Bank Reserves and Their Implications in the Aftermath of the Financial Crises

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The recent financial crises was a huge event in the financial world that has forever changed the financial industry and the way financial policy is done. Some of the greatest consequences of the financial crises is are changes it brought about in bank reserves. Faced with failing banks, a deepening recession, and interest rates near zero percent, the Federal Reserve implemented an unprecedented policy in order to increase liquidity in the financial system. To do this, it purchased bank assets on a massive scale, flooding banks with additional reserves. In August of 2008, there were about $50 billion of reserves in the banking system. By the end of the year, that number had risen to $800 billion. Now, at the end of 2015, reserves have grown to over $2.5 trillion (Federal Reserve Bank of St. Louis 2015a and 2015b). However, despite this massive increase in the monetary base, demand deposits have only slightly increased, as banks have been holding on to these excess reserves rather than increasing their loan portfolios. While the Federal Reserve requires banks to hold only about a 10% reserve to deposit ratio, banks have not expanded credit fast enough to keep up with the flood of new reserves, and as a result, they have allowed the reserve ratio to increase significantly.

Figure 1 data from Federal Reserve Bank of St. Louis - [FRED® Economic Data](https://research.stlouisfed.org/fred2/)

However, now that the economy seems to be recovering and quantitative easing has ended, banks have been left with mountains of excess reserves. The big question now is: what will the future of the financial system look like in a world where banks have amassed such a large quantity of reserves? One major concern is whether or not these reserves will eventually be inflationary. Economists such as Meltzer (2009) and Feldstein (2009) believe that the excess reserves will inevitably lead to severe inflation if the Fed does not remove them from the system. A recovering economy could bring about increasingly profitable opportunities for banks to lend (Walter 2009 p. 4), encouraging them to expand credit and increase their loan portfolios. Historically, banks have kept excess reserves as low as possible in order to take full advantage of the profits to be made from increasing their loan portfolios. However, if banks expand credit enough to bring reserve ratios down to anywhere near their historic levels, it would cause inflation on an unprecedented level.

This paper will analyze this issue of excess reserves and discuss why they exist and what implications they have on monetary policy. First, it will consider why banks are holding on to excess reserves and what the possible implications will be on the monetary system. Then it will look at a historical case of a large buildup of excess reserves. Finally, this paper will analyze the several different policy options as potential solutions to keep the buildup of reserves from becoming inflationary.

The first important question to ask is why banks are holding on to so many excess reserves. Before the end of 2008, excess reserves were only a very small fraction of the total amount of reserves in the system and had been that way for many years. Since banks can create and lend out new demand deposits on top of these excess reserves at very little cost, it is almost always profitable to create new loans. In order to maximize their profits, therefore, banks tend to create as many loans as possible given their level of reserves. In today’s environment, excess reserves have grown to a level many times greater than required reserves, while required reserves have remained fairly stable. Something must be happening, therefore, that is causing banks to be hesitant to lend.

In a recent article released by the Federal Reserve Bank of Cleveland, Craig and Koepke (2015) explain why current conditions are causing banks to keep extra reserves. In their article *Excess Reserves: Oceans of Cash*, they show that the financial crises has altered the calculation that banks make when deciding what level of excess reserves to hold. Banks decide the level of excess reserves to maintain by balancing the liquidity benefits they receive from holding excess reserves with the opportunity cost of the loans that these excess reserves are not generating. Before 2008, this simply involved balancing a banks unknown need for immediate cash to guard against last minute outflows, with the interest that they gave up by holding excess reserves instead of creating additional loan deposits. In today’s environment, however, the opportunity cost of holding excess reserves has become much lower than it was in the past.

The benefits and costs associated with excess reserves have changed for several reasons (Craig and Koepke 2015). One of the main causes attributed to this is that the Federal Reserve now pays interest to banks on the reserve balances that they hold. The current rate of interest is 0.25% on both required and excess reserves, but this rate can be changed by the Board of Governors (Board of Governors of the Federal Reserve System 2015). Before 2008, excess reserves would merely sit on a bank’s balance sheet without producing any income for the bank. It was therefore natural for banks to want to keep excess reserve balances as low as possible. Now that they receive interest payments on their reserves, however, banks can still make a profit on these balances, reducing their incentive use these funds somewhere else.

Before moving on to look at additional factors, there is an important caveat that must be made here. Many people can easily fall into error by mistakenly assuming that a bank’s only alternative to holding on to excess reserves is to get rid of them by lending them out or purchasing other assets. However, this is not usually the case. Banks do not loan out their excess reserves, they simply convert them into required reserves by generating additional demand deposits which they lend to borrowers in exchange for interest. While banks could use the reserves to purchase additional assets such as interest bearing securities, lending out additional demand deposits will normally yield greater returns, since a small amount of reserves can serve as a base for a much greater amount of loans.

Therefore, while the current flat rate of interest on both excess and required reserves may reduce incentives for banks to use their excess reserves to purchase other securities, it will not have much of an effect in their calculation of whether or not to issue more loans. If banks lend additional funds, converting some of the excess reserves to required reserves, they will earn interest on these new loans in addition to the interest that they earn on their reserve deposits at the Federal Reserve. However, these interest payments may still have a marginal effect on lending decisions due to the increase in risk that banks take on when issuing loans. If banks are already receiving interest on their reserve balances, they may be less likely to take on the risk of additional loans than they would be if they were not making any money at all with these excess reserves.

Another reason why conditions have changed is the extremely low rate of interest that banks currently receive on their loans and investments (Craig and Koepke 2015). Since lower interest rates mean that banks make less money on their loans, they have less incentive to increase risk by growing their loan portfolios. These low market interest rates can be explained by the large supply of funds available to be lent out, along with a relatively low demand for commercial loans. In February of 2015, Janet Yellen reported to Congress that demand for small business loans was fairly low (Rogers 2015). Additionally, large U.S. companies are currently flush with cash, reducing the need for business loans (Bryan 2015).

In addition, since other short term investment opportunities such as treasury bills have historically low rates of return, banks are often better off leaving their funds in their reserve accounts where they can receive 25 basis points without taking on any risk. Longer term investments are not a great option either. Since interest rates are currently so close to zero, most people expect that they will increase rather than decrease in the near future. An increase in interest rates, however, will decrease the value of these long term investments. Banks therefore have incentive to hold on to their cash now and invest in the future when interest rates rise again. In addition, due to the current low levels of inflation, holding cash is subject to lower short-run inflation risks than it has been in the past.

Due to these factors, the level of excess reserves at which the marginal cost of an additional dollar of excess reserves is equal to its marginal benefit has become much higher than it was before 2008 (Craig and Koepke 2015). With riskier investments and lower returns coupled with interest payments on reserves, there are simply not enough attractive investment opportunities to convince banks to significantly reduce their excess reserves (Walter and Courtois 2009 p.2). In addition, the current uncertainty about future interest rates and government regulation in the wake of the financial crises has increased banks’ demand for liquidity. These factors, however, could easily change in the future. When demand for loans increases and interest rates return to normal levels, loans and investments will become more attractive and it is likely that banks will begin to draw down their excess reserves once again. If the Federal Reserve wants to prevent severe inflation from occurring, it will need to implement a policy that will prevent banks from using these excess reserves to inject large amounts of newly created money into the economy.

There are three main methods by which the Federal Reserve could attempt to prevent the excess reserve balances from becoming inflationary (Craig and Koepke 2015). First of all, the Fed could reduce its balance sheet by selling large amounts of the assets it purchased during quantitative easing. This would reduce banks reserves, draining the buildup of excess reserves from the system. Another proposed method is for the Fed to incentivize banks to hold on to their excess reserve balances through manipulating the rate of interest it pays on reserves (IOR) (Keister, Martin, and McAndrews 2008). Finally, excess reserves could be instantly transformed into required reserves by increasing the required reserve ratio on demand deposits. Before analyzing each of these methods, however it will be helpful to take a look at an example in U.S. history when the banking system faced a similar situation.

The only other time in American history where the banking system faced a large buildup of excess bank reserves was in the 1930s and 40s. As shown in the graph below, excess bank reserves climbed from about $43 million to over $6.3 billion from 1929 to 1940, while required reserves grew from about $2.3 billion to 6.9 billion. This rapid increase in reserves was a result of large security purchases by the Federal Reserve coupled with gold desterilization and large inflows of gold that grew the monetary base (Freidman and Schwartz 1963, pp. 506-511 and Meltzer 2003, pp.534-548).

As can be seen in the graph below, however, the excess reserves quickly began to disappear starting in 1941. Determining what happened in the 1940s that removed the excess bank reserves from the system will help us to see the nature of the reserve buildup happening in the present day. To do this we will look at the Federal Reserve data during this period (Board of Governors of the Federal Reserve System, 1943a and 1976) to determine which of the three policy solutions were used and what effect they had on the amount of excess reserves in the system. Since the Federal Reserve did not have the ability to pay interest on reserves until 2008 (Board of Governors of the Federal Reserve System, 2015), increasing interest rates paid on excess reserves was not an option. However, the other two options were still available to them.

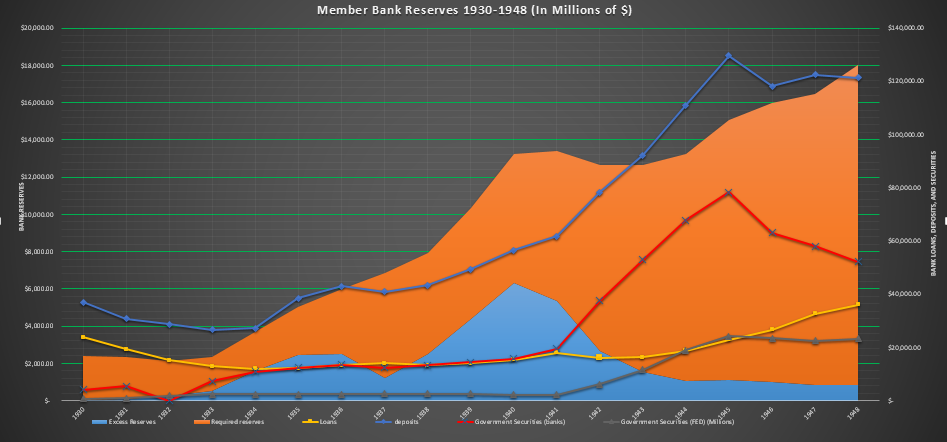
The first question to consider is whether or not the Federal Reserve drained excess reserves through selling off securities and shrinking its balance sheet. This is fairly obvious when looking at the data. While the amount of total reserves in the system fell slightly in 1942, this does not account for the huge fall in excess reserves over this period. In fact, looking at the Federal Reserve’s balance sheet reveals that the amount of securities held by the Federal Reserve continued to increase during this time, which would tend to increase the amount of total reserves in the system.

Figure 2: data from <https://fraser.stlouisfed.org/title/?id=38> and <https://fraser.stlouisfed.org/title/?id=41>

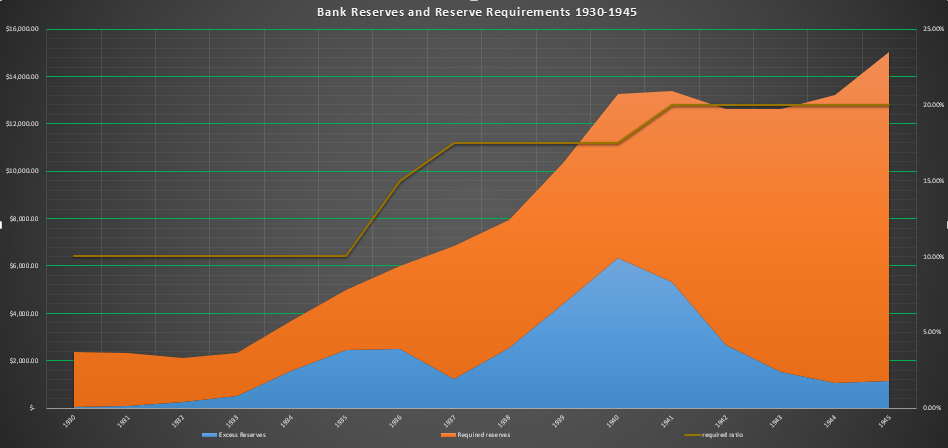
The final solution to examine is an increase reserve ratio requirements, quickly transforming extra reserves into non-inflationary required reserves. Over the 1930s and 40s, reserve requirements did change significantly. However, this still does not seem to fully explain the reason for the fall in excess reserves in the 1940s. As shown in figure 3, the Federal Reserve dramatically increased reserve requirements in the mid-1930s, nearly doubling the required ratio from 1935 to 1937. This clearly had an effect on excess reserves, as the amount of excess reserves in the system fell significantly over this period even as total reserves rose. After 1937, however, excess reserves continued to rise as gold inflows continued to increase the amount of total reserves in the banking system. In 1941, reserve requirements rose again from about 17.5% to 20%. This probably had something to do with the fall in excess reserves from 1940-1941. However, it does not explain why excess reserves continued to fall rapidly until about 1944.

Figure 3: data from <https://fraser.stlouisfed.org/title/?id=38> and <https://fraser.stlouisfed.org/title/?id=41>

It is clear that there must be something else that explains the movement of reserves over this period. This missing piece can be found by looking at the aggregate balance sheet of all member banks in the system. It seems clear that the remaining excess reserves in the system were not neutralized or drained from the system, but were inflated away by a rapid increase in bank investment during the war. In 1942, banks began using their excess reserves to purchase U.S. government securities (Meltzer, 2003, p.598). However, some of the banks soon began to run out of free reserves. Then in April 1993, congress passed an amendment to the Federal Reserve Act that changed reserve requirements for certain deposits held by banks (Board of Governors of the Federal Reserve System 1943a, p.15). The amendment (House of Representatives Committee on Banking and Currency 1943, p.1) stated that:

during the continuance of the present war and for six months after its termination no deposit payable to the United States by any member bank arising solely as the result of subscriptions made by or through such member bank for United States Government securities issued under authority of the Second Liberty Bond Act, as amended, shall be subject to the reserve requirements of this section.

In other words, deposits held by banks in war loan accounts would no longer be subject to any reserve requirements until six months after the conclusion of the war. When bank customers used their deposits to purchase government securities, the funds would be transferred into special war loan accounts at the bank that the treasury could call on when it required funds. This amendment meant that whenever the government issued bonds to finance the war, bank reserves would be temporarily freed up as funds were transferred into these war loan accounts (Board of Governors of the Federal Reserve System 1943a, p.15). Banks would use these extra reserves to purchase government securities and other investments. Later, when the government spent the money in these accounts, the funds would be transferred back into other accounts that were subject to reserve requirements. As required reserves grew, banks would sell some of their newly purchased securities to the Federal Reserve in exchange for reserve funds.

This account explains the movement of reserves and the data shown in figures 2 and 3. In the end, the Federal Reserve did not implement a safe, non-inflationary policy to take care of the excess reserves. Instead, these excess reserves were simply used as part of the Fed’s plan to fund the war through massive amounts of monetary inflation.

It is clear that Federal Reserve policies during this time are not a viable option in today’s environment. With excess reserves above $2 trillion, inflating away these excess reserves would increase the money supply by trillions of dollars which would mean inflation on a massive scale. To prevent this, however, something must be done. Improving conditions will inevitably incentivize banks to expand credit through increasing their loan portfolios. Banks have incentive to continue to lend as long there are profitable lending opportunities available. If economic conditions improve enough, the resulting rapid expansion of credit could lead to hyperinflation.

As was mentioned above, the Fed has three policy options at its disposal to manage the current stockpile of excess reserves. This paper will now look at each one in turn and analyze its feasibility and potential effectiveness. It will also consider the Fed’s stated plan and what its effects will be if the plan is carried out.

The first and most obvious policy option would be to simply reverse the asset purchases that provided the banks with their excess reserves by selling the assets back to the banks. To get excess reserves back down to a normal level, this would involve the sale of about $2.5 trillion in U.S. Treasury and mortgage backed securities. If done very quickly, this would cause major disruptions in bond markets and interest rates and could end up being destabilizing to the economy. In addition, asset sales would reverse the effect of bank bailouts but putting mortgage-backed securities back onto the banks’ balance sheets. Due to these factors, it is unlikely that the Federal Reserve will engage in any type of large scale asset sales to bring down reserves.

Another way in which the Federal Reserve could handle the excess reserves is through manipulating the interest rate it pays on reserve balances. As mentioned above, simply increasing the rate paid on all reserves would not prevent banks from increasing their loan portfolios. However, the Fed does actually have two separate rates of interest for required reserve and excess reserve balances. Currently, these rates are set at the same level of 25 basis points, but the Fed is able to change the rates to pay a higher rate of interest of excess reserves than on required reserves. This would allow the Fed to keep banks from lending even if interest rates rise by adjusting the difference in interest between excess and required reserves. If the difference between these rates is high enough, banks will be incentivized to keep their excess reserve balances high rather than converting them to required reserved through issuing additional loans.

The drawback to this approach is the budgetary effects of paying interest on reserve balances. With excess reserves totaling over $2.5 trillion, even a small increase in this rate will have a large effect on the budget. The Federal Reserve also does not know how market interest rates will behave in the future or the rate it will have to pay on reserve balances in order to incentivize banks to keep their excess reserves. In fact, this rate could potentially be quite high. Because reserve balances can serve as a base for a much greater quantity of loans, even a small increase in interest rates could necessitate a large increase in the rate the Fed pays on reserves. The actual rate needed would be discovered through the Fed’s traditional data-driven policy approach of analyzing empirical feedback and adjusting the rate accordingly. In any case, it is unlikely that this would be a feasible long run solution to managing excess reserve balances, since it could eventually become very costly to execute.

The third option the Federal Reserve has is to simply increase the amount of reserves that banks are required to hold. A substantial increase in reserve requirements from its current 10% level to 50% or even 100% would instantly convert a large portion of the excess reserves into required reserves that could not be used to expand credit and inflate the money supply. However, this policy has historically been dismissed in the literature, due to a fear that raising reserve requirements would cause a large reduction in loan portfolios that would send the economy into recession (Craig and Koepke 2015). Freidman and Schwartz (1963) argue this point in their book *A Monetary History of the United States, 1967-1960*. They make the case that the recession in 1937 was caused by a dramatic increase in reserve requirements that induced banks to drastically reduce their loan portfolios.

A look at the data, however, shows that this theory is seriously flawed. The graph below shows that the large increase in reserve requirements did in fact successfully reduce excess reserves by a substantial amount. However, did this action cause banks to cut back on their loan portfolios, sending the economy back into recession? The data actually suggests otherwise. The amount of loans banks held in their portfolios actually changed very little over this time period. Contrary to Freidman’s view, the increase in reserve requirements in the mid-1930s did not cause a recessionary collapse in bank investment. Instead, it provides an example of how the Federal Reserve successfully neutralized the inflationary effect of a large amount of excess reserves by instantly transforming them into required reserves.

Despite this evidence, however, raising reserve requirements is often still overlooked as a policy option. In fact, when Ben Bernanke (2009) laid out possible exit strategies for the buildup of reserves, he mentioned raising interest rates paid on excess reserves and draining reserves through open market operations, but said nothing about raising reserve requirements. Almost nothing released by Federal Reserve banks over the last few years has rarely entertained raising reserve requirements as a possible way to reduce excess reserves. The Fed’s current policy normalization plans do not mention this possibility at all.

In a press release issued in September of 2014, the Board of Governors (2014) laid out their plans for future policy normalization. The press release stated that the normalization process would not involve a major reduction in reserves through asset sales. The Fed plans to reduce reserve balances much more slowly. The total amount of reserves in the system will naturally decline gradually as the securities held by the Federal Reserve mature, shrinking its balance sheet. While the Fed has currently been keeping reserve levels up by reinvesting the principle repayments in other securities, the current plan for normalization would be to stop this reinvestment policy soon after the Fed raises its target federal funds rate. While this plan would drain reserves very slowly, it would do so without being extremely disruptive or destabilizing.

In the meantime, the Fed would need a method to implement monetary policy and to keep the remaining excess reserves from becoming inflationary. This will be done primarily through manipulating interest rates paid on reserve balances. According to Janet Yellen (2014):

The primary tool for moving the federal funds rate into the target range will be the rate of interest paid on excess reserves, or IOER. The Committee expects that the federal funds rate will trade below the IOER rate while reserves are so plentiful, as is the case at present. The Committee also intends to use an overnight reverse repurchase agreement facility, which, by transacting with a broad set of counterparties, will help ensure that the federal funds rate remains in the target range.

After the excess reserves have been drained, the Fed plans to return to its traditional approach of employing monetary policy.

The Board of Governors’ stated plan for normalization appears to be an effective way bring the banking system back to its pre-2008 state. Allowing the balancing sheet to slowly shrink on its own will drain reserves without distortionary or destabilizing effects. In the meantime, since banks still seem to be holding on to their reserves, the budgetary effects of the interest paid on reserve balances should be fairly low. Additionally, even if the Fed has to increase this rate in the future, as reserve balances begin to drain the budgetary effects of these payments will get smaller and smaller.

However, the main issue with this solution is that it ignores the deeper problem of the instability that is inherent in a fractional reserve banking system. Since the problems with fractional reserve banking have been thoroughly explained by Rothbard (2008) and Huerta de Soto (2012), they will only be briefly discussed here. Fractional reserve banks exist in a constant state of insolvency. When someone deposits money at a bank, these funds are due immediately to that person on demand. However, banks then lend out additional claims to these funds as loans that will be repaid in the future. As a result, banks are left insolvent, since depositors could demand their funds at any time, while borrowers will not repay their loans until sometime in the suture. In the words of Rothbard (2008, p. 99) “*a* [fractional reserve] *bank is always inherently bankrupt,* and would actually become so if its depositors all woke up to the fact that the money they believe to be available on demand is actually not there.”

The entire stability of the banking system rests upon the gamble that depositors will not withdraw their money on a large enough scale to bring out the inherent insolvency in the system. In addition, since banks can issue many times more loans than the amount of reserves that they have on hand, a sudden withdrawal of funds can result in a much greater contraction of credit and investment. In a system where there are more claims on bank reserves than there are reserves to bank up those claims, there will always be a risk of financial collapse. If the Federal Reserve does not make additional changes, there will inevitably be additional instability in the future. The only way to actually stabilize the banking system is abolish fractional reserve banking altogether.

Financial regulators are now beginning to realize this fact and are acting accordingly. New regulations require banks to hold additional reserves against deposits that have been deemed up to be especially volatile and unpredictable, especially in times of trouble (Salerno 2015). Banks are now expected to maintain 40% reserves against some corporate deposits and 100% against certain hedge fund deposits. These high reserve ratios coupled with low interest rates have made these deposits costly for banks to hold on to. As a result, some banks have been starting to charge fees to their clients in exchange for holding these large sums of cash.

According to the most recent data from the Federal Reserve (Board of Governors of the Federal Reserve System 2015b), quantitative easing has pushed aggregate bank reserves above the level of demand deposits. With reserve ratios now over 100%, full reserve banking has become a real possibility. For the first time in many years, the Federal Reserve could enforce a 100% reserve ratio without forcing the banking system to dramatically reduce aggregate loan portfolios. While the Federal Reserve has not mentioned this as a possibility in its policy statements, the previously ignored topic of 100% reserve banking is now being seriously talked about in some academic circles (Benes and Kumhof 2012).

There are several significant advantages to abolishing fractional reserve banking, as has been demonstrated by others such as Fisher (1936) and Rothbard (2001 and 2008). The first and most obvious, as mentioned above, is improved financial stability. Requiring banks to be fully backed by reserves would greatly reduce the possibility of financial collapse in the future. If banks are expected to remain solvent like other businesses, large withdrawals and volatile deposit balances would no longer be destabilizing to the system, since they would not cause banks to contract credit. People would be confident that banks could fulfil their contractual obligations, as demand deposits would always be backed by an equal amount of reserves.

In addition, full reserve banking would be beneficial to financial regulators and policymakers, as it would give them greater control of the banking system and the money supply. Under the current system, the Fed has only an indirect control over the supply of money and credit in the economy. Regardless of what the Fed’s current policy objectives may be, the actual supply of money and credit in the economy is determined by the banks. This puts policymakers in the difficult position of trying to manipulate banks through methods such as adjusting their supply of reserve balances or paying interest on excess reserves. This practice, however, is very imprecise, as the Fed cannot predict exactly how banks will react to different circumstances. In reality, the process involves trial and error, with constant adjustment in response to changes in empirical data.

In a world of 100% reserves, however, a central bank would have a direct and much greater control over the money supply making it much easier to implement monetary policy. If banks no longer have the power to expand and contract the money supply through their lending decisions, the money supply will be much more stable and the Fed would be able to change it much more precisely and mechanically. While the Fed would not be able to adjust to market changes as quickly and fluidly as banks do under the current system, it would take the guesswork out of monetary policy since bank reactions would no longer be a significant issue.

A switch to full reserve banking, however, would completely change the banking industry. As banks could no longer profit from creating new loans out of nothing, the entire profit structure of the banking system would have to change. Banks could still act as a financial intermediaries, borrowing money from investors and investing it to make a profit. However, it order to make money from deposit banking, they would have to charge fees to their clients in exchange for their services. This would be a big shift in a world that has gotten used to banking services that are generally free of charge.

It is still impossible to tell for sure what the final policy outcomes will be in the aftermath of the financial crises. Policymakers are still working on and adjusting their policy plans. In fact, in the Fed’s plans for normalization (Board of Governors 2014) it specifically states that the board will continue to monitor things and adjust future policies as needed. Given the current political climate and the statements of the Federal Reserve, it seems unlikely that 100% reserve banking will become a reality in the near future. However, the current high level of reserves makes it an ideal time to switch to full reserve banking, In addition, since regulators have begun to see the benefits of having 100% reserves, a future without fractional reserve banking seems increasingly possible. The only sure thing, however, is that if the Fed continues to allow fractional reserve banking, there is sure to be more trouble down the road.

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