as Transmission Mechanism**

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### **Abstract**

*The Federal Reserve, banks, and the public are essential in the process of monetary expansion. However, when the Federal Reserve increases the federal funds rate, it adversely affects the ability of the banking system to expand the money supply. Banks expand the money supply by loaning money to the public. Thus, credit is necessary to increase domestic currency in circulation and hence effective demand, production, and employment.*

### **Introduction**

In 2500 BC, the Egyptians produced metal rings for use as money, and before 1100 BC, the Chinese used actual tools and weapons as a medium of exchange. After 1100 BC, they used miniature replicas of tools and weapons made out of bronze (Beattie, 2010). Beattie noted that Lydia's king Alyattes created the first minted currency in 600 BC. The Chinese were the first to use paper currency, during the Tang dynasty, around 618 AD.

Money expansion originated from the goldsmiths, who found it profitable to loan out gold that they stored but did not own. During the middle ages, depositors stored excess gold and silver with local goldsmiths for safekeeping, and the goldsmiths gave them receipts. With the receipts, after paying a fee, they could retrieve their gold or silver (Samuelson, 1973). The paper receipts were easy to transport and became substitutes for gold and silver.

The goldsmiths recognized that they could profit from loaning out gold and silver that they held for their customers to others by issuing additional receipts in place of precious metals (Spencer, 1974). In essence, they could print receipts without backing them with precious metals. Thus, the banking system and modern money developed from goldsmiths.

Note that contemporary bankers used a similar technique to create money. The process of credit default swap (CDS) uses a similar scheme. CDS is, basically, unregulated financial insurance whereby the buyer makes periodic payments to the seller in exchange for the right to a payoff if there is a default or credit event concerning a third party or reference entity. Its original purpose was to transfer credit exposure from holders of fixed income security to the financial firm that sold the CDS. However, over time CDS morphed into a betting game.

Thus, instead of securing the owner's security from default risk, insurance companies, banks, and hedge funds allowed individuals without securities to buy insurance against securities that they did not own. AIG defaulted on \$14 billion worth of CDS it had made to investment banks, insurance companies, and scores of other entities (Phillips, 2008). Phillips noted that banks would take hundreds of different loans made to firms, such as Ford, IBM, Wal-Mart, and others, totaling billions of dollars and cut them up into pieces known as "tranches." The bank would prioritize the riskiest 10 percent of tranche and sell them to investors. They also used CDS for mortgage-back securities.

### The Federal Reserve

In 1913, in the face of strong bankers' opposition, Congress passed and President Wilson signed the Federal Reserve Act creating a U.S. central bank, the Federal Reserve Bank (Samuelson, 1973). The Federal Reserve Bank (Fed) influences the money market through reserve requirements, open market operations, discount windows (Cook and Summers, 1981), interest on reserve (IOR), as well as through other instruments.

Existing laws require banks to keep a certain level of required reserve against deposits liability. The Fed uses open market operations to increase and decrease commercial banks' reserves by purchasing and selling bonds, respectively, to banks; the discount window also increases commercial banks' reserves (Lai, Chang, and Kao, 2004). According to Cook and Summers (1981), the Fed manipulates the level of bank reserves to control the money supply.

However, if the banking system does not provide credit to consumers, expansion of the money supply among the public will not occur, and demand and employment will decrease. Thus, the Fed can increase fiat money in the banking system without drastically changing the nature of the production process or the level of employment.

### Federal Funds Rate

In a monetary economy, the presence of fiat money in the hands of consumers radically changes the nature of trade and the characteristics of the production process (Bertocco, 2005). However, radical changes can only occur when the banking system makes credit available to consumers, merchants, and entrepreneurs.

Branson (1979) defines money as currency in circulation and demand deposits. According to Branson, when the money supply increases, the economy moves towards higher income and lower rates of interest. However, when the value of the money stock is greater than the value of real output, inflation occurs; when it is less deflation occurs. Therefore, it is critical to maintain an equilibrium, at the full employment level, between the value of money circulating domestically and the aggregate value of real output available to consumers.

Fig. 2.1 shows the growth of the money stock, *M1*, from 1975 to 2013, and Fig. 2.2 the federal funds rate from 1955 to 2013. Fig. 2.1, however, includes currency circulating abroad, which researchers estimate to be 30 to 70 percent of total currency. *M1* was virtually flat from 2005 through the third quarter of 2008, and the federal funds rate increased from 0.98 percent in 2003 to 5.26 percent in 2007. From Fig. 2.1, we can see that a restrictive monetary policy, flat monetary growth rates, precedes US recessions, and from Fig. 2.2 we can see that, as far back as 1955, rising federal funds rates, which cause restrictive monetary growth rates, also precedes every US recessions.

The Fed, which is a government agency, cannot simultaneously set both the money supply and the interest rate at whatever levels it wants; it can only set one; the interest rate or the money supply. Whichever it sets determines the level of the other, as well as the levels of output and employment.

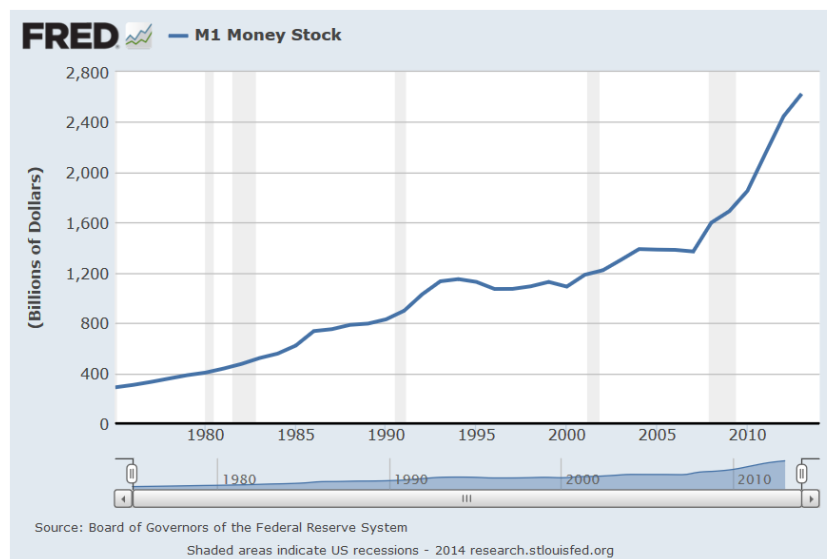


Figure 2.1– M1 Money Stock

### Money Creation

There are two ways to create money: borrowing and spending, and printing by central banks (Samuelson, 1973; Benson, 2004). Benson, as far back as 2004, indicated that for the past decade, the private sector created most money through borrowing and spending. He argued that the private sector's new borrowing would not be able to generate enough new money to service the already massive level of old debt. However, Samuelson (1973) noted that as a new reserve of cash becomes available, the banking system as a whole can expand its loans and investments. Unfortunately, before the 2008 Great Recession, the Fed began in 2003 removing reserves from the economy.

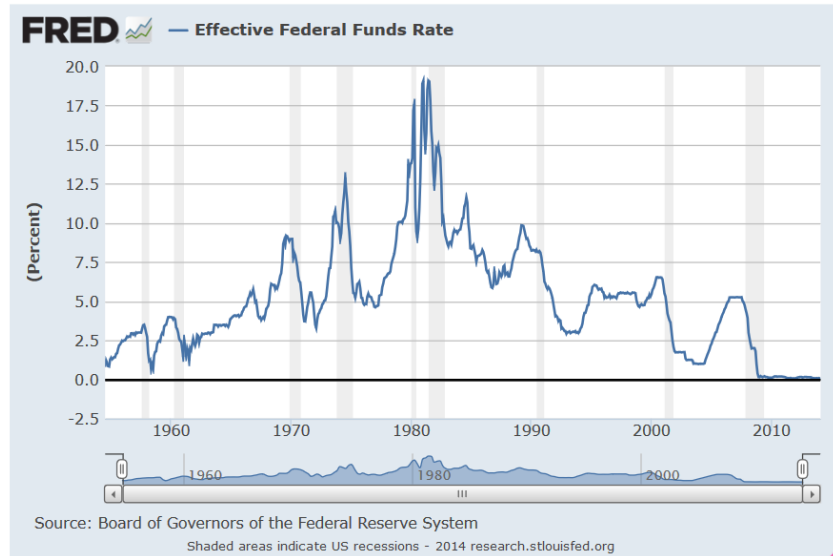


Figure 2.2– Federal Funds Rate

Creating money by borrowing and spending contributes to economic expansion and job creation. Printing (fiat) money does not necessarily lead to economic expansion and job creation, except if banks loan the new reserves to the public. If banks hoard reserves because Congress allows the Fed to pay interest on reserves (IOR) or due to some arrangement with the Fed, then economic expansion and job creation will occur slowly, or not at all.

We can obtain a better understanding of bank money creation, the borrow and spend method, by assuming one bank (the banking) system with a \$1,000 deposit from the central bank through open market operations (bond purchases) and no external leakage. Let's assume further that the central bank, the Fed, required reserve is 10 percent of bank deposits. Therefore, when the bank receives a deposit of \$1,000, it must keep 10 percent as the required reserve in its account at the central bank. Thus, the bank can use \$900 for loans and \$100 for the required reserve.

Table 2.1, below, depicts the banking system credit and money creation process. From the \$1,000 deposit, the banking system creates a total of \$9,000 in bank loans and \$1000 in required reserve, with a total liability of \$10,000. When the banking system provides credit to the public, it expands the money supply.

For instance, if the bank loans the non-reserve portion of the deposit, \$900, it issues a check to the borrower for \$900. The borrower or someone else puts the \$900 back into the banking system; it is unlikely that the borrower will keep it out of the banking system. The banking system has a new deposit of \$900. It puts 10 percent required reserve account at the Fed; and loans out the remaining \$810, which is put back in the bank; 10 percent of the \$810 is required reserve, and it loans the remaining \$729. We can repeat the process can until the amount put back in the bank is zero.

The banking system as a whole creates monetary expansion because only a fraction of loans issued by a particular bank will return to that bank. Therefore, a single bank cannot lend more than its excess reserves (Spencer, 1974). Three factors determine the expansion in demand deposits: (1) the initial amount of excess reserves, (2) the required reserve ratio, and (3) bank willingness to lend. Bank willingness to lend is a key factor for economic recovery.

The deposit-expansion multiplier is the reciprocal of the required reserve ratio,  $R$ , or  $1/R$ . Thus, the change in demand deposits,  $D$ , is equal to excess reserves,  $E$ , times the deposit-expansion multiplier or

$$D = E \times 1/R \tag{2.1}$$

If  $E = \$1,000$  and  $R = 0.10$ , as in Table 2.1, then demand deposits increases to  $(\$1,000 \times 1/0.10 =) \$10,000$  as shown in Table 2.1.

<b>Table 2.1 - Money Creation</b>				
	<b>Deposit (D)</b>	<b>Reserve (10% of D)</b>	<b>Loan (L)</b>	<b>Interest (6% of L)</b>
	\$1,000	\$100	\$900	\$54
	\$900	\$90	\$810	\$49
	\$810	\$81	\$729	\$44
	\$729	\$73	\$656	\$39
	\$656	\$66	\$590	\$35
	\$590	\$59	\$531	\$32
	\$531	\$53	\$478	\$29
	\$478	\$48	\$430	\$26
	\$430	\$43	\$387	\$23
	\$387	\$39	\$349	\$21
	\$349	\$35	\$314	\$19
	\$314	\$31	\$282	\$17
	\$282	\$28	\$254	\$15
	\$254	\$25	\$229	\$14
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<b>Total</b>	<b>\$10,000</b>	<b>\$1,000</b>	<b>\$9,000</b>	<b>\$540</b>

In Table 2.1, the total required reserves plus total loans equal to total deposits. However, bank (private) money creation by itself cannot service the debt, as posited by Benson (2004), when we account for interest payments. The \$540 would have to be covered by the central bank's influx of fiat money.

Table 2.2 shows the bank's initial position, and Table 2.3, the bank's final position. The final position reflects a \$9,000 increase in loans, created from the initial deposit of \$1,000.

Thus, the interaction of the central bank, the banking system, and the public expand the money supply. However, if banks hoard excess reserves, the money supply would not grow.

**Table 2.2 – Bank Initial Position**

Assets		Liabilities	
Reserve	\$1,000	Deposits	\$1,000
Total	\$1,000	Total	\$1,000

**Table 2.3 – Bank Final Position**

Assets		Liabilities	
Reserves	\$1,000	Deposits	\$10,000
Loans	\$9,000		
Total	\$10,000	Total	\$10,000

When banks fail to lend excess reserves, monetary expansion, income growth, and demand for goods and services are adversely affected. Bank bailouts were not effective in creating employment because banks failed to interact with the public. Rather, it appears that they used the bailout funds to interact with other financial institutions or merely to accrue interest payments on reserves loaned to them by the government (Fed).

The Financial Services Regulatory Act of 2006 authorized the Fed to pay interest on reserves effective October 1, 2011. However, as a result of the recession, the effective date was moved up to by three years. When bank reserves earn interest, banks do not suffer a cost for holding reserves. As of March 2014, bank excess reserves exceed \$2.5 trillion, and new fiat money from the Fed is \$2.8 trillion. Thus, it would appear that banks did not place most of the new fiat money into circulation.

Ironically, many politicians, pundits, and even some notable economists would have the public believe that monetary expansion by the Fed does not work. Because they do not understand the necessary steps for expanding the money supply, or they know it. Still, they do not want the public to see that it is the banking system (banks) as a whole that expands the money supply through the creation of loans to non-bank borrowers. Many blamed bank loans for the 2008 Great Recession, which caused banks to retreat and provide fewer loans to the public. After the 2008 Great Recession, bank loans to the public would have accelerated economic recovery and job creation. Furthermore, bank lending cannot create recessions, because it is increasing demand deposits (money) and hence effective demand.

If the public knew that the banking system as a whole determines the money supply and hence economic growth, production, and employment, there would be political consequences.

### Monetary Transmission

During the 2008 economic crisis, policymakers concentrated their attention on recapitalizing banks, because banks are the principal mechanism for monetary transmission and expansion. However, it appears that the government did not want to activate the banking system monetary transmission mechanism (credit). Hence, Congress and the Fed decided to pay banks interest on reserve (IOR), which eliminates

banks' hoarding cost. Meaning, banks could earn interest on excess reserves loaned to them by the government (Fed) without having to lend to the public. As of 2014, Fig. 2.3 shows that banks hoard more than \$2.5 trillion in excess reserves,<sup>1</sup> slightly less than the amount of fiat money created by the Fed. When banks do not lend to the public, demand deposits, domestic money in circulation, effective demand, and employment do not expand.

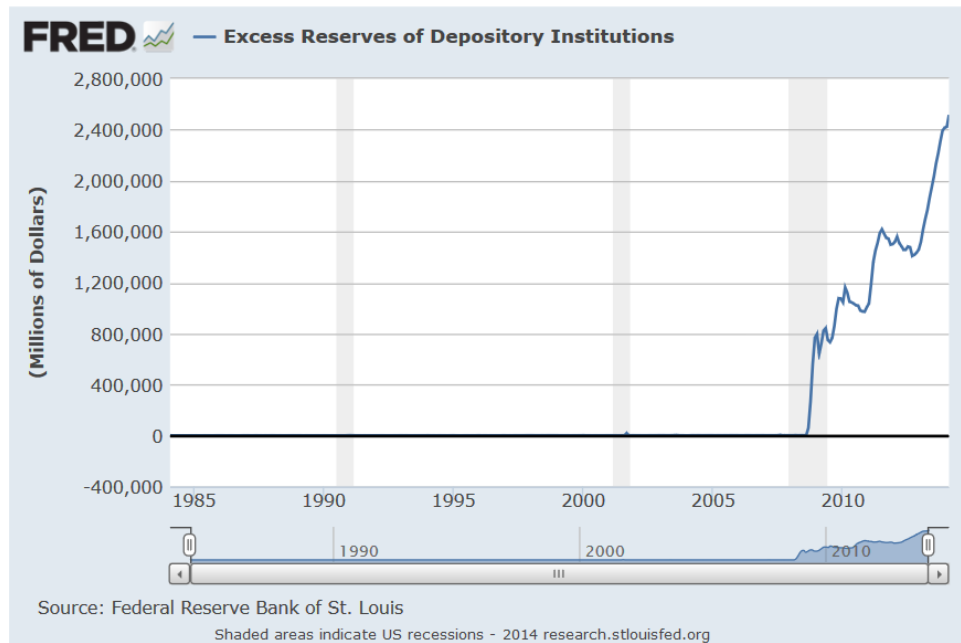


Figure 2.3 Excess Reserves

Bacchetta and Ballabriga (2000) discuss three alternative views of the role of banks in the monetary transmission mechanism. First, they cited the standard 'money' view of monetary policy where bank loans have no special role; rather, monetary shocks affect output through changes in monetary aggregates. Second, they cited the bank-lending channel, where changes in monetary policy directly affect banks' balance sheets; for instance, a reduction in bank loans affects the output. The third view is that monetary policy affects interest rates and output; for example, they note that monetary tightening reduces firms' collateral or cash flow, reducing their ability to secure loans. Cash flow is a requirement for adding physical capital to the economy and hence employment and output.

Fig. 2.1 shows the growth of the nominal money stock, *M1*, which includes currency, traveler's checks, demand deposits, and other checkable deposits; it has been relatively flat between 2005 and 2008. The Fed only began to increase the *M1* in September of 2008, which was too late to prevent the impending recession. Bernanke recently acknowledged that he did not see the 2008 Great Recession coming. One of the Fed's

<sup>1</sup> Aggregate Reserves of Depository Institutions and the Monetary Base - H.3

roles is to manage the quantity of money to achieve stable prices and full employment. Fig. 2.1 shows that the level of *M1* between 2005 and 2008 was inadequate to prevent the economy from falling into a recession; it is flat because of the Fed inflation targeting policies.

Blinder (1977) notes that central banks abandoned monetary targets in favor of interest targets. Arestis and Sawyer (2002) argue that interest rate-targeting policy has nothing to do with monetary aggregates. Furthermore, they indicate that macroeconomic models of the Treasury and the Bank of England do not take into consideration the supply of money, *M1*. They also note that in macroeconomic models for the U.S. economy used by the Fed, shifts in monetary policy are captured by innovations to the federal funds rate, with no role for monetary aggregates (Federal Reserve Board, 1996).

Pool (1970) determined that monetary targets were superior to interest targets. However, Fontana and Palacio-Vera claimed that in practice, monetary targets were often missed. Nonetheless, an examination of Fig. 2.2 shows that interest rate targets are not only missed, but they are also disastrous to the economy; when the government raises the federal funds rate, recessions occur (shaded areas). The problem is not the choice of targets, rather the capacity of sources applying the targets.

It is essential to return to Figs. 2.1 and 2.2 to see the unambiguous relationship between the federal funds rate and recessions. The Fed uses the federal funds rate to manage the economy; it raises rates to reduce banks' excess reserves and their ability to increase money in circulation. Note from Eq. 2.1 and Table 2.1 that excess reserves determine changes in demand deposits, *D*. Therefore, when the Fed chokes off the money supply by draining excess reserves from the banking systems, it restricts economic expansion; again, we can see this from Fig. 2.2, where rising federal funds rate leads to recessions. Banks' excess reserves, when loaned to consumers, increase effective demand, and hence employment.

Researchers, such as Kohn (1976), Porter and Judson (1993, 1996, 2001), Judson (2012), Feige (2002, 2003, 2011, 2012), indicated that the Fed does not know with certainty how much U.S. currency is circulating domestically or abroad. The estimates of U.S. currency circulation abroad range from 30 percent to 80 percent. If the Fed does not know with certainty the amount of U.S. currency circulating domestically, any adjustment to control inflation by draining money from the economy would be a chance occurrence and Fig. 2.2 is indicative of an out-of-control chart that led to multiple recessions.

Imported inflation also affects monetary policy. It reduces the purchasing power of money. The invasion of Iraq on March 19, 2003, caused the crude oil price to rise. Table 2.3 shows the nominal and inflation-adjusted average yearly price per barrel of crude oil from



Table 2.3 – U.S. Average Crude Oil Price <sup>2</sup>					
1946-Present, (In \$/bbl.)					
Year	Nominal	Inflation Adjusted	Year	Nominal	Inflation Adjusted
1946	\$1.63	\$18.49	1979	\$25.10	\$77.05
1947	\$2.16	\$21.73	1980	\$37.42	\$102.26
1948	\$2.77	\$25.92	1981	\$35.75	\$88.55
1949	\$2.77	\$26.17	1982	\$31.83	\$75.24
1950	\$2.77	\$25.90	1983	\$29.08	\$65.69
1951	\$2.77	\$25.00	1984	\$28.75	\$62.26
1952	\$2.77	\$23.47	1985	\$26.92	\$56.28
1953	\$2.92	\$25.50	1986	\$15.44	\$29.62
1954	\$2.99	\$25.04	1987	\$17.75	\$35.13
1955	\$2.93	\$25.57	1988	\$15.87	\$28.32
1956	\$2.94	\$25.35	1989	\$18.33	\$33.24
1957	\$3.14	\$25.12	1990	\$23.19	\$39.80
1958	\$3.00	\$23.38	1991	\$20.20	\$33.36
1959	\$3.00	\$23.15	1992	\$19.25	\$30.85
1960	\$2.91	\$22.15	1993	\$16.75	\$26.09
1961	\$2.85	\$21.44	1994	\$15.66	\$23.76
1962	\$2.85	\$21.19	1995	\$16.75	\$25.73
1963	\$2.91	\$21.39	1996	\$20.46	\$29.32
1964	\$3.00	\$21.75	1997	\$18.64	\$26.12
1965	\$3.01	\$21.47	1998	\$11.91	\$16.44
1966	\$3.10	\$21.48	1999	\$16.56	\$22.30
1967	\$3.12	\$21.04	2000	\$27.39	\$35.76
1968	\$3.18	\$20.53	2001	\$23.00	\$29.23
1969	\$3.32	\$20.36	2002	\$22.81	\$28.50
1970	\$3.39	\$19.65	2003	\$27.69	\$33.86
1971	\$3.60	\$20.00	2004	\$37.66	\$45.81
1972	\$3.60	\$21.44	2005	\$50.04	\$57.57
1973	\$5.75	\$23.87	2006	\$58.30	\$65.03
1974	\$9.35	\$42.58	2007	\$65.20	\$69.51
1975	\$12.21	\$51.00	2008	\$91.48	\$95.25
1976	\$13.10	\$51.78	2009	\$53.48	\$55.96
1977	\$15.40	\$53.41	2010	\$71.21	\$73.44
1978	\$15.95	\$51.58	2011	\$86.84	

<sup>2</sup> Source: [http://inflationdata.com/inflation/inflation\\_rate/historical\\_oil\\_prices\\_table.asp](http://inflationdata.com/inflation/inflation_rate/historical_oil_prices_table.asp)

1946 to 2011. The average annual price of crude oil per barrel, before the invasion of Iraq, between 1946 and 2002 was \$24.96. After the attack, the average price per barrel was \$60.21. Thus, it is clear that the invasion of Iraq affected the purchasing power of consumers and production costs. Rising product prices, combined with lower purchasing power, led to lower consumer demand and rising unemployment.

While purchasing power was falling, the government (the Fed) was reducing the money supply (Fig. 2.1), instead of increasing it to compensate for consumers' higher demand for real money balances due to higher crude oil prices (imported inflation). Instead, the Fed did the opposite; between 2003 and 2008, it increased the federal funds rate and drained money from the economy. Thus, causing a wealth imbalance  $\{(L - M/P) \neq (VS - V)\}$ . When the demand for real money balances,  $L$ , exceeds the supply of real money balances,  $M/P$ ; the supply of real asset,  $VS$ , exceeds the demand for real assets,  $V$ , leading to falling asset prices, and the first manifestation occurs in the housing industry.

Fig. 2.2 and Table 2.3 show that during periods of rising energy prices, 2004 to 2007, the New York Fed, under Timothy Geithner, used open market operations to increase the federal funds rate. The Fed Open Market Committee (FOMC) raised the federal funds rate from 0.98 percent in 2003 to 5.26 percent in July 2007. Therefore, when consumers' real incomes were falling due to imported inflation, the Fed restricted economic growth by reducing the nominal money supply.

The federal funds rate is the overnight interest rate at which depository institutions lend to one another from balances at the Fed. It increases when the Fed uses open market operations to sell bonds to banks, draining excess reserves from the banking system and the public; it is a process where banks are forced by the Fed to exchange excess reserves for government securities. Conversely, the federal funds rate decreases when the Fed buys securities from banks and the public, here the Fed increases banks reserves by buying bonds from the banks.

Thus, during periods of high crude oil prices, the Fed was fighting imported crude oil inflation, which it cannot significantly control. As a result, the Fed pre-recession policies prevented the expansion of bank credit and hence effective demand.

Poor monetary policy decisions decreased the real stock of money, adversely affecting the economy. Fed policies shifted the real LM curve upwards, raising interest rates and reducing output (income). Such a leftward shift of the LM curve caused real damage to the economy and the lives of real people. Fig. 2.3 shows how a reduction in the real balances affects the economy; interest rate rises, output, and employment falls.

When the Fed decreases the nominal stock of money,  $M1$ , in periods of rising energy prices (imported inflation), the wealth of Americans decreases, and they are unable to purchase the same level of goods and services. Thus, the Fed failed to increase the nominal money supply to prevent the real money supply from falling, creating conditions

for low demand and high unemployment. In Fig. 2.3, a reduction in the nominal money supply shifts the LM curve upwards, reducing income from  $Y_0$  to  $Y_1$  and increasing interest rate from  $i_0$  to  $i_1$ ; subsequent adjustment shifts the IS curve inwards, further reducing income from  $Y_1$  to  $Y_2$  and reducing the interest rate from  $i_1$  to  $i_2$ .

From Figs 2.1 and 2.2, it is also clear that the Fed reacted exceedingly late to prevent the 2008 Great Recession; it was in the middle of the recession that the Fed recognized that *M1* should have been increased to avoid the recession. Thus, they began late in 2008 to increase bank reserves. However, this quantitative easing (QE), expansion of bank reserves was way too late to prevent the recession. Furthermore, it appears to be a sleight of hand because it did not increase consumer credit (demand deposits).

The Fed, Treasury, and Congress used QE to recapitalize the banking system and not consumers. However, consumers' share of GDP is 70 percent. Thus, it would appear that they should have recapitalized consumers by requiring the banking sector to expand demand deposits, as the example in Table 2.1. Furthermore, the Fed, Treasury, and Congress began paying banks interest on reserves (IOR), which provided a disincentive for bank lending and an incentive for bank hoarding. As a result, the government's policy excluded the third requirement for monetary expansion, the public.

The inability or unwillingness of government officials to understand and monitor the failure modes of the economy is troublesome. Furthermore, the Fed signaling of monetary expansion was disingenuous and deceptive, injecting money into the banking system is only one of the necessary conditions for monetary expansion; it is not a sufficient condition. Monetary expansion cannot occur without providing credit to consumers.

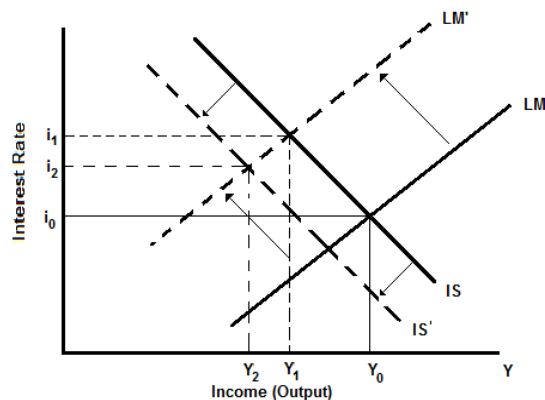


Figure 2.3 – Adjustment of the Economy Following a Decrease in M1

When banks fail to lend excess reserves, investment, income growth, and demand for goods and services are adversely affected. The bank bailouts were not effective because banks failed to interact with the public. Rather, they used bailout funds to interact with other financial institutions.

## Conclusion

Many politicians, pundits, and even some notable economists want the public to believe that monetary expansion by the Fed does not work. Either they do not understand the necessary steps for expanding the money supply, or they know, but do not want the public to see that it is the banking system (banks) as a whole that expands the money supply by providing loans to the public.

If the public knew that the banking system as a whole determines the money supply and hence economic growth, production, and employment, there would be mass political upheaval. Perhaps, this is why most politicians on the right and the left continue to defend the banking system, including the Federal Reserve.

## References

- Arestis, P. and M. Sawyer (2002) The Bank of England macroeconomic model: its nature and implications, *Journal of Post Keynesian Economics*, 24 (4).
- Bacchetta, P., and Ballabriga, F. (2000). The impact of monetary policy and banks' balance sheets: some international evidence. *Applied Financial Economics*, p. 15-26.
- Beattie, A. (2010). The history of money: From barter to banknotes. Retrieved from: [http://www.investopedia.com/articles/07/roots\\_of\\_money.asp](http://www.investopedia.com/articles/07/roots_of_money.asp).
- Bertocco, G. (2005). The role of credit in a Keynesian Monetary economy. *Review of Political Economy*, 17(4), p. 4-489.
- Benson, R. (2004). Money created "Out of thin air," Benson's Economic and Market Trend
- Blinder, A. S. (1977). What central banks could learn from academics – and vice versa. *Journal of Economics Perspective*, 11(2), p. 3-19.
- Branson, W. H. (1979). *Macroeconomic theory and policy*. Harper & Row Publishers: New York, NY.
- Cook, C. Q., and Summers, B.J. (1981). Instruments of the money market. *Federal Reserve Bank of Richmond*.
- Federal Reserve Board (1996). A guide to FRB/US: A macroeconomic model of the United States, *Fed Division of Research and Statistics*, October.
- Feige (1999). The Underground Economy and the Currency Enigma. In G. Fiorentini and S. Zamagni (Eds). *The Economics of Corruption and Illegal Markets*. The International Library of Critical Writings in Economics. Edward Elgar Publishing Limited.
- Feige, E. L. (2011). New estimates of U.S. currency abroad, the domestic money supply, and the unreported economy. *MPRA Paper No. 34778*.
- Fontana, G., and Palacio-Vera, A. (2004). Monetary policy uncovered: theory and practice. *International Review of Applied Economics*, 18(1), p. 25-41.
- Judson, R. A. (2012). Crisis and calm: Demand for U.S. currency at home and abroad from the fall of the Berlin Wall to 2011. *Board of Governors, the Federal Reserve System, International Finance Discussion Papers*, IFDP 1058.
- Kohn, D. L. (1976). Currency movements in the United States. *Monthly Review*, p. 3-
- Lai, C., Chang, J., and Kao, M. (2004). The money-creation model: Graphic illustration. *Journal of Economic Education*, 79-88.
- Phillips, M. (2008). The monster that ate Wall Street. *The Daily Beast*. Retrieved from: <http://www.thedailybeast.com/newsweek/2008/09/26/the-monster-that-ate-wall-street.html>
- Pool, W. (1970). Optimal choice of monetary policy in a simple stochastic macro model, *Quarterly Journal of Economics*, 84(2), p. 197-216.
- Porter, R. A, and Judson, R. A. (1996). The location of U.S. currency: How much is abroad? *Federal Reserve Bulletin*, p. 883-903.
- Samuelson, P. A. (1973). *Economics*. New York, NY: McGraw Hill Book Company.
- Spencer. M. H. (1974). *Contemporary Economics*. New York, NY: Worth Publishers, Inc.

