

# Implications of the Post-2008 Federal Reserve Policy Regime for Austrian Macroeconomics

Zachary Wood

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## **Abstract**

After the beginning of the 2008 financial crisis in the United States, the Federal Reserve changed its monetary policy framework and introduced new policy tools. These changes included interest payments on bank reserves, large-scale asset purchases (quantitative easing), and the creation of emergency lending facilities. The Fed later responded to the economic crisis in 2020 with similarly drastic measures such as lowering its policy rate, increasing asset purchases, eliminating reserve requirements, and creating new emergency lending facilities. These changes in Fed policy entail important implications for macroeconomic analysis and the application of Austrian business cycle theory (ABCT). The Fed's new "ample reserves" regime altered the process of central bank credit expansion, requiring a clarification of the credit expansion process, which is important for the application of ABCT in the post-2008 American economy. This paper clarifies the altered credit expansion process and explains its relevance to ABCT. Additionally, this paper analyzes the macroeconomic consequences of other changes in Fed policy, especially their potential to promote systemic risk in the financial system.

## 1. Introduction

After the beginning of the 2008 financial crisis, the Federal Reserve System adopted numerous measures intended to support the U.S. economy and financial system. Some of these measures, such as interest payments on reserves and quantitative easing, became permanent tools of the Fed's monetary policy. The Fed also adopted some permanent policy changes during the COVID-19 panic, like eliminating reserve requirements for banks. As a result of these changes, the Fed has substantially altered its monetary policy regime. Traditional models of monetary policy are inadequate to analyze the Fed's new policy regime.

These changes have significant implications for Austrian business cycle theory (ABCT). Under the Fed's new regime, the credit expansion process is initiated by the central bank through different policy mechanisms than before. Additionally, some of the Fed's novel monetary policy tools have the potential to cause macroeconomic distortions. It is the primary goal of this paper to explore how the traditional institutional assumptions of ABCT should be updated to account for the Fed's new monetary policy regime. Secondly, this paper analyzes some other potential macroeconomic consequences of changes in Fed policy. I argue that the changes to the Fed's policy regime after the 2008 financial crisis alter the mechanism of credit expansion, increase the potential for systemic risk and instability, and change the Fed's role in conducting monetary policy.

In Section 2, I briefly recount the Fed's pre-2008 policy regime and its relevance to ABCT. In Section 3, I describe the changes to the Fed's regime and the new policy tools it has adopted since the financial crisis, and I explain how the traditional assumptions of ABCT are not perfectly applicable to the current institutional setting. In Section 4, I analyze the implications of the Fed's new credit expansion process for the assumptions and application of ABCT. In Section

5, I explain how the Fed's new operating framework and monetary policy tools have the potential to promote systemic risk in financial markets and the economy more broadly. In Section 6, I evaluate the potential of large-scale asset purchases to induce credit expansion under the Fed's new system. In the final section, I conclude.

## **2. Federal Reserve Monetary Policy Before 2008**

Kroeger, McGowan, and Sarkar (2018) explain the Fed's policy regime before the crisis. In pursuit of its dual mandate of stable prices and maximum employment, the Fed targeted its policy rate, the federal funds rate. Changes in the federal funds rate are transmitted to other short-term interest rates, which also impact long-term rates. Lowering the fed funds rate is intended to stimulate economic activity by lowering the cost of borrowing, while increasing the fed funds rate is intended to "cool down" the economy to stifle price inflation.

The Fed influenced the federal funds rate and other short-term interest rates by changing the supply of and the demand for bank reserves. A higher quantity of reserves would increase the supply of loanable funds, lowering short-term rates and stimulating economic activity. A lower quantity of reserves would reduce the supply of loanable funds, increasing short-term rates and putting a damper on inflation. The Fed used several tools to control the price and quantity of loanable funds. The most important was open-market operations (OMOs), in which the Fed bought and sold securities from banks to, respectively, increase or decrease bank reserves. OMOs were the primary tool that the Fed used to influence short-term interest rates. The Fed also used changes in the required reserves ratio to impact banks' demand for reserves. The discount rate, the rate that the Fed charges for direct lending to banks, also influenced demand for reserves.

Figure 1 illustrates the Fed's pre-2008 policy regime:

### The Market for Reserves

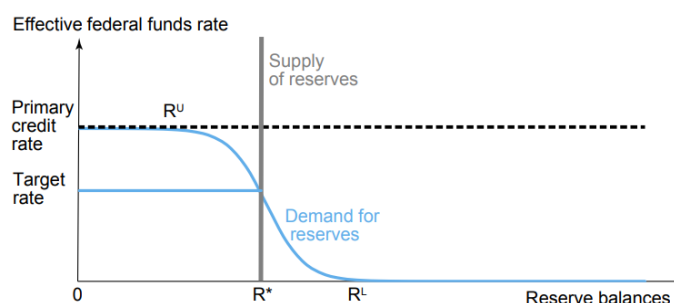


Fig. 1: The market for reserves before 2008 (Kroeger, McGowan, and Sarkar 2018)

The discount rate is a ceiling on the effective federal funds rate, because banks will not borrow from other banks at a higher interest rate than they can borrow from the Fed. The lower bound of the demand curve to the right of  $R^L$  is flat because banks are indifferent to holding more reserves after that point, because they have sufficient funds to cover their payment needs and they will not lend at a negative rate (Kroeger, McGowan, and Sarkar 2018, 41). The Fed controls the discount rate to change the height of the upper bound of the demand curve, and it can change the reserve requirement ratio to shift the demand curve. The Fed keeps the supply of reserves within the steep portion of the demand curve so that it can control the federal funds rate and other short-term rates by adjusting the supply of reserves using OMOs.

It is under this central bank operating framework that Austrian business cycle theory (ABCT) was developed. ABCT does not theoretically require the existence of a central bank to generate a business cycle; it only requires an expansion of fiduciary media. As Rothbard (2008) describes, however, competition in a private banking system on the unhampered market constrains credit expansion, but central banks remove these constraints. Rothbard (2009, 1016; 994-1004) explains how the Fed's pre-2008 framework ties into the process of credit expansion in ABCT. The Fed engages in open-market purchases, which increases bank reserves. Banks use the new reserves to make new loans, and since reserve requirement ratios are less than 100

percent, they lend out more money in the aggregate than the initial increased amount of reserves. The increased supply of loanable funds, which results from increased reserves through OMOs, artificially suppresses interest rates. Other banks receive the new credit as deposits and lend out more loans on top of those deposits. The process, known as the money multiplier effect, continues as credit expands and the money supply increases. Lower interest rates mislead entrepreneurs into overestimating the supply of saved resources, inducing them to invest in longer, more roundabout, and more capital-intensive production processes and setting in motion a business cycle.

### 3. Federal Reserve Monetary Policy After 2008

Since the 2008 financial crisis, the Fed no longer operates in the framework described above. Ihrig, Senyuz, and Weinbach (2020) describe the post-crisis changes to the Fed’s monetary policy regime. The Fed’s post-2008 framework is described as an “ample reserves” regime, where the Fed keeps the supply of reserves well above the level of required or “prudential” reserves. As a result, banks hold a much larger quantity of excess reserves than before 2008. Figure 2 shows the massive growth in the level of excess reserves after 2008, whereas before 2008 the level of excess reserves was negligible.

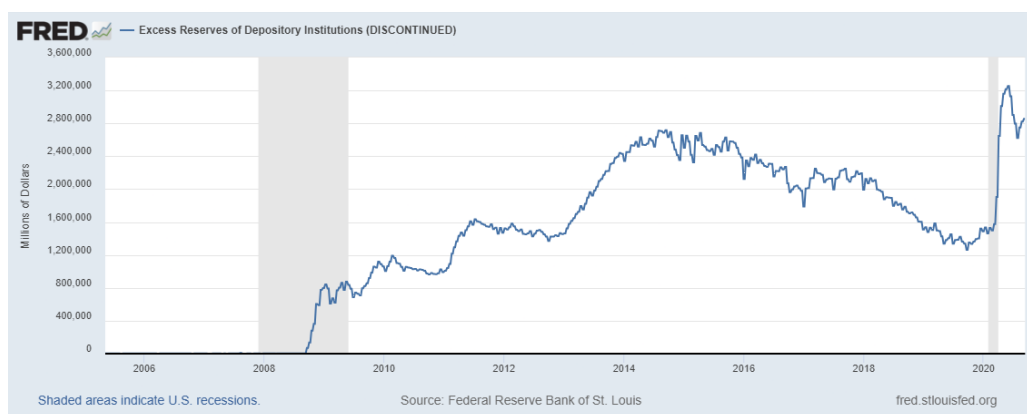


Fig. 2: Excess reserves of depository institutions (Federal Reserve Bank of St. Louis 2024)

The Fed transitioned to this regime by engaging in large-scale asset purchases and by paying banks interest on excess reserves held at the Fed. This interest rate, the interest rate on excess reserves (IOER), is an interest rate administered by the Fed. The Fed also began paying interest on required reserves (IORR), which from its introduction in 2008 until the removal of reserve requirements in 2020 was paid to banks at the same rate as the IOER rate. After reserve requirements were removed in 2020, these two rates became one interest rate, the interest on reserve balances (IORB) rate. Since the rates on IOER and IORR were equal, I will refer to these rates as a single IORB rate.

The Fed used large-scale asset purchases, also known as Quantitative Easing (QE), to transition to the ample-reserves regime. Before the Fed began paying interest on reserves, banks would normally lend out a large proportion of new reserves to other banks and to commercial borrowers, so large-scale asset purchases would have resulted in massive credit expansion and monetary and price inflation. However, largely because the Fed began paying interest on bank reserves, banks opted to hold the new reserves from QE at the Fed, earning a riskless interest rate rather than lending to other banks and commercial borrowers. Once the Fed reduced the federal funds rate to the zero-lower bound, QE was used to loosen monetary policy further, although the impact of QE under the zero-lower bound has been questioned, as will be discussed below.

The Fed introduced three other tools in response to the 2008 financial crisis (Machaj 2024). Fed policymakers announced policy stance changes in advance (“forward guidance”) to influence the behavior of actors in financial markets. In 2011, they also bought long-term assets and sold short-term assets to reduce yield spreads in “Operation Twist.” The Fed additionally created emergency lending facilities to strengthen the liquidity of financial institutions (Board of Governors of the Federal Reserve 2024).

Dutkowsky and VanHoose (2017) point out that under the current monetary policy framework, the Fed's operating regime can change depending on the levels of the federal funds rate, the IORB rate, and the reserve requirement ratio. As Selgin (2019, 25-28) explains, the levels of these parameters determine whether banks hold excess reserves instead of engaging in interbank lending, or vice versa. If the IORB rate is sufficiently high relative to interbank lending rates (such as the federal funds rate), banks will accumulate excess reserves rather than engage in interbank lending. If interbank lending rates are sufficiently high relative to the IORB rate, then banks will engage in interbank lending rather than accumulating excess reserves. Since 2008, aside from several instances during 2009 and 2010, the Fed has operated in an excess reserves regime.

The Fed's policy response to the COVID-19 panic in 2020 is also worth considering for the future of business cycle analysis. In addition to expanding asset purchases and reducing the IORB rate, the Fed used several new emergency lending facilities to support the flow of credit to banks, businesses, and governments (Cachanosky et al. 2021). The Fed also eliminated reserve requirements in 2020 to "support lending to households and businesses," although it is curious why this would have any effect on the quantity of lending since reserve requirements were ineffective as a result of banks holding excess reserves since 2008 (Murphy 2021, 94-96).

In the Fed's post-2008 monetary policy regime, the traditional mechanism of credit expansion loses much of its effectiveness. The Fed no longer relies as extensively on open market operations to change short-term interest rates because asset purchases and sales and balance sheet changes have a weaker effect on short-term rates as a result of interest payments on reserves. Balance sheet expansion alone has a substantially smaller effect on broader monetary aggregates like M2 for the same reason. Instead of open market operations, the Fed now uses

administered rates like the IORB rate to change short-term interest rates. The traditional ABCT applied to central bank intervention assumes an operating framework like the one that the Fed used before 2008. To analyze business cycles and macroeconomic activity post-2008 using the tools of ABCT, the credit expansion process under the current monetary policy regime needs to be clarified.

#### **4. Implications of Interest on Reserves and the New Credit Expansion Process for ABCT**

The Fed no longer uses open-market operations as its primary means of expanding credit. The credit expansion process must then be clarified. Cutsinger (2023) argues that substantial increases in bank reserves as a result of Fed asset purchases no longer necessarily cause business cycles. Because the Fed pays sufficiently high interest on bank reserves, the money multiplier is much smaller and increases in bank reserves have little to no effect on interest rates. Interest rates are not artificially suppressed and a boom-bust cycle will not necessarily occur. According to Cutsinger, malinvestment no longer necessarily occurs by the traditional intertemporal malinvestment mechanism explicated by ABCT. Instead, the capital structure is distorted by the increased allocation of credit by the Fed. When banks in the current monetary policy regime accumulate excess reserves, they deposit them at the Fed to receive interest on those reserves, essentially lending those reserves to the Fed. The Fed then uses those reserves to purchase assets like Treasury bonds and mortgage-backed securities. Since 2008, the Fed's balance sheet has expanded significantly, so the Fed has a much larger "footprint" in credit markets. The Fed, as a government enterprise not subject to the discipline of the market, faces knowledge and incentive problems in allocating credit to its most highly valued uses. The Fed's new monetary policy



system, although not necessarily causing intertemporal malinvestment, distorts the capital structure by allocating credit inefficiently.

In addition to the mechanism that Cutsinger identifies, the Fed's new policy regime can still cause intertemporal malinvestment, but through a different mechanism than asset purchases. Instead of open market operations, the Fed can cause intertemporal distortion of the production structure, and thus business cycles, by lowering its administered interest rate, the IORB rate. When the Fed lowers the IORB rate, it increases banks' opportunity cost of holding reserves at the Fed. A lower IORB rate makes lending to other banks and to commercial borrowers more profitable on the margin because banks make a relatively lower return by holding reserves at the Fed. Banks then shift some of their reserves toward lending, increasing the supply of loanable funds. This could set in motion a business cycle. A higher supply of loanable funds, sourced from bank reserves supplied by the Fed, suppresses interest rates below their natural levels. As in the standard ABCT, lower interest rates mislead entrepreneurs into beginning longer production processes, which are eventually revealed to be unsustainable as income to original factors increases, consumer prices and lower order producer goods prices are bid up, and input costs increase while prospective returns decrease for higher-stage producers.

The credit expansion process under the Fed's post-2008 policy regime is illustrated in Figure 3:

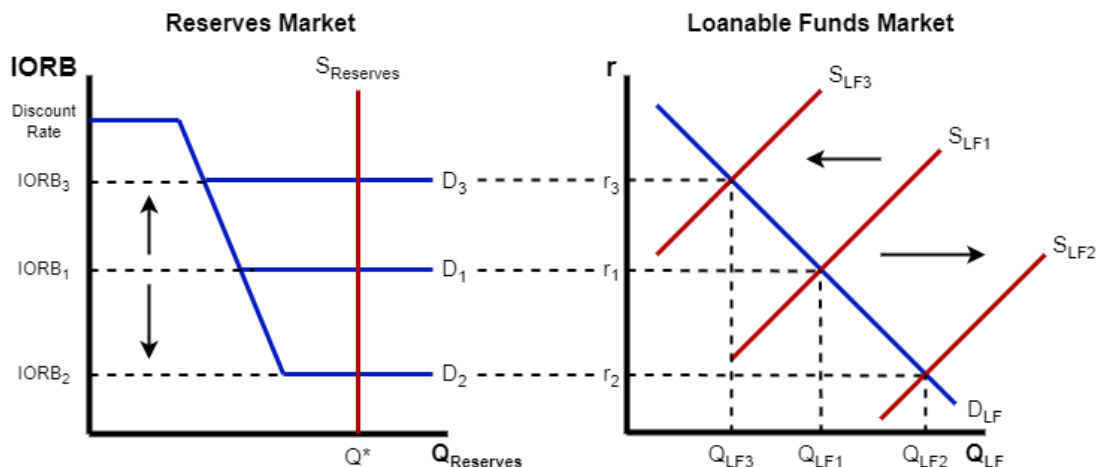


Fig. 3: Graphical model of the credit expansion process

If the Fed decides to expand credit and stimulate lending by loosening monetary policy, it will lower the IORB rate from  $IORB_1$  to  $IORB_2$ . This will move the interest rate “floor” downward, as shown by the lowering of the flat portion of the demand curve from  $D_1$  to  $D_2$ . Because the IORB rate is lower, banks make a lower return on holding reserves at the Fed, so the opportunity cost of reserves has risen. Marginal interest rates on the interbank and retail loan markets are now higher than the interest rate on reserves. Banks will shift some of their reserves into loans because the marginal return on lending is now higher than the marginal return on holding reserves. As a result, the supply of loanable funds increases from  $S_{LF1}$  to  $S_{LF2}$ . The quantity of loanable funds increases from  $Q_{LF1}$  to  $Q_{LF2}$  and interest rates on the loanable funds market are bid down from  $r_1$  to  $r_2$ . The artificially suppressed interest rates set in motion intertemporal malinvestment and a business cycle. The reverse process of credit contraction by the central bank is illustrated by the shift from  $IORB_1$  to  $IORB_3$ .

Despite the Fed’s sterilization of asset purchases by its interest payment on reserves, the Fed’s monetary policy can still cause an Austrian business cycle. By reducing the IORB rate, the Fed allows some of the commercial banks’ reserves to “leak” out into retail lending markets,

increasing the volume of credit and the broad money stock. As Figures 4 and 5 show, there appears to be a generally negative relationship between the IORB rate and the growth rates of M2 and bank loans and leases, with two major exceptions: the beginning of the financial crisis, and, for bank loans and leases, the COVID-19 downturn. The former can be explained by the stylized facts of the business cycle, where the volume of bank credit and sometimes the money supply collapse during the crisis. The latter can be explained by the liquidity crunch and economic uncertainty that occurred during the COVID-19 downturn.

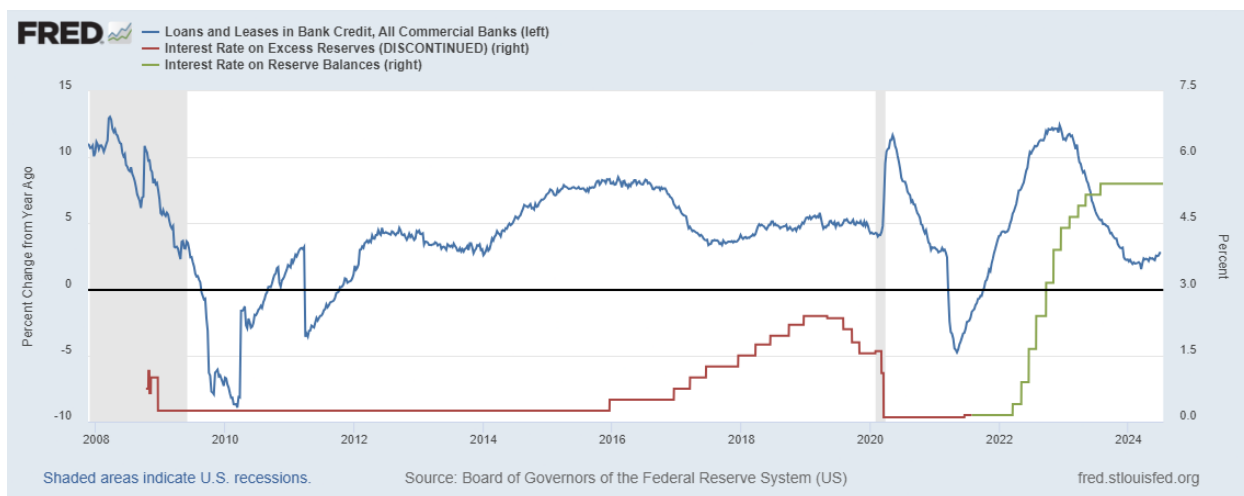


Fig. 4: YOY growth of loans and leases in bank credit, IOER rate, and IORB rate (Board of Governors of the Federal Reserve System 2024)

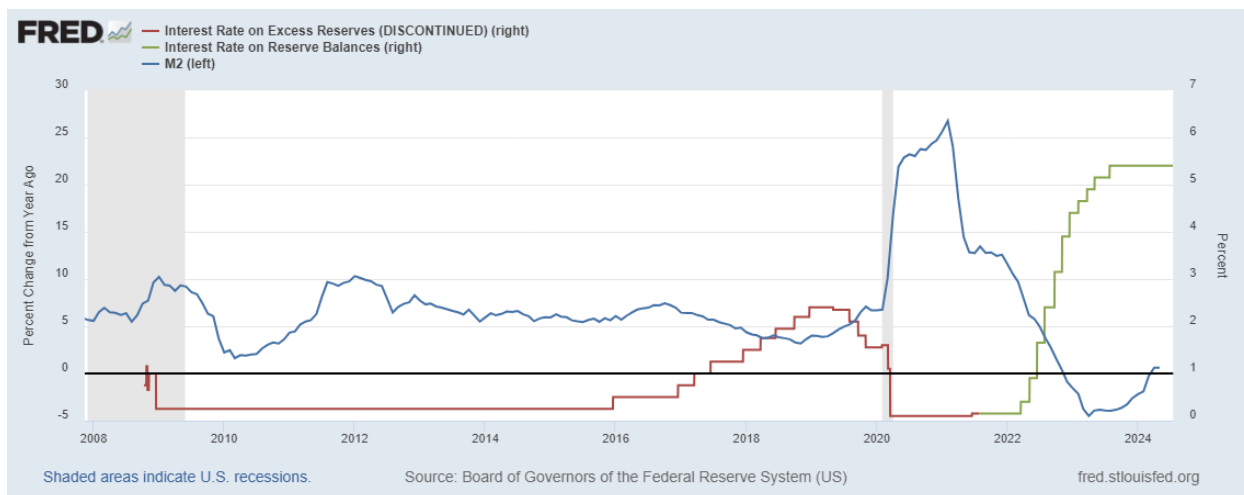


Fig. 5: IOER rate, IORB rate, and YOY growth rate of M2 (Board of Governors of the Federal Reserve System 2024)

In addition to the altered credit expansion process, IORB brings about some other consequences. The graphical model in Figure 3 illustrates that as the IORB rate falls, the Fed may have to increase the stock of reserves to remain in an ample-reserves regime. If the Fed lowers the IORB rate beyond a certain point, banks will lend out enough of their reserves to the point where their reserves become scarce and the stock of reserves is located in the steep portion of the demand curve for reserves. If this were to happen, the Fed would again be operating in a scarce-reserves regime like the one that existed prior to 2008. As the Fed loosens monetary policy by reducing the IORB rate, it may also have to expand asset purchases to remain in an ample-reserves regime.

Furthermore, since the introduction of IORB payments, the M2 money multiplier has fallen precipitously (Selgin 2018, 94), as Figure 6 shows:



Fig. 6: M2 money multiplier (Board of Governors of the Federal Reserve System 2024)

For an increase in the monetary base, the increase in broader money aggregates like M2 is much smaller than before 2008. The reserves-to-deposits multiplier fell even further than the M2

multiplier (Selgin 2018, 94-95). To demonstrate further the effects of IORB on bank lending, Figure 7 shows the level of bank deposits, bank credit, and bank reserves:

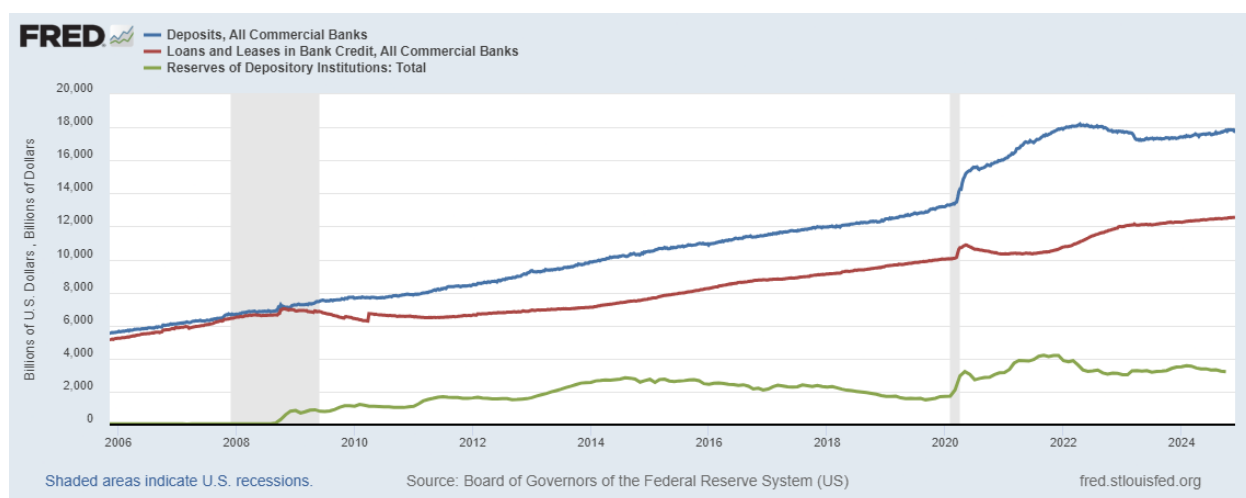


Fig. 7: Commercial bank deposits, loans and leases in bank credit for commercial banks, and reserves of depository institutions (Board of Governors of the Federal Reserve System 2024)

Bank deposits and bank credit were closely linked prior to 2008, but since then they have increasingly diverged, while bank reserves have grown as a proportion of deposits. Since 2008, banks have been much more reluctant to make loans on top of reserves and deposits. By giving banks a riskless return comparable to other short-term interest rates, IORB stifles bank lending in wholesale and retail loan markets. This entails at least two major consequences. First, as Selgin (2018, 125-126) and Cutsinger (2023) point out, the Fed has a much larger role in credit allocation than before the crisis. Figure 8 shows the ratio of Federal Reserve assets to commercial bank assets:

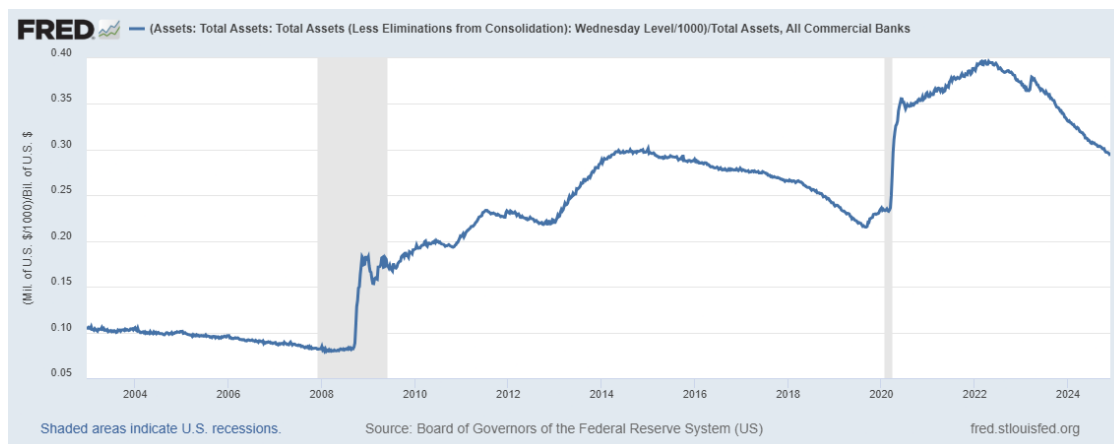


Fig. 8: Ratio of Federal Reserve assets to commercial bank assets (Board of Governors of the Federal Reserve 2024)

The share of credit allocated by the Fed has more than tripled since the beginning of the financial crisis. After the introduction of IORB and large-scale asset purchases, banks effectively lend a large proportion of their funds to the Fed, which uses those funds to purchase Treasury securities and mortgage-backed securities. A substantially lower proportion of total credit in credit markets is allocated by private actors who are constrained by profit and loss. Instead, that credit is allocated by the Fed, which is subject to political (Boettke and Smith 2013) and bureaucratic incentives rather than consumer preferences. A recent NBER study (Diamond, Jiang, and Ma 2024) supports the conclusion that QE crowds out private bank lending.

A second consequence of IORB is that larger quantities of asset purchases are needed to expand credit to the same extent as before 2008. If the Fed intends to expand credit through asset purchases instead of by reducing the IORB rate, perhaps because IORB is already at the zero-lower bound, low M2 and reserves-to-deposits multipliers require that the Fed increase the monetary base substantially to achieve even a relatively small impact on broader monetary aggregates and macroeconomic variables. To make asset purchases more effective, the Fed must adjust the IORB rate to increase the monetary base multiplier (Selgin 2021, 13). A secondary

consequence of this is that such a growth in the monetary base through asset purchases would increase the Fed’s credit footprint even more, further distorting credit allocation.

## 5. Quantitative Easing and Systemic Risk

### 5.1: Quantitative Easing and its Effectiveness

The other major change in Fed policy after the 2008 financial crisis was the introduction of large-scale asset purchases, commonly known as quantitative easing. Quantitative easing (QE) was used to provide further liquidity to financial markets when the IORB rate was near the zero-lower bound. When the Fed engages in QE, it buys large quantities of assets like Treasury securities and mortgage-backed securities, especially long-term assets. This is intended to push down interest rates on long-term assets to encourage borrowing and the flow of credit with the goal of stimulating economic activity and reducing unemployment (Ricketts 2011). The Fed engaged in three rounds of quantitative easing from 2008 to 2012, as well as “Operation Twist” in 2011, in which the Fed sold short-term assets and bought long-term assets to reduce yield spreads across maturities (Federal Reserve Bank of St. Louis 2015). Figure 9 shows the composition of the Fed’s asset purchases by different maturities. A large majority of the Fed’s Treasury and MBS purchases is composed of assets with maturities ranging from one year to over ten years:

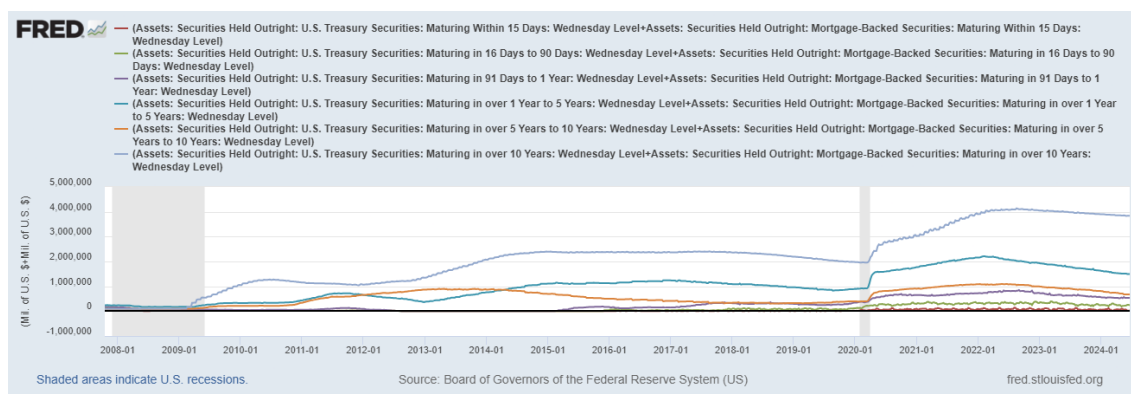


Fig. 9: Maturity composition of the Fed's asset purchases (Board of Governors of the Federal Reserve System 2024)

The extent to which QE is effective at reducing long-term yields is disputed. Gagnon, Raskin, Remache, and Sack (2011) argue that QE reduces long-term interest rates through three mechanisms: by reducing the supply of long-term assets on the market, by improving market liquidity, and by removing assets with high prepayment risk from private portfolios. They review other empirical studies and use an event-study analysis to demonstrate the effect of QE on long-term yields. Likewise, Vissing-Jorgenson (2021) argues that Fed asset purchases were causal for the reduction of Treasury yields after the beginning of the fourth round of QE in March 2020.

Figure 10 shows Fed assets along with 10-year Treasury yields and the yield spread between 10-year and 3-month Treasuries:



Fig. 10: Fed assets, 10-year Treasury yield minus 3-month Treasury yield, and 10-year Treasury yield (Board of Governors of the Federal Reserve System 2024; St. Louis Federal Reserve 2024)

A cursory look at this data suggests that the effect of QE on long-term yields is ambiguous. The first and fourth rounds of QE appear to coincide with reductions in long-term yields, but the impact of the second and third rounds, along with Operation Twist, are less clear. Selgin (2018, 98-99) argues that while QE may have reduced bond yields, it failed to stimulate output and employment. However, he cites several studies (Belke, Gros and Osowski 2017; Thornton 2017;



Greenlaw, Hamilton, Harris, and West 2018) which suggest that QE did not even have a persistent and large-magnitude effect on long-term bond yields (Selgin 2018, 100-101).

It is outside the scope of this paper to answer whether QE has a substantial effect on long-term yields. To the extent that it does, however, some possible consequences for the structure of production can be deduced.

### *5.2: Quantitative Easing and Systemic Risk*

Quantitative easing, in conjunction with various other changes in the Fed's policy and new monetary policy tools, has the potential to promote systemic risk throughout financial markets and the economy more broadly. While asset purchases under the interest on reserves system may not necessarily cause large distortions in the time structure of production, they can cause distortions in what Young (2015) calls the "risk structure of production."

If quantitative easing is effective at reducing long-term yields relative to short-term yields, then through quantitative easing the Fed can cause systemic risk-taking in loans and investments beyond the risk that the market would otherwise bear. By conducting large-scale asset purchases, the Fed, if successful, reduces the yield spread. This can reduce the risk premium on riskier loans through several mechanisms described by Gagnon, Raskin, Remache, and Sack (2011). Fed asset purchases reduce the amount of riskier and higher-yield assets held by the private sector, while increasing the quantity of short-term, risk-free reserves held by the private sector. The prices of higher-yield assets remaining on the market will be bid up in response and their yields will fall (Gagnon, Raskin, Remache, and Sack 2011, 42). As the Fed buys higher-yield Treasuries and mortgage-backed securities, their demand will rise and their supply on the market will fall, increasing their prices and reducing their yields. Lower returns on

these assets will induce investors to shift some of their funds into assets with higher yields, such as corporate bonds and equities, so the prices of those assets will rise and their yields will fall (43). Finally, by conducting large-scale asset purchases, the Fed increases demand for riskier long-term assets by becoming a buyer for them, making them less risky and driving down their risk premiums (43). By inducing investors to seek higher yields in riskier investments and by cheapening credit for risky investments, quantitative easing could promote riskier investments and projects than would otherwise take place.

The Fed's post-2008 monetary policy regime could promote systemic risk through mechanisms other than reducing the yield spread. The Fed's asset purchases increase the prices of longer-term Treasuries and mortgage-backed securities by raising their demand, so these assets can be used as collateral for riskier loans. As the Fed's balance sheet grows larger, it allocates a larger share of credit relative to private financial intermediaries, as Cutsinger (2023, 30-31) shows. The Fed, because it is not guided by the discipline of profit and loss on the market, might funnel some of this credit to investments that are riskier than the unhampered market would be willing to bear. For instance, the Fed directs a large proportion of credit toward mortgage-backed securities, as Figure 11 shows:

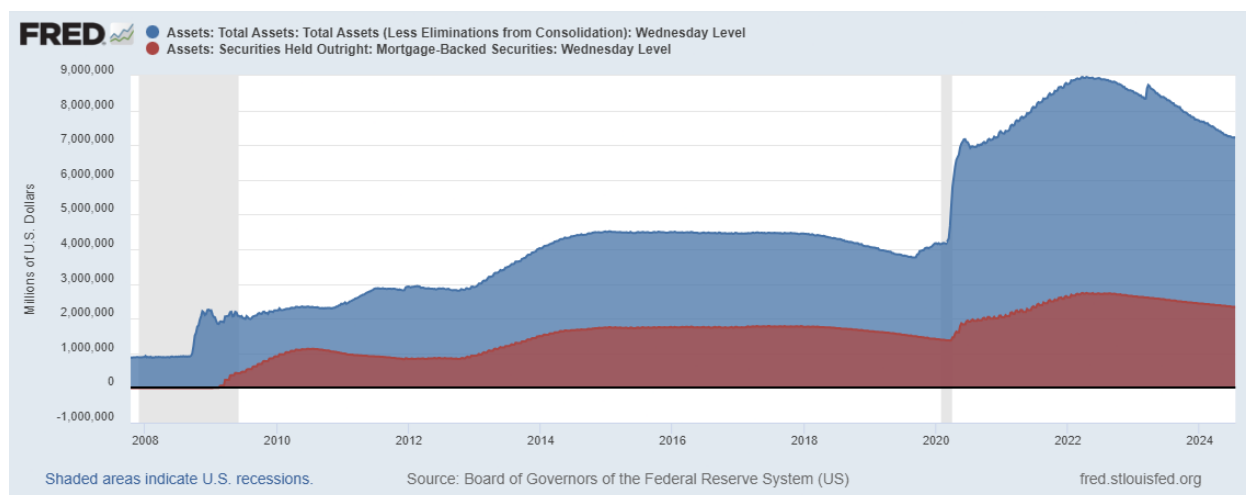


Fig. 11: Total Fed assets and mortgage-backed securities held by the Fed (Board of Governors of the Federal Reserve System 2024)

By redirecting a large quantity of credit toward mortgage markets, the Fed encourages banks and mortgage companies to expand mortgage loans, which they can only do by lending mortgages to marginal borrowers whom they would not have lent to in the absence of the Fed's MBS purchases. These marginal borrowers are likely to be less creditworthy and thus greater risks.

Selgin (2018, 41-46) points out that excess reserves and IORB substantially reduce the volume of interbank lending. Because banks are flush with reserves, they generally no longer need to borrow from other banks to maintain the required or prudential level of reserves. As a result, the volume of credit exchanges on the federal funds market has fallen significantly. During the last quarter of 2007, financial institutions lent over \$200 billion daily on the federal funds market; by the end of 2012, they only lent around \$60 billion daily (Selgin 2018, 42). As of July 2024, the volume of lending in the federal funds market is around \$80 billion, as Figure 12 shows:

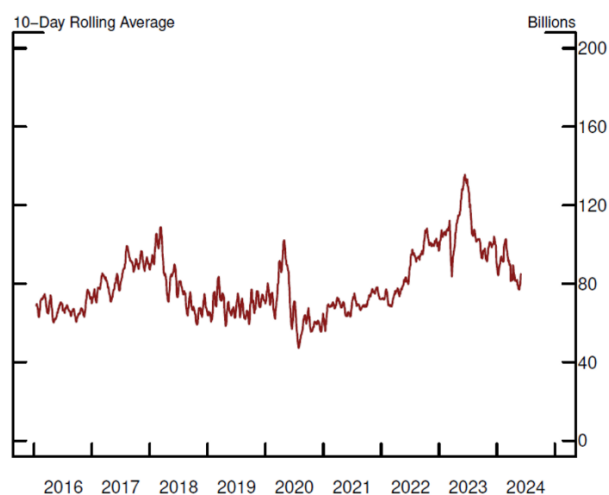


Fig. 12: Volume of federal funds lending (FEDS Notes, Board of Governors of the Federal Reserve System 2024)

Prior to the introduction of the ample reserves regime, banks and financial institutions had a stronger incentive to monitor banks on the fed funds market for soundness before lending to them to avoid incurring losses on unsecured loans. Now that banks are flush with reserves, banks are less reliant on the federal funds market for securing overnight loans to maintain sufficient reserves. Interbank monitoring is less important as a result. As Selgin (2018, 44) argues, “by shutting down interbank lending on the fed funds market, the Fed’s switch to a floor system destroyed an important promoter of interbank monitoring—and an important source of information about individual banks’ health.” This makes it more difficult for banks to evaluate other banks’ credit risk and accurately price risk premiums (44). IORB and the ample reserves system removes an important constraint on banks’ risk-taking and makes systemic risk less containable (43).

Finally, the Fed created multiple emergency lending facilities to support the flow of credit to various entities during the crises in 2008 and 2020. In response to the 2008 financial crisis, the Fed created various lending facilities for primary dealers and other borrowers and investors, as well as lending programs for specific financial institutions such as Bear Stearns (Board of Governors of the Federal Reserve System 2024). In 2020, the Fed created more lending facilities to extend credit to specific banks, businesses, municipalities, states, and other entities (Cachanosky et al. 2021, 1160). Cachanosky et al. (2021, 1166-67) point out that the use of these facilities in 2020 was limited, at least in part because the circumstances surrounding the COVID pandemic did not initiate a severe financial crisis. Although these lending facilities were temporary, the creation of emergency lending facilities in two consecutive economic crises risks creating moral hazard. If banks, financial institutions, and other investors expect that the Fed will bail them out in the next economic crisis, they will be encouraged on the margin to take greater

risks than they otherwise would. In addition to directing credit away from safer investments into riskier ones, this moral hazard could increase the intensity of economic crises by further distorting capital and labor allocation in the production structure, whether the crisis arises from an unsustainable boom or a real shock like the COVID panic.

## 6. Quantitative Easing and Credit Expansion

### 6.1: Transmission mechanisms of Quantitative Easing

As explained in Section 4, a consequence of interest payments on reserves is that the Fed's asset purchases have a smaller effect on bank lending and broader monetary aggregates. Cutsinger (2023) argues that distortionary credit expansion will not necessarily occur as a result of the Fed's asset purchases. Since 2008, however, a connection between the monetary base and broader monetary aggregates can still be observed, as Figure 13 shows:

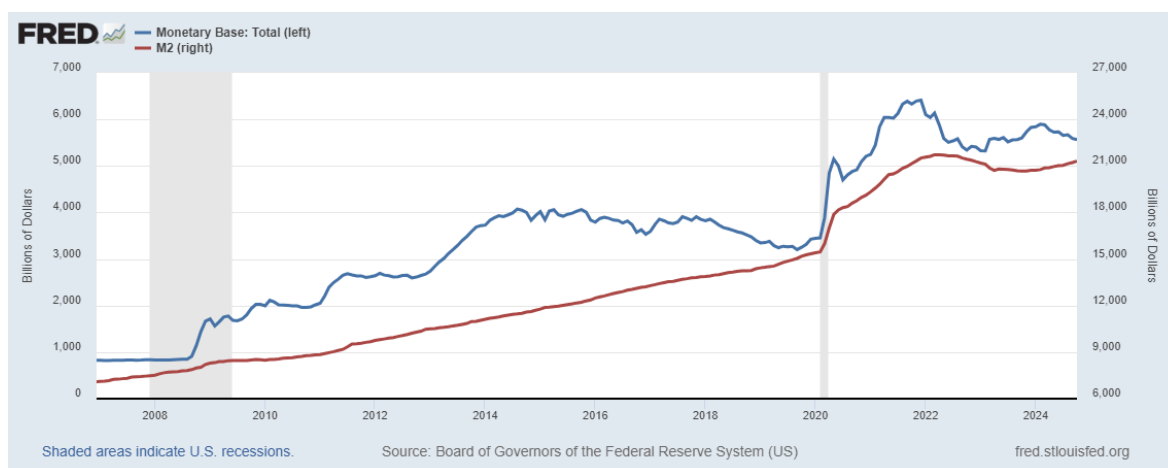


Fig. 12: Monetary Base and M2 (Board of Governors of the Federal Reserve System 2024)

It appears that increases in the monetary base from Federal Reserve asset purchases can still cause the broader money supply to increase, as is most evident in Figure 12 in late 2008, 2011, and from 2020 onwards. When the Fed pays banks a risk-free interest rate on reserves, why

would an increase in the monetary base alone, without a simultaneous decrease in the interest rate on reserves, cause credit expansion and an increase in the broad money supply?

Furthermore, does this mean that asset purchases alone could still cause business cycles?

Large-scale asset purchases alone can still induce credit expansion through several mechanisms. As Ryan and Whelan (2021) explain, interest payments on reserves did not eliminate the cost to banks of holding excess reserves; IORB only reduced the cost. IORB did not necessarily eliminate the incentive for banks to invest in higher-risk and higher-return assets once their liquidity requirements are met. When banks receive injections of reserves from Fed asset purchases, they might find it more profitable to invest in loans or other assets instead of keeping all of the new reserves at the Fed. As a result, broad monetary aggregates are still responsive to Fed asset purchases, but to a lesser extent than before 2008.

Under the Fed's post-crisis policy regime, banks are given greater discretion over the money supply. Whereas before 2008, banks would generally expand lending proportionally to the increase in reserves because of the high cost of holding reserves, banks now hold some fraction of new reserves at the Fed and decide according to expected profitability how much to increase their investments in other assets.

Kandrac and Schlusche (2020) find that increases in bank reserves from quantitative easing cause loan growth to accelerate. To explain this relationship, they cite Tobin's (1969) explanation of the monetary transmission mechanism: the Fed buys assets, forcing banks to hold a higher reserve supply. This reduces the marginal benefit for banks of holding reserves, so banks buy securities and make new loans. The prices of securities are bid up and new loans are made until the marginal benefit of assets in banks' portfolios are equalized. In accordance with this theory, Kandrac and Schlusche's econometric analysis finds that bank reserves created through

quantitative easing lead to higher loan growth and an increase in higher-risk lending activity within banks' portfolios. Furthermore, they find that changes in the quantity of reserves itself can change the supply of credit, not just the types of assets purchased. Thus, the relationship between increases in bank reserves and the broad money supply appears to be due to increases in bank credit induced by Fed asset purchases. A further question remains, however: when banks can hold reserves at the Fed for risk-free interest payments, and given that banks are flush with reserves, what explains their decision to invest in other assets in response to reserve injections? In other words, if banks already have reserves with which they could invest in other assets, but instead choose to hold them at the Fed, why do banks increase non-reserve investments in response to increased reserves from Fed asset purchases?

Rodnyansky and Darmouni (2017) describe two channels through which increased reserves could induce banks to expand credit by increasing their non-reserve investments. The first is the "net worth channel": when large-scale asset purchases increase the prices of securities, the equity of banks holding those assets rises, which allows banks to expand lending and take on more debt without weakening their solvency position or their leverage ratio. This mechanism functions because banks target constant leverage ratios, so if an exogenous increase in their equity occurs which lowers their leverage ratio, they will expand credit to restore the ratio to its prior level.

The second mechanism they identify is the "liquidity channel": the Fed's purchases of mortgage-backed securities from banks make the banks more liquid, which allows them to expand lending while maintaining their prior liquidity position. Banks' loss of liquidity from extending new credit is balanced by the liquidity gain from Fed asset purchases.

Rodnyansky and Darmouni's econometric analysis finds that the first (QE1) and third (QE3) rounds of quantitative easing significantly increased bank lending, while the second round did not have a strong effect on lending. In the second round of quantitative easing (QE2), the Fed's asset purchases were mostly composed of Treasury bonds, which make up a small portion of banks' balance sheets compared to mortgage-backed securities, and as a result QE2 had a weaker effect on lending. The net worth channel was more important during QE1, which significantly increased mortgage-backed security prices. The liquidity channel was more important during the third round of quantitative easing because QE3 had a greater impact on bank reserves without substantially increasing the prices of bank assets.

Rodnyanski and Darmouni provide two important insights in addition to the channels through which QE is effective. First, quantitative easing does not affect all financial institutions equally; the distribution of assets across financial institutions plays a role in determining how and where newly created money is injected into markets. In QE1 and QE3, banks with larger mortgage-backed security holdings were impacted more than others and acted as the channels of credit creation. Second, the type of assets that the Fed purchases is important: mortgage-backed securities made up a larger proportion of bank assets during the first rounds of QE, so Fed purchases of mortgage-backed securities caused greater credit expansion than purchases of Treasury securities.

While the impact of asset purchases on credit expansion is reduced by interest on reserves, quantitative easing alone can still induce credit expansion, but the extent to which QE will be effective depends on various factors. One factor is the available opportunities for banks to invest: for banks to invest in non-reserve assets in response to asset purchases, there must be alternative assets available for them to invest in which give sufficiently high rates of return



compared to interest on reserves. A second factor is banks' liquidity position: if QE sufficiently increases banks' liquidity positions beyond what they think is necessary, they may expand credit using new reserves instead of using them to strengthen their liquidity position. A third factor is bank equity: if QE increases bank equity by increasing the prices of their assets, banks can expand credit without weakening their solvency or leverage position. The magnitude of the Fed's asset purchases and the type of assets that the Fed purchases can impact these variables, so the effect of quantitative easing on credit expansion can vary.

### *6.2: Relationship between banks and the Fed*

The Fed's altered policy regime changes the relationship between banks and the Fed in the conduct of monetary policy. Before 2008, the Fed had more control over bank lending and the money supply. By simply changing the supply of reserves using open market operations, the Fed induced banks to expand or contract credit according to the required reserve ratio. The Fed's policy changes after 2008 allow banks more discretion in determining the quantity of loans and the amount of credit expansion, which gives banks more control over the money supply. Instead of expanding or contracting credit in response to changes in reserves according to the required reserve ratio, banks must determine according to expected profitability how to allocate new reserves, i.e., whether to hold them at the Fed for risk-free interest or to make higher-yield and higher-risk investments. As a result, banks have a greater role in credit expansion; for asset purchases to cause credit expansion, banks must "cooperate" with the Fed by increasing loans and investments.

Given banks' increased amount of discretion, the Fed's most direct tool for inducing credit expansion is now interest payments on reserves. Reducing the IORB rate makes it more costly for banks to hold reserves at the Fed and makes it relatively more profitable to make loans

and invest in other assets, inducing banks to shift from holding reserves to making loans and investing in other assets. Increasing the IORB rate makes it less costly for banks to hold reserves and makes it relatively less profitable to make loans and invest in other assets, so banks increase their reserve holdings and draw down loans and other investments.

### *6.2: Quantitative Easing, Interest on Reserves, and Austrian Business Cycle Theory*

These insights on the transmission mechanism of quantitative easing have some implications for the application of Austrian business cycle theory. As a result of interest on reserves, increases in bank reserves have a smaller impact on the quantity of credit. Instead, banks hold some of the new reserves at the Fed and decide based on expected profitability and their solvency and liquidity positions how much to invest in loans and other assets. Consequently, a given magnitude of an increase in bank reserves without a simultaneous decrease in the interest rate on reserves should have less of a distortionary effect on the time structure of production after 2008 than before 2008. To achieve the same magnitude of credit expansion as would occur before 2008, the Fed would have to purchase a substantially larger quantity of assets. As a result, the amount of distortion in the time structure of production, and thus the intensity of business cycles, per increase in bank reserves should be lower in the Fed's post-2008 policy regime than in the old regime.

This does not necessarily imply, however, that the total amount of distortion in the capital structure caused by a given amount of Fed asset purchases is lower in the new system. In addition to the remaining distortion of the time structure of production resulting from Fed asset purchases, interest on reserves gives the Fed a larger share of credit allocation, as Cutsinger (2023) explains, so the Fed allocates a large portion of credit according to bureaucratic and political incentives instead of according to consumer preferences dictated by economic

calculation. If the Fed engages in large-scale asset purchases in conjunction with lowering the interest rate on reserves, however, it can induce a larger magnitude of credit expansion, potentially causing distortion in the time structure of production comparable to the distortion that would be induced by credit expansion in the Fed's pre-2008 policy regime. Therefore, the lower the Fed sets the interest rate on reserves, and the larger the magnitude of asset purchases, the more distortion in the time structure of production results and the greater should be the intensity of business cycles. On the other hand, as the interest rate on reserves rises and as bank reserves fall as a result of reductions in the Fed's balance sheet, the less credit expansion should occur and the less intense should business cycles be.

## **7. Conclusion**

In conclusion, the changes to the Fed's policy regime after the 2008 financial crisis alter the mechanism of credit expansion, increase the potential for systemic risk and instability, and change the Fed's role in conducting monetary policy. The switch to an ample reserves regime with interest on reserve payments requires an updating of institutional assumptions to account for the new mechanisms behind the credit expansion process. While asset purchases now have a weaker impact on the quantity of bank credit, the Fed can still cause business cycles by expanding credit through the manipulation of interest rates by lowering the interest rate paid on bank reserves. Especially in conjunction with lowering the interest rate on reserves, the Fed's asset purchases also cause distortion in the time structure of production. In addition to altering the credit expansion process, the Fed's new policy tools have the potential to promote systemic risk through quantitative easing and yield curve manipulation, distorted credit allocation, moral hazard caused by the creation of emergency lending facilities, and the weakening of constraints on risk-taking by financial institutions. These changes to the Fed's monetary policy framework

should be considered in applied business cycle research and macroeconomic analysis going forward.

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