

COVID-19 and the Fed's Credit Policy

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COVID-19 and the Fed's Credit Policy

Robert L. Hetzel

Abstract: In March 2020, with the realization of the enormity of the threat posed by the COVID-19 virus, financial markets exhibited unusual volatility. According to the Federal Reserve's narrative, financial markets became dysfunctional; that narrative implies the belief that market participants could no longer assess risk appropriately. However, nothing in market volatility implies that private markets can no longer assess risk or allocate credit; nevertheless, the Fed responded with numerous programs to intervene in private credit markets. This paper examines the causes of the financial market volatility, discusses the moral hazard entailed by intervening in private credit markets, and explores whether credit market interventions could undermine the Fed's political independence. The Fed promoted its 13(3) programs as providing resources to sectors of the economy where markets have failed to do so, but the Fed's credit programs can only allocate credit, not increase real resources. It was monetary policy actions that calmed financial markets, not the announcement of future credit market interventions. Involvement in credit policy drags the Fed into the political arena; therefore, to maintain independence, the Fed should return to the sole job of monetary policy.

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A signal feature of the Federal Reserve's response to the COVID-19 recession was the creation of programs to intervene in credit markets with the intent of sustaining financial intermediation.¹ That response raises difficult questions. One must address the underlying premise of the interventions. Did the ability of private credit markets to assess risk fail so that the Fed had to maintain the flow of credit by transferring risk from private balance sheets to the public's (taxpayers') balance sheet (the combined balance sheet of the Fed and the Treasury)? If, upon reflection, one decides that the assessment of risk would better have been left to the marketplace, how should the Fed have responded to maintain the stability of financial markets?

¹ With credit policy, the Fed attempts to influence financial intermediation, that is, the transfer of resources from households (savers) to firms or government (borrowers). The essential characteristic of credit policy is the way in which the Fed influences how the resources made available by households get allocated among competing uses. Through its influence on the term structure of interest rates, monetary policy influences the intertemporal distribution of the aggregate demand for resources in a way that aids in maintaining that demand equal to potential output and that maintains price stability.

Just as troublesome are the issues of the role of an independent central bank in a constitutional democracy. Credit policy supplants the market allocation of private savings. Through its redistribution of the resources allocated to investors, it more closely resembles fiscal policy than monetary policy. The opaqueness of the resulting transfers limits the transparency and thus the accountability desirable for a central bank. Asking for its credit programs to be funded through congressionally authorized debt, as was done with the 1932 Reconstruction Finance Corporation (Todd 1996) or with the 2008 Troubled Asset Relief Program (TARP), would have increased transparency. Moreover, in the longer run, the moral hazard that credit policies create encourages excessive risk taking, especially in the shadow banking system (financial institutions with the characteristics of banks but not regulated as banks).

Applied to the credit market interventions of a central bank, the fundamental idea expressed here is that the real quantity of savings of households is determined independently of the central bank. The central bank can supersede the working of financial markets by allocating household savings among competing uses, but it cannot increase the aggregate amount of available savings.

Section 1 summarizes the Fed's narrative of the events in financial markets in March 2020. That is, financial markets became dysfunctional presumably because of an inability of market participants to assess risk. Section 2 shows how instability created by the shadow banking system created much of the volatility in financial markets in March 2020. It explains the existence of the prime money market funds as a manifestation of moral hazard. Nothing in market volatility implied that private markets could no longer assess risk and allocate credit.

Section 3 makes the argument that the Fed's monetary policy actions—namely its massive open market operations, not the announcement of future interventions into credit

markets—calmed financial markets. It also asks whether the Fed’s credit programs worsened market function by exacerbating a two-tier credit market favoring relatively riskless assets over relatively risky ones. Section 4 illustrates how the Fed’s credit programs allocate credit without increasing the aggregate supply of credit. It also explains how paying interest on reserves (IOR) expands the ability of the Fed to become a financial intermediary like the housing government sponsored enterprises (GSEs).

Section 5 illustrates the standard response of a central bank to a financial panic of freely creating reserves by comparing that aspect of the Fed’s response in March 2020 with its response to the default of Penn Central Transportation Company in May 1970. When the commercial paper market ceased functioning in May 1970, the Fed made certain that the banks could lend freely. This alternative would still assure markets of the uninterrupted continuation of financial intermediation while avoiding Fed involvement in the allocation of credit and attendant risks to its independence. Section 6 questions whether the Fed can retain its independence given a heavy involvement in credit markets. Appendices document the past reluctance of the Fed to be drawn into credit policy and explain graphically how IOR allows the Fed to become a financial intermediary.

1. Chairman Powell Defines the Narrative

The Fed’s narrative for its unprecedented intervention into private credit markets is that financial intermediation to households and businesses ceased in mid-March, and the Fed’s programs restored the flow of credit from savers to borrowers. Chairman Powell (2020b) stated,

Some essential financial markets had begun to sink into dysfunction, and many channels that households, businesses, and state and local governments rely on for credit had simply stopped working. We acted forcefully to get our markets working again. . . . When . . . private markets and institutions are once again able to perform their vital functions of

channeling credit and supporting economic growth, we will put these emergency tools away.

Later, Powell (Blinder and Powell 2020) defended the need for the credit programs with similar assertions. He noted that when markets realized that the virus would not be contained in China, they became “volatile.” He further claimed that “investors fled from any kind of risk and really markets stopped functioning” and that “companies and households couldn’t borrow, couldn’t roll over debt. Markets kind of closed. . . . They stopped working.”

When financial markets actually did continue to function, Chairman Powell claimed that it was because of an announcement effect that the programs would become operational in the future. Powell stated, “Even before we began lending, [markets] started to work again. There’s a confidence factor” (Blinder and Powell 2020).

The Federal Open Market Committee (FOMC) meeting minutes are interesting because they summarize FOMC views just at the start of announcements of the various Board credit programs:

Corporate bond issuance came to a near standstill around late February in the midst of elevated volatility following the escalation of concerns about the coronavirus outbreak. Later in the intermeeting period [January 29 to March 15, 2020], investment-grade bond issuance resumed intermittently, but speculative-grade issuance and leveraged loan issuance virtually stopped. . . . Credit quality indicators . . . deteriorated following the escalation of the coronavirus outbreak, particularly for the speculative-grade and energy segments of the market. (Board 2020b, 5)

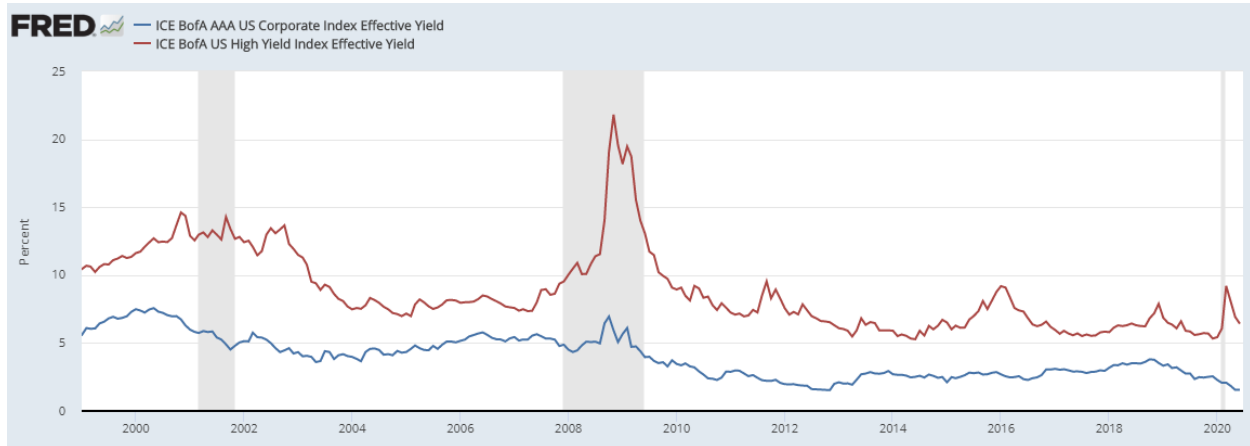
Lorie Logan, executive vice president at the New York Fed, stated her view: “In early to mid-March, amid extreme volatility across the financial system, the functioning of Treasury and agency MBS markets became severely impaired. Given the importance of these markets, continued dysfunction would have led to an even deeper and broader seizing up of credit markets and ultimately worsened the financial hardships that many Americans have been experiencing as a result of the pandemic” (Logan 2020). Logan expressed the traditional New York Fed view that

equates market volatility (formerly denoted as “disorderly markets”) with market failure requiring Fed intervention. It is right that the New York Desk has a responsibility to maintain the short-term funding of brokers and dealers, which supports the government securities market. However, massive open-market purchases by the Desk rectified that “dysfunction.” While it may be correct that “continued dysfunction would have led to an even deeper and broader seizing up of credit markets,” nothing in her account of markets indicated the necessity of the Board’s broad array of 13(3) programs.

The Powell and FOMC narrative raises many questions. What evidence is there of a breakdown in the ability of markets to perform the function of financial intermediation? Was Clarida (2020, 4) right that the Fed’s credit-market programs were required to “support the flow of credit to households and businesses” by “supporting lending throughout the economy”? It is natural that the issuance of long-term securities would cease while investors evaluated the risk that the COVID-19 virus would shut down the world economy. The question is whether investors looked beyond the COVID-19 crisis to the return of a normal world and therefore continued to be able to price risk and allocate resources. Alternatively, did markets cease to function because investors feared an end-of-the-world, apocalyptic outcome?

Market trading did continue, and markets did continue to price risk. Figure 1 shows the yields on AAA corporate bonds and high-yield (junk) bonds. In March 2020, markets priced risk with a long-term perspective that the economy would return to normal. Yields on junk bonds did rise but were not high relative to the past two recessions.

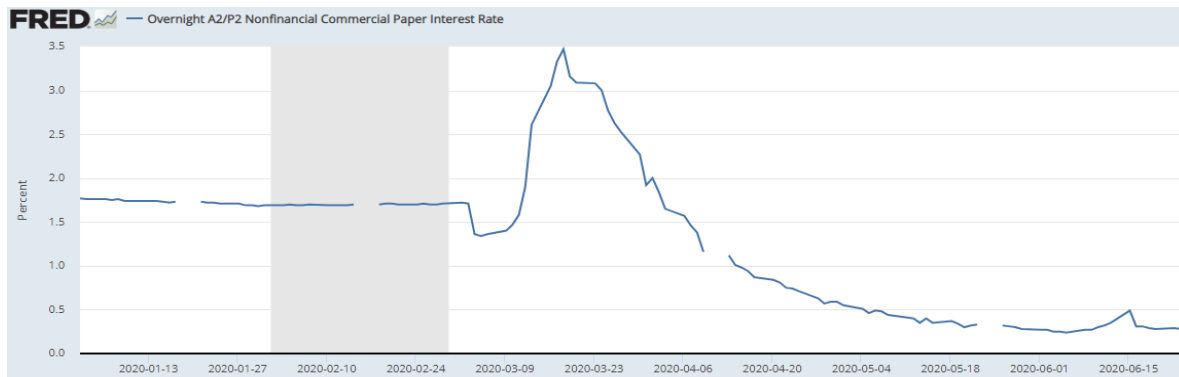
Figure 1. Investment Grade and Junk Bond Yields



Note: ICE BoA AAA US Corporate Index Effective Yield (investment grade) and ICE BoA US High Yield Index Effective Yield (junk bond).

Source: Ice Data Indices, LLC, ICE BofA AAA US Corporate Index Effective Yield [BAMLC0A1CAAAEY] and Ice Data Indices, LLC, ICE BofA US High Yield Index Effective Yield [BAMLH0A0HYM2EY], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org>.

Figure 2. Yield on Overnight A2/P2 Nonfinancial Commercial Paper



Source: Board of Governors of the Federal Reserve System, “Overnight A2/P2 Nonfinancial Commercial Paper Interest Rate,” retrieved from FRED, Federal Reserve Bank of St. Louis, accessed July 15, 2020, <https://fred.stlouisfed.org/series/RIFSPNA2P2D01NB>.

Figure 2 shows the yield on high-grade commercial paper. It shows that the period of unusual market volatility was short-lived. The yield on high grade rose above 1.5 percent on March 11 and then declined below 1.5 percent after April 6. The Fed’s Board of Governors

created the 13(3) programs well before its members could possibly have had any evidence that financial intermediation had broken down. The prior quotations indicate that policymakers based that conclusion on market “volatility.” One must then ask whether volatility in response to increased risk provides evidence of a breakdown in financial intermediation.

2. What Destabilized Financial Markets in March 2020?

The increase in risk measures in mid-March 2020 reflected the sudden apparition of the COVID-19 virus and its devastating impact on the real economy. Starting abruptly on March 13, “total spending by all consumers” declined by more than 30 percent before steadying in early April.² At the same time, the tumult in credit markets also reflected regulatory features that reduced the ability of the system to respond to shocks. The rise of the shadow banking system as embodied in the prime money market funds, municipal bond market funds, and real estate investment trusts (REITs) made credit markets unstable. In addition, the Basel III Accords ironically made financial markets less resilient through the liquidity coverage ratio (LCR) and especially the supplementary leverage ratio (SLR).³

The Fed’s balance sheet offers evidence on the causes of market instability in March 2020. Table 1 shows the balance sheet on selected dates. The most important entry increasing the size of the balance sheet was the Fed’s security holdings, which increased by almost two trillion

² This was measured using credit card data. For these and other economic data on a variety of indicators relating to the COVID-19 pandemic, see Opportunity Insights, “Economic Tracker,” www.tracktherecovery.org.

³ The LCR for large systemically important financial institutions emerged as a reform after the fall 2008 financial crisis. Some individual banks and investment houses lacked sufficient liquid assets to survive a funding shortfall. Under Basel III, banks with more than \$250 billion in assets had to hold enough high-quality liquid assets to substitute for a lack of short-term funding for 30 days. Level 1 high-quality liquid assets, whose value is not discounted, include deposits with the Fed (reserves). The SLR, which requires a minimum ratio of capital to total assets, was intended to provide an additional safeguard to prevent banks from manipulating ratios based on risk weightings for assets.

dollars from the March 18 to the May 20 statement week. The Fed’s special credit programs, few of which had yet begun operation, contributed little.⁴ Striking is the increase in the swap lines, which grew by \$401 billion. That increase signaled a run on short-term dollar funding for foreign banks and a corresponding fragility in the financial system. What is the source of that fragility?

Table 1. Federal Reserve Balance Sheet, 2020 (in billions of dollars)

	18 March	25 March	1 April	8 April	22 April	20 May
Securities	3,929	4,187	4,605	4,973	5,452	5,873
Repo outstanding	389	388	302	228	172	162
Discount window	7	40	50	44	35	21
Swap lines	45	169	328	385	406	446
Primary Dealer Credit Facility		14	34	33	31	9
Money Market Mutual Fund Liquidity Facility		7	47	54	50	38
Commercial Paper Funding Facility					3	4
Paycheck Protection Program Liquidity Facility					3	43

Source: Board of Governors of the Federal Reserve System, “Factors Affecting Reserve Balances - H.4.1,” May 21, 2020.

Why Were the Swap Lines Needed?

The first clue to answering this question is to note that the swap lines have ballooned three times, starting with the fall 2008 financial crisis. They provided dollars to replace the suddenly unavailable dollars formerly obtained from the prime money funds, which buy the CDs and commercial paper of foreign banks. In the first episode, drawings on swap lines reached a peak of \$586 billion on December 4, 2008 (GAO 2011, figure 25, 201). In addition, the Fed’s Term

⁴ As of May 6, 2020, the total of lending by the CPFF, the PDCF, the PPPLF, and the MMLF amounted to only \$91 billion (Board 2020d). The MLF, MSLF, PMCCF, SMCCF, and TALF were not yet operational.

Auction Facility (TAF) offered dollars to foreign banks directly through auctions. TAF borrowing peaked at \$493 billion on March 4, 2009 (GAO 2011). According to a GAO report, 41.7 percent of the borrowing originated in foreign banks(2011, figure 30, 231). Using that percentage, of the \$493 billion of peak TAF borrowing, about \$206 billion supplied dollars to foreign banks.

In the second episode, as reported by Stein (2012), drawings on the swap lines went from zero at the end of September 2011 to \$108 billion in the statement week of February 22, 2012.⁵ In the third episode, March 2020, fearing outflows, the prime money funds reduced buying of foreign bank debt except at short maturities. The foreign banks then replaced the funds obtained from the prime money funds with dollars made available by their own central banks, which drew on their swap lines. In all three episodes, the sudden withdrawal of dollar funding by the prime money market funds forced foreign banks to look to their central banks to provide them with the lost dollar funding (Eren et al. 2020a, 2020b).

Moral Hazard and the Shadow Banking System

The financial system is fragile because in a financial crisis, when there is a flight to safety into the deposits of large banks, there is also a flight away from the suddenly illiquid prime money funds. The money funds are a creature of the moral hazard created by the Fed. Moral hazard results from the Fed’s unwillingness to allow the failure of any financial institution, including the

⁵ Stein (2012, 3, 6) wrote, “In the second half of 2011, when the credit quality of a number of large euro-area banks became a concern . . . US prime money market funds sharply reduced their lending to those banks. In a span of four months, the exposure of money funds to euro-area banks fell by half, from about \$400 billion in May to about \$200 billion in September.” The central role played by money market funds in the 2011 episode is a reminder of the fragility of these funds themselves—and of the risk created by their combination of risky asset holdings, stable-value demandable liabilities, and zero-capital buffers. The events following the Lehman Brothers bankruptcy in 2008 provide even starker evidence of the risks that money market funds pose for the broader financial system.

money funds, when that failure would impose losses on debt holders.⁶ The common feature of money funds is the use of short-term debt to finance a portfolio of assets that become illiquid in periods of financial stress. Often the assets are hard to value and have long-term maturities. Money funds remove financial intermediation from the books of banks by selling themselves as banks. They offer transactions services and shares redeemable upon demand. Although not regulated as banks, investors know that the Fed will bail them out in periods of stress. While the common term is TBTF (too big to fail), a better term is TITF (too indebted to fail).

In reaction to the use of the financial safety net to protect sophisticated investors in the turmoil of fall 2008, Congress imposed restrictions on the Treasury’s Exchange Stabilization Fund (ESF) to prevent its use to backstop money funds—restrictions removed in the 2020 CARES Act. The *Wall Street Journal* quoted Aaron Klein, a former Obama administration Treasury official, who pointed out that “there was widespread agreement following the [2008] financial crisis that money-market funds would bear losses in the future, and post-crisis regulatory changes were meant to impress upon investors the risks they were taking” (Davidson and Michaels 2020). Klein added that “the Exchange Stabilization Fund was created to stabilize the value of the dollar, not to be used for domestic purposes.”

With the COVID-19 crisis, the institutional prime money funds again found themselves in a situation like September 2008. The commercial paper market was normal on March 12 with 30-day A2/P2 nonfinancial 30-day paper selling at 1.9 percent (with 7-day and 1-day at basically the same rate). The rate then rose each day through March 18 when it reached 3.47 percent (7-

⁶ “Mr. Clarida (vice chair of the Board of Governors) also dismissed a question about whether the central bank had created a ‘moral hazard’ that encouraged risky investor behavior when the Fed moved quickly to backstop swaths of credit markets. ‘This is entirely an exogenous event,’ said Mr. Clarida, noting how the virus—not private-sector behavior—had forced widespread business closures and revenue losses” (Timiraos 2020). This argument is like claiming that, if one builds a house in a flood plain due to government insurance, there is no moral hazard because floods are exogenous events.

day and 1-day at 3.59 percent and 3.07 percent, respectively). After March 12, the institutional money market funds experienced outflows. The shareholders in those funds are institutional investors (e.g., companies and pension funds). Fearing cash-flow shortfalls themselves, it was natural to withdraw funds and place them in banks or government money funds. The prime funds then ceased to buy commercial paper. Foreign banks, which had obtained their dollar funding from the money funds, obtained that funding from their own central banks, which drew on the dollars made available by swap lines. US corporations that would have issued commercial paper instead drew on their bank lines of credit.

The money funds could have imposed a “gate” to limit withdrawals to the amount of their maturing paper. In 2014, the SEC had required the prime money market funds to adopt a floating share price and gave them the ability to impose fees on redemptions and even freeze redemptions. As reported by the *Wall Street Journal*, the intention was to make “it more apparent to investors that they could suffer losses” (Kiernan, Ackerman, and Michaels 2020). However, that would have made the funds unattractive in the future to their investors, who want the liquidity offered by bank deposits but with higher returns than are available on bank deposits.

To again bail out the prime money market funds, the Fed announced the Commercial Paper Funding Facility (CPFF) and the Money Market Mutual Fund Liquidity Facility (MMLF). In a *Wall Street Journal* article, Jonah Crane, a Treasury Department official in the Obama administration, said, “It is déjà vu. At this point, investors in money funds can just assume that the Fed is going to backstop them” (Kiernan, Ackerman, and Michaels 2020). Sheila Bair, former head of the FDIC, said, “It’s just frustrating that we never really fixed this stuff. . . . The

industry lobbyists came in and persuaded regulators to do half measures. And we're back in the soup again.”⁷

REITs illustrate the same moral hazard. Thomas Barrack, executive chairman of Colony Capital, explained that after 2008, increased capital requirements for mortgages held by banks caused the banks, which originate the mortgages, to place them in REITs, which turn around and fund them with RPs (repos or overnight repurchase agreements) with the banks. “Since 2013, bank financing through repurchase agreements has surged—the top six publicly traded mortgage REITs alone reported over \$42.5 billion in total loan originations and \$20 billion in repurchase borrowings in 2019” (Barrack 2020, 4–5). These mortgage REITs were in trouble in March 2020 because they were required to mark to market the mortgage-backed securities (MBS) used in their RPs and post additional collateral as the value of the MBS declined. Just like their structured investment vehicle (SIV) predecessors, the basic problem was funding long-term, illiquid assets with short-term debt. In March 2020, the Fed bailed out the mortgage REITs by purchasing enormous quantities of MBS.⁸ From the statement week ending February 26 to the statement week ending May 27, the Fed increased its holdings of MBS by \$476 billion.

The question arises of why banks could not recycle the funds they gained from the flight from the money funds and the REITs to buy debt sold by these entities. The answer lies in the perverse operation of the LCR and SLR regulations, which were designed for a funding shortfall by an individual bank. Broker-dealers, the trading arms of the large bank holding companies, lacked the balance sheet capacity to add the debt instruments sold by the money funds and the REITs.

⁷ The obvious reform is to regulate the money funds as banks as suggested by the Working Group on Financial Reform (2009). By offering transaction services, withdrawal on demand, and a stable net asset value, they offer the services of banks. However, they do so as the modern equivalent of “wildcat” banks.

⁸ Under pressure from Congress, the Fed bought some FNMA and Freddie Mac debt in the 1970s. The Fed ceased the purchases in the 1980s but then revived them in November 2008 at the instigation of FOMC Chairman Bernanke.

In addition, banks had entered interest-rate swap contracts that offered insurance to companies against an increase in interest rates on their sales of future debt. When market rates fell in March, those companies had to post additional collateral, which added to bank assets. Banks had also lent to REITs to increase the leverage of the latter. The decline in the value of MBS forced the REITs to post additional collateral, which again added to bank assets.

Finally, hedge funds increased market volatility by suddenly adding to the supply of Treasury securities. Using as a model LTCM, which became insolvent in September 1998, hedge funds arbitrage the small yield difference between on-the-run Treasuries (newly issued) and off-the-run Treasuries (secondary market). Using repo financing, they buy the latter and enter a futures contract to deliver the former. Although the yield differences are small, leverage by a factor of 100 normally allows a profitable carry trade. However, in March 2020, the futures market became illiquid. The hedge funds became subject to margin calls and had to sell their Treasuries. Foreign central banks also sold Treasuries to acquire dollars to support their currencies. At a time of a flight to safety, the yields on coupon Treasuries rose instead of falling (Schrimpf et al. 2020).

With the SLR binding, broker-dealers lacked the balance sheet capacity to absorb the supply of Treasuries coming on the market (Duffie 2020).⁹ Because of the stress caused by balance sheet constraints, bid-ask spreads increased by a factor of 10. The Fed relieved market stress with its enormous purchases of Treasury securities. Although stressed, short-term funding

⁹ Writing for the *Wall Street Journal*, Justin Baer (2020) said, “Senior executives . . . wouldn’t trade. . . . There was no room to buy bonds and other assets and still remain in compliance with tougher guidelines imposed by regulators after the previous financial crisis. In other words, capital rules intended to make the financial system safer were . . . draining liquidity from the markets. One senior bank executive leveled . . . ‘We can’t bid on anything that adds to the balance sheet right now.’”

markets continued to function.¹⁰ The trading volumes of broker-dealers increased (Duffie 2020). However, a shadow banking system created by the moral hazard of TITF and perverse regulatory constraints increased the stresses in the money market in mid-March. The resulting volatility did not indicate that markets had lost the ability to assess risk and allocate resources.

In the long run, the Fed’s credit programs also contribute to moral hazard. For example, with interest rates low after 2008, corporations had an incentive to take on debt and engage in share buybacks. Especially for highly leveraged firms, an increase in risk premia increases their debt service costs. The Corporate Credit Programs (CCP) effectively puts a floor under bond prices and encourages firms to “lever up” in times of low interest rates—a “Powell put.”

Bill Dudley (2020), former president of the New York Fed, highlighted how the Fed has exacerbated moral hazard:

The Fed’s enormous purchases of Treasuries . . . [were] a backdoor bailout of highly leveraged hedge funds. . . . [R]eal-estate investment trusts . . . were forced sellers as they struggled to meet margin calls. Again, the Fed purchases [of MBS] helped limit their losses. . . . Heavily indebted corporations also got a helping hand.

3. What Calmed Financial Markets in March 2020?

The fundamental issue in analyzing the Fed’s response to financial market volatility in March 2020 is whether that volatility arose from a scramble for liquidity or from a more fundamental breakdown in the ability of markets to evaluate risk and thus sustain the flow of credit from households to firms and state and local governments. Assuming the former, the only required

¹⁰ One measure of stress in the short-term funding markets is the amount of overnight RPs made by the New York Desk with broker-dealers. Over the period March 3 to March 17, overnight RPs averaged \$68 billion. Fall 2019 was also a period of stress due to a maldistribution of reserves. From October 16 to December 5, overnight RPs averaged \$57 billion. Although somewhat less than in March 2020, the RPs persisted over a longer period (data are from the St. Louis Fed).

response was the traditional one of supplying liquidity through open market purchases.

Assuming the latter, the Board of Governors appropriately introduced an array of programs to intervene in individual credit markets.¹¹

The Fed had not planned for how monetary policy would respond to a pandemic. That lack of planning contrasted with its operational planning. During the period when the author was an economist at the Federal Reserve Bank of Richmond, the Fed ran exercises in which randomly selected individuals would be sidelined and the remainder of employees would work from home. The Fed could then determine how well prepared it was for a pandemic.¹² When the FOMC did respond to the COVID-19 pandemic, markets interpreted the response as a message that the situation was much worse than perceived. A key role of the central bank is to assure investors of the stability of the financial system. However, by startling markets, the Fed precipitated a panic.¹³

¹¹ John Mousseau (2020), CEO of Cumberland Advisors and manager of their bond portfolio, argued for the former: “That was not a . . . selloff [of] people thinking ‘Oh my God, credit is going to hell, [an] erosion of [creditworthiness of] state and local governments or corporations.’ What this was was a selloff of people wanting cash as the stock market was imploding.”

¹² Lack of planning for the response of monetary policy to a pandemic is consistent with the Fed practice of treating monetary policy as something made discretionarily, period by period. With the language of discretion, the Fed can control the historical narrative. That is, each period, it responds optimally to shocks arising externally. In contrast, thinking about policy as a rule requires examination of how the rule produces a mutual interaction between the behavior of the Fed and the behavior of the economy. One can then learn from the past about which rules stabilized or destabilized the economy.

¹³ The *Wall Street Journal* reported, “The Federal Reserve set the stage for the downturn on Sunday, March 15. Most investors were expecting the central bank to announce its latest response to the crisis the following Wednesday [the date of the FOMC meeting]. Instead, it announced at 5 p.m. that evening that it was slashing interest rates and planning to buy \$700 billion in bonds to help unclog the markets. Rather than take comfort in the Fed’s actions, many companies, governments, bankers and investors viewed the decision as reason to prepare for the worst possible outcome from the coronavirus pandemic. A downdraft in bonds was now a rout. The Dow Jones Industrial Average plunged nearly 13% that day [Monday, March 16], the second-biggest one-day fall in history. . . . ‘On that first day, the Fed got completely run over by the market,’ said Dan Ivascyn, who manages one of the world’s biggest bond funds” (Baer 2020).

Increased Risk Spreads Do Not Indicate That Financial Intermediation Has Broken Down

Table 2 presents daily measures of risk in financial markets from February 20, 2020, through April 8, 2020. The February 20 yield spread of 2.05 serves as a benchmark for a normal level of risk. In March 2020, risk spreads increased when default risk increased. For example, on March 11, when the World Health Organization (WHO) declared COVID-19 a pandemic and countries imposed international travel restrictions, the BAA 10-year spread increased and the S&P 500 declined from the day before to the day after (table 2). The Fed associated the increase in risk spreads with market dysfunction. In March 2020, LH Meyer Inc. published a blog post titled “The Fed Is Here to Close Spreads” (2020b). Widening credit spreads, however, did not mean that market specialists could no longer evaluate risk and allocate credit.

When it became obvious that financial markets were, in fact, continuing to function, Chairman Powell attributed their functioning to the announcement of the Fed’s credit programs.¹⁴ However, market risk spreads increased after the Board of Governors of the Fed started to announce its credit programs. On March 17, the Board announced the establishment of the Primary Dealer Credit Facility (PDCF), which lends to primary dealers collateralized by a wide variety of collateral. It also announced the CPFF, which purchases commercial paper. From the day before the announcement to the day after, the A2/P2 paper rate increased from 3.05 to 3.47. On March 18, it announced the MMLF, which makes loans to banks secured by commercial paper. On March 19, it announced the swap lines. On March 20, the Board announced that the MMLF would make loans to banks secured by collateral from states and

¹⁴ LH Meyer Inc. (2020g) said, “Powell noted the powerful easing effect of the mere announcement of such facilities. He pointed to the easing in market conditions that has occurred even though the facilities are not even operational yet.”

municipalities. Appendix A provides a list of further programs. Only after March 23, however, did risk spreads begin to decline.

Table 2. Market Stress

Date (2020)	BAA-10Y	S&P 500	Oil Brent
20 Feb.	2.05	3373	59.57
21 Feb.	2.09	3338	58.60
24 Feb.	2.13	3226	56.71
25 Feb.	2.19	3128	55.29
26 Feb.	2.20	3116	54.96
27 Feb.	2.27	2979	52.19
28 Feb.	2.38	2954	51.31
2 March	2.44	3090	52.52
3 March	2.48	3003	52.24
4 March	2.47	3130	51.86
5 March	2.52	3024	51.29
6 March	2.55	2972	45.60
9 March	2.93	2747	35.33
10 March	2.93	2882	35.57
11 March	2.99	2741	34.45
12 March	3.20	2481	31.02
13 March	3.30	2711	32.25
16 March	3.38	2386	27.98
17 March	3.49	2529	27.97
18 March	3.81	2398	22.79
19 March	4.01	2409	23.98
20 March	4.23	2305	25.55
23 March (P)	4.31	2237	23.75
24 March	4.19	2447	24.50
25 March	4.13	2476	25.62
26 March	4.04	2630	23.55
27 March	3.98	2541	22.39
30 March	3.89	2627	19.19
31 March	3.93	2585	14.85
1 April	3.97	2471	14.97
2 April	3.92	2527	20.24
3 April	3.92	2489	24.33
6 April	3.91	2664	22.58
7 April	3.79	2659	22.10
8 April	3.75	2750	25.22

Note: The first column is the difference between the BAA corporate bond rate and the 10-year treasury constant maturity yield; the second is the S&P 500 index; and the third is the Brent-Europe price of crude oil used as a measure of the state of the world economy. The “P” marks the peak value of the BAA-10Y spread.

Source: Federal Reserve Economic Data, St. Louis Fed, “Moody’s Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury Constant Maturity [BAA10Y]”; “S&P Dow Jones Indices LLC, S&P 500 [SP500]”; “U.S. Energy Information Administration, Crude Oil Prices: Brent - Europe [DCOILBRETEU].”

When it became obvious not only that markets were functioning but also that they were pricing risk, the Fed argued that it could better assess risk than the market. LH Meyer Inc.

(2020h) published a blog about the Fed's program to purchase corporate bonds, saying,

The Fed will buy [corporate] bonds/loans directly from the issuer only if the issuer certified it is "unable" to secure "adequate credit accommodations" from banks and the capital markets. "Lack of adequate credit" does not mean that no credit is available. The standard is not as high as a total credit freeze, but merely pricing or terms "inconsistent with a normal, well-functioning market."

What Effect Did the Fed's Credit Programs Have?

The problem for evaluating the Fed's credit market interventions is that news arrived as a mixture of congressional fiscal policy and of Fed monetary policy, not just Fed credit policy. On Monday, March 23, 2020, the Board announced additional facilities for credit market interventions: the Primary Market Corporate Credit Facility (PMCCF), the Secondary Market Corporate Credit Facility (SMCCF), and the Term Asset-Backed Securities Loan Facility (TALF). At the same time, it announced expansionary monetary policy measures. "The Fed removed the guidance for asset purchases to make it open ended (from 'at least' \$500bn UST and 'at least' \$200bn MBS [mortgage backed securities]). . . . Instead, NY Fed announced it will buy \$75bn UST and \$50bn MBS daily this week" (LH Meyer 2020d). "If this rate is sustained 'over coming months,' the expansion of the balance sheet from these assets alone would sum to \$4.5tn" (LH Meyer 2020c). (In late March, the Fed was purchasing \$75 billion in Treasuries daily.)

Speculation about the CARES Act, which was passed on Friday, March 27, filled the airwaves. AP News (2020) reported that after talks lasting until midnight Monday, March 23, Treasury Secretary Mnuchin announced the likelihood of a deal tomorrow (Tuesday). A draft of the CARES Act circulated Thursday, March 25. It contained significant provisions for fiscal policy

and the Fed's credit policy.¹⁵ By including \$454 billion for the ESF, it would allow the Fed's 13(3) special purpose vehicles (SPVs) to extend loans to beneficiaries up to 10 times their allocated ESF amount. The CARES legislation buoyed confidence by showing that despite a bitter partisan divide, Congress could come together to enact legislation dealing with the crisis.

There is then no way to isolate the announcement effect of the Fed's credit programs from the Fed's monetary policy actions and from the fiscal policies in the CARES Act. Moreover, a Fed program to buy, say, corporate or municipal securities should buoy the prices of those securities. Investors benefit from a "Powell put" on the price of the asset. However, that fact does not imply that the enhanced price better measures the riskiness of the asset.

It is striking how little market risk measured by the BAA-10-year spread declined in response to the Fed's credit programs. The spread was 2.05 on February 20 and remained at an elevated 3.91 on April 6. The modest decline in perceived market risk, despite all the combined firepower of Fed credit and monetary policy and congressional fiscal policy, suggests that the increase in market risk spreads reflected not market dysfunction but rather real risk created by the unknown impact of the COVID-19 pandemic.

The decline immediately following April 6 followed good news about the spread of the novel coronavirus. Amherst Pierpont's Stephen Stanley (2020) said, "Finally, there is unambiguously good news to report. Yesterday might turn out to be a turning point globally. . . . [T]he US got some surprisingly good news yesterday. The number of new cases and deaths

¹⁵ On March 27, the president signed the Coronavirus Aid, Relief, and Economic Security Act (CARES Act). It provided for \$290 billion in direct payments to eligible taxpayers; \$260 billion in expanded unemployment insurance; \$150 billion for state and local governments; \$510 billion in expanded lending for businesses and local governments; \$377 billion in new loans and grants for small businesses; and \$127 billion for hospitals for ventilators and other equipment (Amadeo 2020).

yesterday both fell, and by a sizable amount.” In the end, what likely calmed markets the most was news that the COVID-19 disease, while devastating, could be contained.

Buoyed by optimism that the COVID-19 crisis could be contained, financial intermediation remained robust. For example, despite the minimal use of the programs to support asset-backed commercial paper, as shown in table 1 for the MMLF and the CPFF programs, the structured finance market was healthy in April.¹⁶

Similarly, despite the non-operational status of the two programs designed to support corporate borrowing (the Primary and Secondary Market Corporate Credit Facilities, PMCCF and SMCCP), the corporate bond market remained healthy. “Companies last month sold more than \$227 billion of investment-grade corporate bonds in the US market, breaking the previous record of \$194 billion set a month earlier, according to Dealogic” (Goldfarb 2020). Newspaper accounts indicated that markets continued to evaluate credit worthiness from a long-term perspective.¹⁷

Financial markets retained their long-run perspective in the evaluation of risk because of a return of confidence that the COVID-19 crisis would pass. As shown in table 2, from March 23 through April 8, the S&P 500 rose from 2237 to 2750. That rise likely reflected the general return of confidence rather than the promise of the Fed’s 13(3) programs becoming operational in the future.

¹⁶ S&P Global reported that “the credit quality of US ABCP issuance remains stable. From the total outstanding 48 ABCP programs, 85% are fully supported by liquidity, while the remaining 15% are well-diversified partially supported assets. . . . Banks and non-bank institutions providing liquidity to US ABCP programs are diversified and highly rated entities. . . . [T]he credit quality of the [structured finance] issuances remains stable” (Kalra 2020).

¹⁷ The *Wall Street Journal* reported that “the aviation industry is selling debt at a record pace, reflecting investors’ continuing willingness to buy debt from companies hard-hit by the pandemic—at the right price. ‘The investor base is not fixated on the status quo, it’s focused on where these companies will be when the virus is managed,’ said Mr. Foley, whose team helped lead the debt sales on behalf of Boeing and Delta. . . . ‘[T]he market is saying this is inherently a good business and willing to price that risk,’ said Mr. Foley” (Pellejero 2020).

Financial intermediation did not break down in March 2020. Although the Fed's actions were critical, it seems likely that it was the monetary policy actions that made the difference. For the three statement weeks ending March 4, 2020, the New York Desk's purchases of securities added an average of \$27.5 billion a week. For the three statement weeks ending April 8, security purchases added on average \$347.9 billion a week. As explained in the previous section, purchases of Treasuries by the Fed helped to relieve market stress by absorbing much of the supply coming on the market from hedge funds. Also, the addition of reserves added to banks' high-quality liquid assets (HQLAs) and thereby relaxed the balance sheet constraint on their broker-dealers. And, most importantly, the reserves provision allowed the banking system to expand its deposits to meet the increased liquidity demanded by businesses.

In mid-March, the immediate concern was continued short-term funding in the money markets. The Fed dealt with that concern through its traditional tools. As shown in table 1, these tools (securities holdings, repos, discount window borrowing, and swap lines) added almost one trillion dollars (\$978 billion) to bank reserves between the statement weeks ending March 18 and April 1. Nothing in this response required involvement in financial intermediation, heretofore conducted by banks and capital markets. The fact that the maximum increase in discount window lending was only \$43 billion shows that the Fed's reserves provision met the liquidity demands of financial markets (table 1). In his public pronouncements, Chairman Powell could have maintained public confidence in the functioning of financial markets by stressing these dramatic actions.

Chairman Powell could have said that he was monitoring whether private markets had broken down and could no longer evaluate credit risk and allocate credit to productive uses. He could have created the 13(3) programs, then waited two weeks (or some such time period) to make a determination that financial intermediation had broken down; if such a determination

could be made, he could have implemented the programs thereafter. Instead, he simply assumed that increased credit spreads indicated a breakdown in financial intermediation.

The Fed Reinvents Itself

In a three-week period, between March 4 and March 23, the threat of the COVID-19 disease went from being perceived as a nuisance that might disrupt global supply chains to being understood as a possible killer of millions and a destroyer of the economy. That three-week period is dated here as from March 4 when the S&P was at 3130 to March 23 when the S&P sank to 2237. On March 17, the Board established the CPFF and the PDCF, and on March 20 the MMLF. Those programs reflected a concern for maintaining short-term funding in the money market. It was on March 23 that the Board reinvented the Fed as a financial intermediary.

On that date, March 23, in a press release, the Board announced the “establishment of two facilities to support credit to large employers—the Primary Market Corporate Credit Facility (PMCCF) for new bond and loan issuance and the Secondary Market Corporate Credit Facility (SMCCF).” It also announced “the Term Asset-Backed Securities Loan Facility (TALF), to support the flow of credit to consumers and businesses.” Finally, it stated that “the Federal Reserve expects to announce soon the establishment of a Main Street Business Lending Program to support lending to eligible small-and-medium sized businesses, complementing efforts by the [Small Business Administration].” On April 9, in a press release, the Board announced “that it is creating the Municipal Liquidity Facility (MLF), a tool to help states and localities deal with budgetary stresses.”

The pre-March 23 programs, the first tier, reflected the Fed’s traditional concern with the functioning of the money market. The March 23 and subsequent programs, the second tier, were

completely different. Chairman Powell must have had the latter in mind when he said, “We crossed a lot of red lines that had not been crossed before. . . . [Y]ou do that and you figure it out afterward” (Blinder and Powell 2020). Menand (2020) illustrates how extreme is the departure from the Fed’s “baseline statutory framework.” As characterized by Daleep Singh, executive vice president and head of the Markets Group at the New York Fed, “Our first obligation is to make sure the financial system is functioning. And then afterwards our work isn’t done. We have to make sure we try to provide credit to particular parts of the economy that aren’t really getting a near-term benefit from Treasury market stabilizing and that’s where the targeted support comes in” (2020, 12).

This change in the conception of the role of the Fed is striking. The focus of monetary policy had been on influencing the expenditure of the public through the FOMC’s influence on the term structure of interest rates. As a separate tool, the Fed added credit policy. Like a giant, multi-faceted GSE, the Fed would control the flow of credit from households to particular sectors of the economy. The change happened in a remarkably short period of time. The puzzle is why the Board of Governors did not wait until it had evidence that financial intermediation had broken down. It could have announced the second tier of programs as available but only to be made operational in the event of such a breakdown.

The optimism that sustained financial markets likely derived from the belief that, despite the severity of the shock, the economy would recover rather than from the Fed’s entry into the business of credit allocation. Giglio et al. (2020) offered evidence to support this assertion. They surveyed investor sentiment on March 11 and 12. Those dates were near the height of the financial turmoil but before the announcement of the Fed’s credit programs and thus before one can ascribe a renewal of optimism to the Board’s 13(3) programs.

We surveyed retail investors who are clients of Vanguard . . . on March 11–12, after the stock market had collapsed by over 20%. . . . Following the crash, the average investor turned more pessimistic about the short-run performance of both the stock market and the real economy. . . . In contrast, investor expectations about long-run (10-year) economic and stock market outcomes remained largely unchanged, and, if anything, improved.

Did Lender of Last Resort Require Becoming Financial Intermediary of Last Resort?

The Fed’s credit programs may make a bad situation worse. With the COVID-19 crisis, apart from Treasury securities and FDIC insured bank deposits, all debt became riskier. At the same time, Fed programs favor the less risky assets.¹⁸ Its programs thus helped to reinforce a two-tier market for debt—relatively less risky and relatively more risky.¹⁹ If market dysfunction was a problem, then the Fed’s credit programs exacerbated it by drawing funds into the relatively safe (more functional) part.²⁰ Similarly, for its open market portfolio, as of April 9, 2020, the Fed had almost \$1.5 trillion in GSE residential MBS and none of the riskier CMBS, that is, commercial mortgage-backed securities (Board 2020d). Acharya and Steffen (2020) documented the two-tier character of credit markets by showing that at the height of the crisis, highly rated firms were issuing bonds to deal with anticipated cash shortfalls while lower rated firms had to draw on lines of credit.

¹⁸ For example, when operational, the Primary Market Corporate Credit Facility (PMCCF) will accept corporate bonds rated at least BBB-/Baa3, that is, investment grade. The Money Market Mutual Fund Liquidity Facility (MMLF), which opened March 23, accepts asset-backed commercial paper (ABCP) “in the top rating category (not lower than A1, F1, or P1).” The Commercial Paper Funding Facility (CPFF) accepts commercial paper rated at least A1/P1/F1. For the Secondary Market Corporate Credit Facility (SMCCF), “The preponderance of ETF [exchange traded funds] holdings will be of . . . investment-grade corporate bonds.” (Federal Reserve Bank of New York 2020)

¹⁹ Davies, Isaac, and Ostroff (2020) wrote, “One of the Fed’s programs buys new commercial paper from companies and banks that had top credit ratings when the program was announced. . . . That excludes lower-rate companies such as Marriott International Inc. that need cash the most. . . . It’s the tier-two guys: They’re the ones that will need the cash.”

²⁰ The Board announced its SIV to buy corporate bonds on Monday, March 23, 2020. On Friday, March 20, the AAA corporate bond yield was 3.36 percent, and on Tuesday, March 24, it was 2.776 percent—a decline of 0.6 percentage points. Over this same interval, the junk bond yield *rose* from 10.75 percent to 11.13 percent.

4. Credit Policy Does Not Draw Forth Real Resources

The Fed’s credit programs convey to the public a power to create resources—a power that it does not possess. The Fed can only allocate credit between competing uses. On March 26, 2020, on NBC’s *Today Show*, Chairman Powell explained that the Fed could lend unlimited amounts to the private sector because of an unlimited ability to expand the size of its asset portfolio. The only limit was the amount of ESF funds to backstop its lending.²¹ Similar to the comment of Savannah Guthrie on the *Today Show*, in commenting on the CARES Act nearing passage in Congress, Senator Patrick Toomey (R-PA) expressed the objective of leveraging up “the unlimited balance sheet of the Fed” (Torres 2020).

Newspapers repeat the misconception that because the Fed can create reserves and bank deposits through a bookkeeping operation it can expand the aggregate of real resources made available to borrowers through financial intermediation. The *Wall Street Journal* said, “The Fed has a unique power, the ability to create money by crediting banks with funds they can lend. That helps it guide the cost of money, which is the interest rate” (Timiraos and Hilsenrath 2020). The misconception appeared in a *Wall Street Journal* article reporting comments by Richard Clarida: “The Fed last week announced an expansion of nine different programs it has unveiled to support lending to US states and businesses. It has said those programs will enable \$2.3 trillion in new lending” (Timiraos 2020).

²¹ LH Meyer Inc. (2020e) printed an informal transcript.

Savannah Guthrie: [Y]ou do have the ability to conjure money out of thin air. . . . Is there any limit to the amount of money the Fed is willing to put into this economy . . . ?

Jerome Powell: [E]ssentially, the answer to your question is . . . “No.” . . . [E]ffectively, \$1 of loss absorption of backstop from the Treasury is enough to support \$10 worth of loans. . . . When it comes to this lending, we’re not going to run out of ammunition. . . . [W]e’ve cut [short-term interest rates] to 0 now. We still have policy room in other dimensions to support the economy but the main thing we’re doing now is really with our lending programs.

Financial intermediation transfers resources from savers to borrowers. The Fed's programs will not draw forth any additional savings. Confusion within Congress and apparently also within the Fed itself may lead to expectations that ultimately the Fed cannot fulfill. Paul Tucker (2020) wrote, "The more central banks acquiesce (even revel) in the 'only game in town' label, the easier it becomes for politicians to give them more to do, and so undo them." The Fed should not mislead Congress that it has an ability to create credit (create household savings) as opposed to directing it.

The Fed has packaged its 13(3) lending programs not as the allocation of resources among competing uses but rather as adding to the total of resources available to borrowers and making those additional resources available to borrowers in sectors shunned by financial markets. Sorting out the fallacies underlying the presumption of the central bank as a creator of real resources requires clarification of basic analytical concepts. The most basic concept is the nominal versus real distinction and its application to the difference between financial intermediation and money creation.²²

A nominal variable is a dollar amount. A real variable is physical quantity or a relative price (the rate of exchange between two goods). The deposits that households hold with banks constitute not only savings but also media of exchange. What the public cares about is the real purchasing power of its deposits, not the number of nominal units. If the nominal (dollar) amount of deposits corresponds to a real amount that differs from what households desire to hold, the price level adjusts to eliminate the difference. Increasing the nominal quantity of bank deposits then does not make available additional resources to the banks' borrowers.

²² For the author, the analysis here came from the money and banking course offered by Milton Friedman in 1967.

Consider a modern central bank like the Fed. Like a commercial bank, the Fed possesses a balance sheet with assets on the left-hand side and deposits on the right-hand side. Since the era of FOMC chairman William McChesney Martin and until recently, the Fed has eschewed credit allocation. It has done so primarily by holding Treasury securities as assets. Its deposits are those of the commercial banks. These deposits—bank reserves—constitute the media of exchange that banks use to effect finality of payment. Moreover, with a fixed exchange rate between bank reserves and currency, the total of bank reserves and of currency held by the public constitutes the monetary base. The monetary base, as the name suggests, constitutes the support for bank deposits and thus the money stock—the media of exchange used by the public to effect finality in transactions.

Although both commercial banks and the central bank have similar-looking balance sheets with assets on the left and deposits on the right, there is a critical difference. A commercial bank competes for the savings of households by offering interest and transactions services on its deposits. The central bank creates the deposits held with it by commercial banks. If a commercial bank buys a Treasury security, it likely loses deposits. If the central bank buys a Treasury security, it adds to its deposits (i.e., bank reserves). Competitive market forces limit the deposits of a commercial bank. Only an externally imposed rule, not the marketplace, can limit the deposit creation of the central bank. With this quantity-theoretic framework, one can understand the origin of the fallacy that a central bank can increase the flow of savings from households to investors rather than simply affect its allocation. Although the central bank can

increase the nominal quantity of bank deposits, apart from transitory non-neutralities, it cannot increase the real quantity.²³

In the above example, instead of sending the interest payments on the newly acquired Treasury debt back to the Treasury, the Fed could instead allocate them to selected borrowers by lending at subsidized interest rates. It would then transfer less to the Treasury and more to selected borrowers. However, maintaining seigniorage revenue is sacrosanct for the Fed. A sharp reduction in Fed transfers to the Treasury could draw congressional attention and generate efforts to put the Fed on budget as a way of reducing its expenditures and restoring seigniorage. This concern appears in the Fed dictum that it can only lend if it does so with enough collateral that it cannot incur a loss. The CARES Act met this concern by providing ESF money for the first 10 percent of losses on 13(3) loans. However, for evaluating fiscal policy, one should combine the balance sheets of the Fed and the Treasury. Regardless of whether a loss is booked to the Fed or to the ESF, it is a loss to government revenue. Even though Fed transfers to the Treasury do not decline, lending at a loss still does not make additional resources available to borrowers. Losses increase the deficit and the issuance of Treasury debt, which competes for private saving.

The reality that the Fed can allocate savings but not create them is evident in its traditional operating procedures. With those procedures, the size of its asset portfolio was constrained by the necessity of creating just the amount of reserves required to achieve the funds rate target. To illustrate, consider first the purchase by the Fed of an MBS from a bank. The bank

²³ Seigniorage does not change the situation. As the economy grows, the public desires to hold additional currency. The Fed adds that currency by purchasing Treasury securities from the public. With less debt now held by the public, the Treasury Department issues debt to restore the original total. At this point, the Treasury has additional funds in its Fed account, and the public, which has bought the Treasury security, has no additional currency. When the Treasury spends those funds, it obtains real resources in exchange for the additional currency demanded by the public. (Up to a point, higher inflation increases seigniorage revenues; however, an inflation target eliminates that option.)

then replaces the MBS with deposits at the Fed (reserves) on the left side of its balance sheet.

The additional reserves created by the Fed with the MBS purchase lower the funds rate, causing the Fed to sell a Treasury security to the bank to defend its funds rate target. The bank now has a Treasury security in place of an MBS, and the Fed has an MBS in place of a Treasury security. Intermediation by the Fed that provides funds to the housing market replaces the intermediation formerly done by the bank.

Assume alternatively that the Fed purchases the MBS from an individual. The individual deposits the check received from the Fed with their bank, which creates a deposit. The bank sends the check to the Fed and gains additional reserves. Again, the Fed must sell a Treasury security to prevent a decline in the funds rate. Intermediation by the Fed that provides funds to the housing market replaces the intermediation formerly done by the individual. The Fed has replaced a Treasury security with an MBS in its portfolio while the individual has replaced an MBS with a Treasury security in their portfolio.

With interest on reserves paid to banks (IOR), the Fed can create additional reserves and bank deposits without lowering short-term interest rates below its interest rate target. Those additional bank deposits also do not increase money in a way that creates inflation. It may appear that those facts overturn the above conclusion that “increasing bank deposits will not increase the real resources available to bank borrowers,” and IOR may seem like a kind of magic that draws forth additional saving by households. But in fact, nothing changes with IOR and an expansive Fed balance sheet. Intermediation by the Fed that provides funds to, say, the housing market through the purchase of MBS only replaces intermediation formerly conducted through the private sector.

Assume that the Fed buys an MBS in the secondary market. Using the check received from the Fed, the seller buys a CD from their bank. Because of the interest paid on reserves through IOR, the bank impounds as additional desired reserves the reserves created by the Fed's MBS purchase. The IOR interest paid to the bank is in turn passed on as interest paid on the CD held by the seller of the MBS. The sterilized reserves are the equivalent in the above examples of the Fed extinguishing additional reserves creation from an MBS purchase by selling a Treasury security. Again, there is simply a change in who (which party) is doing the intermediation. Nothing changes in this argument when IOR sets the funds rate at the zero lower bound. Appendix C illustrates these points graphically. It clarifies the difference between the two functions assumed by the Fed: monetary (reserves) control and now financial intermediation.

When long-term interest rates are above short-term rates (the interest rate on MBS exceeds the IOR rate), the Fed is engaged in a carry trade and can send additional profits to the Treasury. These are not profits due to seigniorage, however. There is no corresponding purchase of goods and services by the government monetized by the Fed with the money creation to meet a demand for currency. Profits will turn to losses if short-term rates rise and exceed long-term rates. The way to think of the Fed as a financial intermediary is as a GSE involved in a carry trade.

5. Supporting Financial Markets While Avoiding Credit Allocation

The Fed's narrative is that financial markets ceased to function in mid-March but were revived by the announcement of 13(3) programs. The narrative here is that markets continued to function. The Fed played a key role in that continued functioning. However, its role was the traditional one of supplying ample reserves, not allocating credit.

In March, banks accommodated the public's increased precautionary demand for deposits. Businesses wanted an increase in their cash reserves (deposits) in the event of an interruption to cash flow. Through a bookkeeping operation, the banks increased their deposits. Over the interval January 1 through March 4, 2020, the cash assets of all commercial banks averaged \$1.76 trillion; as of April 1, 2020, they had increased to \$2.734 trillion (FRED 2020).²⁴ The Fed's massive purchases of Treasuries and MBS accommodated the expansion of bank deposits by meeting additional demand for reserves.

An alternative model could have been the Fed's response to the failure of Penn Central Transportation Company in May 1970 (Maisel 1973). The default by Penn Central on its commercial paper surprised markets and interrupted the demand for commercial paper. In response, the Fed encouraged banks to lend freely and made clear its support by emphasizing that the discount window was wide open for borrowing. All nonfinancial firms of any economic significance have a relationship with a bank and a line of credit. In an emergency, they draw on those lines. With the Penn Central model, the Fed would make clear that discount window borrowing would amount to "whatever it takes."²⁵ With that funding, there is no limit to the ability of the banking system to expand its balance sheet. Regulators would relax capital requirements for banks and the LCR and SLR.

²⁴ David Benoit (2020) of the *Wall Street Journal* wrote, "Companies and consumers flooded US banks with a record \$1 trillion of deposits in the first quarter. More than half of it went to the four largest banks in America—JPMorgan Chase, Bank of America, Wells Fargo, and Citigroup. . . . Much of the \$1 trillion flowed into the banks in a two-week span in March. . . . Banks' loan books grew sharply in March, largely a result of companies draining their credit lines." The use of the word "flooded" shows that Benoit did not understand that the banks created the reserves through a bookkeeping operation.

²⁵ The discount window can be used to keep insolvent banks afloat, as was the case with banks in New England in the late 1980s with the real estate slump (Schwartz 1992). To prevent moral hazard, it is appropriate that there is a stigma attached to borrowing at the window. However, in a financial panic, lowering the discount rate to the funds rate appropriately removes that stigma.

The role of the Fed in a period of stress should be to make certain that intermediation formerly conducted through the money market can occur through the banking system rather than becoming a financial intermediary itself. Banks undergo regular stress tests to make certain that they can handle a major period of stress. Press releases from the Board read,

The Federal Reserve Board on Thursday released the hypothetical scenarios for the 2020 stress test exercises, which ensure that large banks have adequate capital and processes so that they can continue lending to households and businesses, even during a severe recession. The harshest scenario includes a severe global recession with heightened stresses in corporate debt markets and commercial real estate, and for banks with large trading operations, additional pressure on leveraged loans. . . . Additionally, banks with large trading operations will be required to factor in a global market shock component as part of their scenarios. This year's shock features, among other things, heightened stress to trading book exposures to leveraged loans. Additionally, firms with substantial trading or processing operations will be required to incorporate a counterparty default scenario component. (2020a)

US bank holding companies have built up substantial levels of capital and liquidity in excess of regulatory minimums and buffers. The largest firms have \$1.3 trillion in common equity and hold \$2.9 trillion in high-quality liquid assets. (2020b)

It is also important to remember that for distressed corporations there are sources of funding other than banks. In addition to highlighting the record amount of debt issuance by investment-grade firms, Chappatta (2020, 4) pointed out the extent to which private equity firms are willing to lend to firms in industries particularly hard hit by the COVID-19 virus, like hospitality. Of course, such funding can require restructuring that imposes costs on bondholders. However, a capitalist system only works if those who gain the rewards in good times bear the losses in bad times.²⁶

²⁶ Writing for the *Wall Street Journal*, Miriam Gottfried (2020) stated: “Working to the industry’s advantage is a record-high mountain of unspent cash—around \$2 trillion across global private markets, with most of that dedicated to private equity, according to investment-advisory firm Hamilton Lance Inc. Blackstone could be among the best positioned to capitalize on market disruption: It has yet to spend a dollar of the record \$26 billion private-equity fund it raised last year. . . . Buyout firms have submitted proposals to invest in cruise lines, casinos, airlines and other hard-hit sectors of the economy, but corporate chiefs have so far been hesitant to accept financing under their onerous terms.” The *Wall Street Journal* also reported that “As of December, private investment firms of all types, including venture capital and private equity, were sitting on around \$2.5 trillion in unspent capital, according to a Bain & Co. report released in February. It said buyout firms held \$830 billion” (Louch and Singh 2020).

6. Can the Fed Maintain Its Independence?

What will happen to Fed independence when Congress realizes that it can remake the Fed into a hybrid central bank and GSE serving its constituencies?²⁷ The amounts are large. If all the Fed's 13(3) programs are fully levered up with ESF money, of the \$2 trillion in loans, more than \$1 trillion would be divided between the politically sensitive sectors of the SMEs (small- and medium-sized enterprises) and state and local governments (LH Meyer 2020f).²⁸ Congress has an incentive to transfer risk to the Fed's books where it is invisible to taxpayers.

If the Fed is going to forswear intervention in credit markets in the future, it will have to abandon its historic aversion to commitment and rules. Without such commitment, moral hazard reigns. If the Fed committed to not bailing out the prime money funds in the future, then regulators would have to regulate them like banks and eliminate the inherent instability they impart to the financial system. The commonly repeated statement of Bernanke (2015, 168) makes this point: "There are no atheists in foxholes or ideologues in a financial crisis." That comment makes the obvious point that without institutional constraints, regulators will follow a policy of TITF.

Ben Bernanke articulated the time-consistency issue creating moral hazard. "We wanted creditors that funded financial institutions, large as well as small, to be careful about where they put their money. That they might not, because they expected any failing firm to be bailed out, was the moral hazard problem. In the short run, though, we couldn't risk a general panic in the repo market and other funding markets" (2015, 219). He continued, saying,

The Fed had traditionally opposed expanding deposit insurance, on the grounds that it would increase moral hazard. But during the crisis, insuring the checking accounts used

²⁷ For additional commentary on the political economy of credit policy, see Goodfriend and King (1988); Schwartz (1992); Goodfriend (1994); Broadus and Goodfriend (2004); Cecchetti and Schoenholtz (2020); and Todd (2019).

²⁸ Fully levered up, the Main Street Lending Facility (MSLF) can lend up to \$600 billion, and the Municipal Liquidity Facility (MLF) can lend up to \$500 billion.

by businesses, municipalities, and nonprofit organizations made a lot of sense. Without it, these entities might rapidly shift their deposits from smaller banks perceived to be at risk to banks perceived as too big to fail. (342)

In reference to the Fed's role in facilitating a privately financed rescue of LTCM, which made highly leveraged bets on differences in yield spreads, Barney Frank (D-MA) commented,

Mr. Greenspan has said that this may happen again. So then the question is, if it was so important as to justify this intervention now, how do you persuade us to do absolutely nothing except wait again and trust entirely in your discretion to deal with it if it happens again? . . . [Y]ou intervened in a way that left the mistake-makers better off. . . . [A] consequence . . . was to leave some of the richest people in this country better off than they would have been if the Federal Government hadn't intervened; and that rankles a lot of us . . . when we are told we can't do anything similar for people much needier. . . . I am disappointed that you tell us we can do nothing except allow for repetitions of this. (US Congress 1998, 81, 83)

There are changes that would assure that Congress, not the Fed, conducted fiscal policy in a future crisis. First, Congress should eliminate the authorization for the Board of Governors to pay IOR. In doing so, the Fed would have to restrict the size of its balance sheet to the amount required to conduct monetary policy. Second, Congress should eliminate the 13(3) authorization for the Fed to lend to nonbanks. Third, the prime money market funds and REITs, which amplify instability of the financial system in a period of stress, should be regulated like banks.

Congress could also end the Fed's authority to arrange swap lines with other central banks. All the large foreign banks have US branches and thus can borrow from the Fed's discount window. It would be desirable to phase out the swap lines with the understanding that in a financial panic, large foreign banks would use their US branches to borrow at the discount window subject to supervision by the New York Fed. There would be an advantage to the United States in that the financing of foreign trade, which is invoiced in dollars, would come to be centered in New York in the way that it was centered in London before World War I. The advantage of having the dollar as a reserve currency comes from the seigniorage of foreign

individuals holding dollars in the form of currency as an emergency store of value. That would not be affected by ending the swap lines.

7. Final Comment

The Fed's bookkeeping operations allow it to create bank reserves through the purchase of debt instruments. Nothing in a bookkeeping operation allows it to conjure up real resources. It follows that the Fed's credit programs can only allocate credit among competing uses, not increase the real resources made available through financial intermediation. Such actions are subject to only limited public debate. Therefore Fed accountability is limited.

The payment of IOR enhances the ability of the Fed to engage in financial intermediation by buying private debt. However, to an offsetting extent, its financial intermediation reduces intermediation in the private sector. Nevertheless, the Fed has not communicated its 13(3) programs as allocating credit. Instead, it promotes them as making resources available to sectors of the economy where markets have failed to provide resources due to market dysfunction. The absence of any talk of tradeoffs implies that the Fed's involvement in financial intermediation augments the total transfer of resources from households to businesses and state and local governments. Such a message can only encourage Congress to require the Fed to allocate credit to politically important constituencies.

In March 2020, the Fed's monetary policy actions consisting of massive purchases of Treasuries and of RPs were critically important. Chairman Powell, however, should have waited to see whether these actions kept financial markets working. Instead, he assumed that markets would no longer be able to evaluate risk and direct credit flows to productive uses. The Fed's

credit programs may even have worsened market function by reinforcing a two-tier market favoring the allocation of credit to the investment-grade (safer) part of the market.

Bill Dudley (2020) dramatized the need to address the issue of moral hazard, saying, “The moral hazard issue needs to be debated and addressed. Big crises seem to be occurring more often and Fed interventions are growing ever bigger in size and broader in scope. Whatever you thought was the size of the moral-hazard problem before, now it’s gotten even larger.”

Inevitably, because of the way in which the allocation of credit apportions losses and windfalls, involvement in credit policy drags the Fed into the political arena.²⁹ To maintain its independence, it is important that the Fed return as expeditiously as possible to the sole job of monetary policy. The COVID-19 crisis has greatly increased the role of government in the economy. The Fed policy of commandeering the allocative role of private credit markets is a major contributor to this expansion of state power. If the political system comes to expect the Fed to allocate credit to favored constituencies, the COVID-19 crisis will mark a permanent movement away from a free-market system.

²⁹ Appendix B documents the historical aversion of the Fed to becoming involved in the allocation of credit.

Appendix A: Program Definitions

Fed 13(3) Programs

CPFF (Commercial Paper Funding Facility)

The CPFF is a special purpose vehicle (SPV) that purchases unsecured and asset-backed commercial paper rated A1/P1, with funds supplied by the Federal Reserve Bank of New York. It was established March 17, 2020. The Exchange Stabilization Fund (ESF) provides \$10 billion in funds.

MLF (Municipal Liquidity Facility)

The MLF will establish an SPV to buy state and local government debt. It will purchase up to \$500 billion of short-term notes directly from states and from counties (as originally announced) with a population of at least two million residents, and from US cities with a population of at least one million residents. On April 27, the Fed reduced the minimum city size from one million to 250,000 and reduced the minimum county size from two million to 500,000.

MMLF (Money Market Mutual Fund Liquidity Facility)

Through the Federal Reserve Bank of Boston, the MMLF makes loans to banks collateralized by commercial paper, especially asset-backed commercial paper (ABCP), purchased from money market funds. It was established March 18, 2020, and became operational March 23. The ESF provides \$10 billion in funds. Under the program, a bank (depository institution, bank holding company, or US branch or agency of a foreign bank) purchases the assets used as collateral for the Fed loan from an eligible money market mutual fund (MMMF), which comprises prime, single-state, or tax-exempt money market funds. Loans are nonrecourse. Eligible assets include ABCP rated not lower than A1, F1, or P1.

MSLF (Main Street Lending Facility)

The MSLF will establish an SPV to buy loans from banks. Eligible loans consist of loans to firms employing 10,000 or fewer workers or firms with revenues less than \$2.5 billion. Loans are for four-year terms with deferral of principal and interest payments for one year. Banks retain 5 percent of the loans on their books. The SPV will purchase up to \$600 billion of loans.

PDCF (Primary Dealer Credit Facility)

On March 17, 2020, the Fed resurrected the PDCF. It supplies funds to primary dealers through repurchase agreements. (A primary dealer engages in open-market transactions with the New York Fed.) Loans are made with recourse. Eligible collateral includes commercial paper (investment grade, that is, rated A2/P2/F2), investment-grade corporate debt securities, international agency securities, municipal securities, mortgage-backed securities, asset-backed securities, and equity securities. Commercial mortgage-backed securities (CMBS), collateralized loan obligations (CLOs), and collateralized debt obligations (CDOs) must be rated AAA.

PMCCF (Primary Market Corporate Credit Facility)

The PMCCF is an SPV that will purchase bonds and syndicated loans directly from investment-grade corporations. The bonds must be rated at least BBB-/Baa3 as of March 22, 2008. Thus firms having been downgraded are included. The Treasury ESF will make a \$75 billion investment. It was established March 23, 2020.

PPPLF (Paycheck Protection Program Liquidity Facility)

The PPPLF will establish an SPV to lend to the small business administration (SBA) by providing term financing for PPP loans. There are no haircuts on the loans serving as collateral. It became operational April 16, 2020.

SMCCF (Secondary Market Corporate Credit Facility)

The SMCCF is an SPV, which buys investment grade corporate bonds on the secondary market. It will also buy shares in corporate bond exchange-traded funds (ETFs), which will include high-yield bonds. The individual corporate bonds must be rated at least BBB-/Baa3, and the ETFs must buy investment-grade corporate bonds. The Treasury's ESF will invest initially \$10 billion. It was established March 23, 2020.

TALF (Term Asset-Backed Securities Loan Facility)

The TALF is an SPV that holds investment-grade (AAA-rated) asset-backed-securities (ABS)—private student loans, auto loans and leases, consumer and corporate credit card receivables, and specified loans guaranteed by the SBA. It was established March 22, 2020. Effective April 9, 2020, TALF began to accept as eligible collateral leveraged loans and commercial mortgages. The \$10 billion in funds supplied by the Treasury's ESF bear the first loss. Although loans to the structured investment vehicle are recourse, the TALF loans to the issuers of the ABS are nonrecourse. If the ABS decline sufficiently in value below the value of the loan, after deducting the ESF contribution, the Fed suffers a partial default and the loan is effectively nonrecourse. On April 9, 2020, the Board broadened eligible collateral to include AAA CMBS and newly issued CLOs.

Fed Non-13(3) Programs

Swap Lines

A swap line is an agreement between central banks to exchange their currencies and later reverse the transactions. When a foreign central bank draws on its swap line with the New York Fed, it receives dollars. At the same time, it agrees to buy back at a later date its currency with dollars at an unchanged exchange rate.

Government Programs

PPP (Paycheck Protection Program)

The PPP is a \$349 billion relief program designed to help small business owners keep their workers employed. It lends to businesses with fewer than 500 employees. Loans are to cover up

to two months of payroll and are capped at \$10 million. The SBA administers the program through approved lenders. Loans are forgiven if the business maintains its payroll for 8 weeks after receipt of the loan at a level that existed before the pandemic.

TARP (Troubled Asset Relief Program)

TARP was a program to buy MBS from banks. President George W. Bush signed it into law on October 3, 2008. It was funded with \$700 billion.

Miscellaneous Terms

LCR (Liquidity Coverage Ratio)

The idea of the LCR is that a bank will have sufficient liquid assets to offset 30 days of a run on its deposits. It is the ratio of the bank's liquid assets to net cash flows over a two-day period.

REITs (Real Estate Investment Trusts)

A REIT is a mutual fund that owns properties that generate income (e.g., apartment buildings and hotels). Most are publicly traded.

SLR (Supplementary Leverage Ratio)

The Basel III accords require that large banks hold a minimum of capital relative to all assets. For large bank holding companies, the ratio is 5 percent.

Appendix B: The Fragile Political Economy of Credit Policy

Arthur Burns (1975, 65–66), who was FOMC chairman from February 1970 until March 1978, made some of the strongest statements on the dangers to the Fed of involvement in the allocation of credit. The following came in response to a bill (H.R. 212) that would have required the Fed to allocate credit toward “national priority uses.” It should serve as a warning for any Fed involvement in a policy that requires it to supplant the market allocation of credit with its own judgment.

Our financial markets are highly competitive and they have served our Nation well over the years. As we read H.R. 212, it envisages a comprehensive intrusion of the Federal Government into private credit markets. . . . The bill delegates enormous and virtually dictatorial power to the Federal Reserve. Implementation of the bill could undermine the market system and wreck all chances for economic recovery. And it is even highly doubtful whether H.R. 212 could achieve the objectives being sought—that is, larger credit flows to certain uses, such as essential capital investment, small businesses, and agriculture, at low interest rates.

Decisions as to social priorities in the use of credit are inherently political in character. If such decisions are to be made at all, they should be made by the Congress—not by an administrative and nonpolitical body such as the Federal Reserve. After all, tilting credit in favor of some borrowers implies denying credit to someone else. Our economy has developed by relying mainly on the market to make such decisions. The market reflects the interaction of many thousands of borrowers and lenders. If the day ever arrives when governmental decisions are to be substituted for individual preferences expressed in the marketplace, then the priorities should be set explicitly by the Congress.

The specifications of H.R. 212 are so vague and general that they would inevitably involve the Board in political judgments—an area in which it obviously has no special competence.

More succinctly, Burns commented,

The concept of credit allocation implies a degree of knowledge of social priorities that I for one am quite certain that we at the Federal Reserve Board do not have. I think the Congress would not be well advised to give us a power that we simply do not know how to exercise properly. If we are to have credit allocation in this country, then I think credit allocation should proceed according to the rules devised by the Congress. But there again, I must say, in all humility, that I am not at all sure that Congress has the wisdom to substitute its rules for the workings of the marketplace. (US Congress 1974, 263)

In early 2009, the Federal Reserve Board (2009) issued a statement jointly with the Treasury. The section “The Federal Reserve to avoid credit risk and credit allocation” included the following

language: “The Federal Reserve’s lender-of-last-resort responsibilities . . . should improve financial or credit conditions broadly, not . . . allocate credit to narrowly defined sectors or classes of borrowers. Government decisions to influence the allocation of credit are the province of fiscal authorities.” FOMC chairman Ben Bernanke (2015, 156) stated in his August 2007 Jackson Hole speech, “It is not the responsibility of the Federal Reserve—nor would it be appropriate—to protect lenders and investors from the consequences of their financial decisions.”

In May 1975, New York City petitioned the federal government for financial aid to prevent bankruptcy and a default on its debt. At the time, New York politicians made dire predictions that a default by New York City would disrupt the entire municipal bond market. Other mayors of large cities warned that their cities could fall in a domino effect if New York City defaulted. New York politicians pressed the Fed to open its discount window to New York, but the Fed refused. Peter Sternlight (1975, 70), Deputy Manager for Domestic Operations, told the FOMC, “It has been made clear . . . that there is no likelihood of direct Federal Reserve assistance to New York City.”

More recently, FOMC chairman Jay Powell (2020a) engaged in the following exchange with congresswoman Rashida Tlaib (D-MI):

Tlaib: Can you explain to me why we shouldn’t, the Federal Reserve, ensure that state and local governments have access to funding during time of stress.

Powell: As you know, we have limited authority. . . . [A] series of FOMC chairs in all kinds of different political environments have thought of that as something that’s not appropriate really for us in the sense that it’s government. [I]t’s to be dealt with by fiscal authorities rather than the monetary authority. We focus on the job you’ve given us . . . as opposed to the solvency of state and local governments.

. . .

Tlaib: Yes or no, does the Federal Reserve retain the ability to give emergency lending facilities? Is that accurate in stabilizing the economy?

Powell: Yes, to financial institutions, we do.

Tlaib: So, when the Fed steps in to rescue banks in a crisis is that because you believe their role in the economy is vital? . . . Do you not believe that the governments of

Detroit and Puerto Rico also play a vital role that should be preserved even if a financial crisis makes it hard for them to borrow money?

Powell: What I believe is that's not a job for the Fed. It has a particular role and particular authorities. Lending to state and local governments and supporting them when they are in bankruptcy. . . .

Tlaib: Yeah. . . . I'm afraid that's simply not good enough. . . . Look, the federal government is supposed to be about people.

Appendix C: Separating Monetary Control from Financial Intermediation with IOR

Assume that the FOMC has a reaction function that assures price stability. The reaction function not only causes the interest rate to track the natural rate of interest, r^* , but also provides for a stable nominal anchor in the form of nominal expectational stability. Both real and nominal interest rates are then equal to r^* .

With these assumptions, nominal money demand and the associated reserves demand are given. With an interest rate instrument, commercial banks create the demandable deposits desired by the public, Dep^* . The New York Desk supplies the associated amount of reserves demanded by banks, Res^* . Res^* allows banks to clear the interbank deposit flows associated with the payments made using bank demand deposits. Res^* measures the reserves creation that the central bank needs to fulfill its responsibility as a central bank charged with price stability. Assuming the Fed creates the reserves demanded only through the purchase of Treasury bills, the Fed is engaged solely in monetary policy.

With interest on reserves (IOR), the Fed can create additional reserves beyond Res^* without lowering short-term interest rates below its interest rate target, taken here as the benchmark natural rate, r^* .³⁰ The reason is that the Fed sterilizes that additional reserves creation by paying banks interest on the reserves. Beyond the amount of reserves required to support the clearing of deposits associated with the nominal money stock, Res^* , the reserves created by the purchase of assets by the Fed—for example, MBS—are liabilities associated with financial

³⁰ The Fed introduced IOR in October 2008. The original purpose was not to turn the Fed into a financial intermediary. The “problem” was that programs established to lend to various segments of the financial system created reserves. The FOMC, still concerned with inflation, did not want markets to misinterpret the reduction in the funds rate due to this reserves creation as an easing of monetary policy. In actual practice, IOR is an instrument used to control the targeted funds rate set by the FOMC. The reason for targeting the funds rate has to do with the political economy fact that the Board of Governors, not the FOMC, sets IOR. However, simplifying without any loss of insight, it is convenient to assume that the FOMC uses the IOR rate as its instrument. Based on the current and forecasted value of IOR, markets arbitrage other interest rates and transmit monetary policy.

intermediation. On the Fed’s balance sheet, the MBS are assets and the interest-bearing reserves of banks are liabilities.

To illustrate, consider figure A1, which displays the pre-IOR reserves market. With the purchase of an MBS by the Fed, the supply of reserves exceeds the “target supply” and the funds rate falls below the “target rate r^* .” The Fed must sell a Treasury security to restore the initial condition in the reserves market. Consider now the reserves market with IOR shown in figure A2. The Fed can buy MBS to provide for “target supply 1” or a greater amount “target supply 2” without lowering the funds rate below r^* . Now, in contrast to the pre-IOR case, the public exchanges an MBS for additional bank deposits. However, those additional deposits are matched on the bank’s balance sheet by additional excess reserves. There is no increase in financial intermediation—the transfer of real resources from households to investors. The increase in reserves beyond the amount labeled “target supply” in the “without IOR” case measures the extent to which IOR allows the Fed to engage in financial intermediation.

Figure A1. Reserves Market without IOR

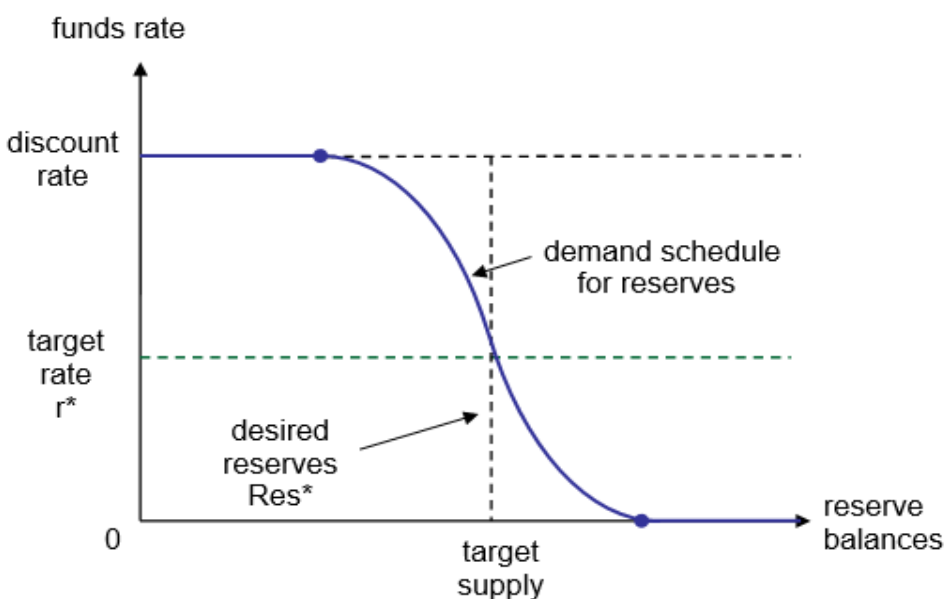
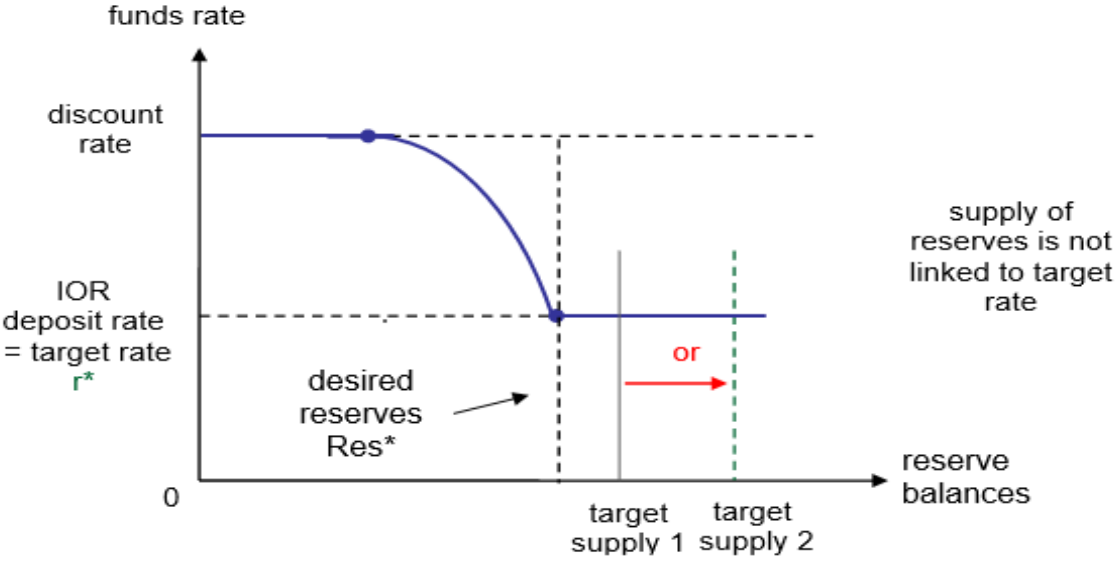


Figure A2. Reserves Market with IOR



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