L Street: Bagehotian Prescriptions for a 21st Century Money Market

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In *Lombard Street*, Walter Bagehot (1873) offered his famous advice for reforming the Bank of England's lending policy. The financial crisis of 1866, and other factors, had convinced Bagehot that instead of curtailing credit to conserve the Bank's own liquidity in the face of an "internal drain" of specie, and thereby confronting the English economy as a whole with a liquidity shortage, the Bank ought to "lend freely at high rates on good collateral." Bagehot's now-famous advice has come to be known as the "classical" prescription for last-resort lending.

Largely forgotten, however, is Bagehot's belief that his prescription was but a second-best remedy for financial crises, far removed from the first-best remedy, namely, the substitution of a decentralized banking system—such as Scotland's famously stable free banking system—for England's centralized arrangement. Bagehot's excuse for proffering such a remedy was simply that he did not think anyone was prepared to administer the first-best alternative: "I propose to maintain this system," he wrote, "because I am quite sure it is of no manner of use proposing to alter it. . . . You might as well, or better, try to alter the English monarchy and substitute a republic" (Bagehot 1873: 329–30).

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Like Bagehot, I offer here some second-best suggestions, informed by recent experience, for improving existing arrangements for dealing with financial crises. Unlike Bagehot, who merely recommended changes in the Bank of England's *conduct*, I propose changes to the Federal Reserve's *operating framework*. And although, like Bagehot, I consider my proposals mere "palliatives," I do not assume that we cannot ultimately do better: on the contrary, I doubt that any amount of mere tinkering with our existing, discretionary central banking system will suffice to protect us against future financial crises. To truly reduce the risk of such crises, we must seriously consider more radical reforms (see, e.g., Selgin, Lastrapes, and White 2010).

A Top-Heavy Operating System

Both the financial crisis and the ways in which the Fed felt compelled to respond to it point to shortcomings of the Fed's traditional operating framework—a framework that relies heavily on a small number of systematically important financial firms known as "primary dealers," as well as on JPMorgan and Bank of New York Mellon in their capacity as "clearing banks" for the Fed's temporary open market transactions.

In theory these private institutions serve as efficient monetary policy agents—that is, as private middlemen or conduits through which liquidity is supplied by the Fed to the rest of the financial system. The theory breaks down, however, if the agents themselves become illiquid or insolvent, or if some agents fear being damaged by the liquidity or insolvency of others. In that case, the agents may cease to be effective monetary policy conduits. Instead, their involvement can undermine the implementation of ordinary monetary policy, denying solvent firms access to liquid assets. The Fed may for these reasons alone—and setting aside others that contribute to the agents' "systematic significance"—be compelled to bail out a monetary policy agent, further interfering with efficient credit allocation. The expectation that it will do so in turn enhances agents' "too big to fail" status, encouraging them to take excessive risks, and increasing the likelihood of future crises.

In what follows I explore the drawbacks of the Fed's top heavy operating framework, especially as revealed by the recent financial crisis. I then offer suggestions for making that framework both less

top-heavy and more flexible. The suggested reforms should serve to reduce both the extent of the Fed's interference with an efficient allocation of credit and the extent of implicit guarantees in the financial system, while making it easier for the Fed to adhere to the spirit of Bagehot's classical rules for last-resort lending. More specifically, the changes I recommend seek to ground Fed operations more firmly in the rule of law—and make them less subject to the rule of men—by allowing the Fed to rely on one and the same operating framework to both implement normal monetary policy and meet extraordinary liquidity needs during times of financial distress.

Ordinary Monetary Operations

The Fed traditionally conducts monetary policy by means of a combination of "permanent" and "temporary" open market operations. Permanent operations involve outright purchases and sales of Treasury securities. Because permanent open market sales are relatively rare, purchased securities are usually held in the Fed's System Open Market Account (SOMA) until they mature. Permanent open market purchases are mainly used to provide for secular growth in the stock of base money, and especially in the outstanding stock of paper currency.

Temporary open market operations, in contrast, are aimed at making seasonal and cyclical adjustments to the stock of base money, and are typically conducted, not by means of outright purchases and sales of Treasury securities, but by means of repurchase agreements or "repos" involving such securities. Although in name a repo is contract providing for the sale of a security with an agreement by the seller to repurchase the same security at a specified price within a relatively short period after the initial sale, in practice repos resemble collateralized loans in which the security to be repurchased serves as collateral. The Fed, having first introduced repos to the U.S. economy in 1917, shied away from them after the massive bank failures of the 1930s. They came back into favor as monetary policy instruments following the 1951 Treasury Accord. Eventually a private repo market developed in which repos, instead of being confined to Treasury securities, came to include a broad range of private debt instruments (Acharya and Öncü 2010: 323–30).

The self-reversing nature of repos, and the fact that the vast majority of them are overnight loans, make them especially fit for temporary open market operations, because the Fed has only to refrain from renewing its repos to absorb base money after a peak demand for it subsides. Repos come in handy, for example, during the Christmas season, when the Fed uses them to offset the decline in bank reserves that must otherwise result from heavy currency withdrawals. Repos also help the Fed to implement its federal funds rate target, because for banks overnight Treasury repos are a relatively close substitute for borrowing in the federal funds market. Arbitrage thus tends to cause the federal funds rate to track the rate for such repos. The Fed is consequently able to use repos to move the federal funds rate in whatever direction it desires, and move it more assuredly than it could do using outright Treasury purchases and sales.

Both permanent and temporary open market operations have traditionally been conducted with a limited number of counterparties known as primary dealers. Although the roots of this primary dealer system trace to 1935, when the Fed was first prevented from buying bonds directly from the U.S. Treasury, the system officially got started with 18 members in 1960. By 1988 the number had climbed to 46. But on the eve of the crisis it had dwindled to just 20, including a dozen foreign bank affiliates. Today, after the failure of MF Global—one of two post-crisis additions to the list—there are 21. The Fed normally conducts its open market operations with these dealers only, arranging both outright Treasury security purchases and repos with them, and leaving it to them to channel funds to other financial firms mainly by means of private repos, with commercial banks in turn sharing reserves through the overnight federal funds market.

Two other private market agents also assist the Fed in implementing monetary policy. The failure of two major security dealers during the 1980s gave rise to so-called "tri-party" repos, in which repo counterparties, including the Fed, rely on third parties, known as clearing banks, to price and otherwise manage repo collateral. Today, as at the time of the crisis, there are only two such banks—JPMorgan Chase and the Bank of New York Mellon. Besides being conduits for the Fed's open market operations, the clearing banks also play a crucial role in allocating available liquidity among primary dealers.

Ordinarily, as Donald Kohn (2009: 6) observes, the primary dealer system "allows the Federal Reserve to implement policy

quite efficiently . . .with minimal interference in private credit markets." Because it relies on the private market to price and direct funds, the system avoids any risk of credit being provided at subsidized rates, and so heeds Bagehot's classical prescription. The Fed nevertheless maintains a standing facility—the discount window—for the purpose of direct lending to illiquid financial institutions, partly in recognition of the possibility that open market operations, as ordinarily conducted, may prove inadequate for meeting "serious financial strains among individual firms or specialized groups of institutions" during times of financial distress (Board of Governors 1971: 19).

Generally speaking, the presence of efficient wholesale lending markets means that banks are unlikely to turn to the discount window unless they lack the sort of good collateral that would qualify them for classical last-resort loans. The Fed, for its part, appears unable to resist lending to insolvent banks.[1] Consequently, several economists (Friedman 1960: 50–51 and 1982; Humphrey 1986; Goodfriend and King 1988; Kaufman 1991, 1999; Lacker 2004: 956ff.; and Hetzel 2009) have recommended doing away with extended discount-window lending altogether, and having the Fed supply liquidity solely through the open market. The crisis has, however, been regarded by some as proof that such a step would be imprudent. "A systemic event," Stephen Checchetti and Titi Disyata (2010: 12) observe, "almost surely requires lending at an effectively subsidized rate" secured by "collateral of suspect quality," which can be had only by direct appeal to a central bank.

Further consideration suggests, however, that the apparent need for direct lending during crises stems, not from the inadequacy of open market operations as such, but from the inadequacy of the Fed's particular rules and procedures for conducting such operations, including its reliance upon the primary dealer system.[2]

[1]According to a Congressional study of discount window lending during the late 1980s, of 418 banks that received discount window loans, nearly all had CAMEL scores of 5, indicating effective insolvency, at the time; and about 90 percent of them subsequently failed (Kaufman 1999:4; see also Schwartz 1992).

[2]Even considered with regard to the Fed's traditional open market procedures Checchetti and Disyata's claim appears too strong: open market operations have sufficed to preserve market liquidity during several past "systemic events," including the failure of Penn Central, the October 1987 stock market crash, Y2K, and 9/11.

In particular the Fed, by depending upon a small set of primary dealers, and on two clearing banks, for its open market operations, risks a breakdown in the monetary transmission mechanism when these agents themselves become troubled. Consequently the Fed may be compelled, not merely to engage in direct lending, but also to depart from Bagehot's principles by bailing out insolvent firms when their failure threatens to cause a breakdown in its operating framework. The Fed's reliance upon primary dealers and tri-party repos thus contributes to the notion of the "systemically important financial institution" (SIFI), official recognition of which, according to former Kansas City Fed President Thomas Hoenig (2011), poses a serious threat to the future of capitalism.

While some firms would perhaps continue to be regarded as "systematically important" no matter how monetary policy is conducted, a responsible central bank ought to avoid arrangements that contribute to the existence of such financial goliaths, to the extent that it can do so without otherwise compromising its ability to conduct monetary policy. Policymakers should in turn welcome new arrangements that might do away with a perceived need for ad hoc changes to the Fed's operating procedures in response to systemic events.

Monetary Operations during the Subprime Crisis

The Fed's primary dealer-based operating system takes primary dealers' financial health for granted. If the dealers themselves are in danger of failing, the system can break down.

Primary dealers are hardly likely to go broke owing to their participation in open market operations. However, the set of primary dealers "overlaps substantially" with that of major dealers in securities and OTC derivatives, and such dealers "tend to finance significant fractions of their assets with short-term repurchase agreements" with counterparties consisting mainly of other dealers, money market mutual funds, and securities lenders (Duffie 2009: 9, 27–8). Hence, dealers' notoriously high leverage. When a dealer's solvency becomes suspect, its counterparties may choose not to renew their repos with it, so as to avoid risks involved in having to realize on their collateral. The general refusal of a dealer's counterparties to renew can force the dealer into bankruptcy, while its attempts to provide for its own liquidity at short notice

could threaten other dealers by contributing to a general decline in the market value of, and hence an increase in haircuts applied to, private security repos.

An increased perceived risk of primary dealer insolvency can short-circuit monetary policy in at least two ways. First, as just noted, an increase in perceived counterparty risk may cause prospective private lenders to cease lending to them except perhaps at very high rates. Second, highly leveraged banks, including dealers, upon realizing that adverse asset shocks have increased their own debt rollover risk, may "hoard" liquidity by refraining from lending—and especially from term lending—even to counterparties that they know to be solvent (Acharya and Skeie 2011). Consequently, instead of serving as efficient conduits for the transmission of reserves, dealers become so many liquidity traps, contributing to the drying-up of wholesale lending markets. The drying-up of liquidity in turn contributes to the perceived riskiness of nondealer counterparties, and hence to more liquidity hoarding, possibly leading to a general credit freeze.

Such a freeze appears to have hampered monetary policy during the subprime crisis when, as various Federal Reserve officials have themselves acknowledged, instead of assisting the Fed in keeping financial markets liquid, the primary dealer system "blocked, or seriously undermined, the mechanisms through which monetary policy influences the economy" (Fisher and Rosenblum 2009; cf. Afonso, Kovner, and Schoar 2011). At the onset of the crisis, during the third quarter of 2007, primary dealers, having been among the financial institutions faced with the largest toxic asset losses, were also "the quickest to freeze or reduce their lending activity" (Fisher and Rosenblum 2009), and so ceased to be a source of liquidity to either businesses or to other banks (Giles and Tett 2008). According to Kohn (2009: 6),

> The fact that primary dealers rather than commercial banks were the regular counterparties of the Federal Reserve in its open market operations, together with the fact that the Federal Reserve ordinarily extended only modest amounts of funding through repo agreements, meant that open market operations were not particularly useful during the crisis for directing funding to where it was most critically needed in the financial system.

In consequence, and despite the Fed's considerable lowering of its federal funds rate target, interest rates paid by business and households rose. Sound banks that, thanks to the reduced volume of wholesale lending, found themselves short of liquidity, had the option of turning to the Fed's discount window, but refrained from doing so owing to the stigma associated with discount window borrowing ever since the Fed's 1984 bailout of Continental Illinois. It was thanks to this credit "distribution bottleneck" that the Fed was driven to create "an array of mechanisms by which institutions, other than primary dealers, could properly avail of official liquidity provision" (Dunne, Fleming, and Zholos 2009: 4), including the Term Auction Facility (TAF)—a term repo lending facility established on December 12, 2007—designed to bypass the primary dealer system while avoiding the discount-window stigma.[3]

Besides not having been able to rely on them as monetary policy conduits, the Fed felt obliged to rescue several primary dealers, and to do so at the expense of solvent banks. When Bear Stearns collapsed in March 2008, the Fed first announced a new Term Securities Lending Facility (TSLF), which would allow primary dealers to borrow securities for up to 28 days from the System Open Market Account so as to be able in turn to employ them as collateral for overnight repo borrowings of Fed funds, made between March 2008 and February 2010 via the Primary Dealer Credit Facility (PDCF). As Robert Eisenbeis (2009: 5) observes, the TSLF served, in effect, to reallocate to primary dealers reserves "that would otherwise have been available to smaller banks or holders of Fed funds to support lending and asset acquisition, with some predictable results for the real economy and economic growth."

Having announced the TSLF, the Fed introduced what was, according to Acharya and Öncü (2010: 337), "its most radical change in monetary policy since the Great Depression," namely, the PDCF. The facility was, essentially, a new discount window for primary dealers. While the old discount window remained relatively quiescent, the new one witnessed an unprecedented volume of lending,

[3]According to Armantier et al. (2011), the stigma was such that, after Lehman's failure, banks were willing to pay a premium of at least 150 basis points to acquire funds from the TAF rather than from the discount window.

most of which took place following Lehman Brothers' September 2008 failure, when the PDCF started to accept risky assets as collateral. According to the Fed's December 2010 disclosure, the heaviest borrowers were banks that were in the greatest peril of failing, including Merrill Lynch, Citigroup, Morgan Stanley, and Goldman Sachs. The accumulated borrowings of each ended up being in the neighborhood of $2 trillion (Sheridan 2011: 13–14), while the total accumulated lending of the PDCF fell just shy of $9 trillion, with a peak of about $150 billion in daily credits during the first week of October 2008.

Finally, starting in November 2008, the Fed began its first round of "quantitative easing," eventually making outright purchases of about $400 million of GSE-guaranteed mortgage-backed securities and (through special purchase vehicles) of another $250 billion in commercial paper and various toxic assets acquired from Bear Sterns and AIG. According to Paul Volcker (2008: 2), these actions took the Fed "to the very edge of its lawful and implied powers, transcending certain long-embedded central banking principles and practices," and testing "the time honored central bank mantra in time of crisis—'lend freely at high rates on good collateral'—to the point of no return." Because the Fed sterilized most of its subprime asset purchases, by reducing its Treasury holdings by over $250 billion and by having the Treasury increase its deposits at the Fed by about $300 billion, the purchases actually reduced the availability of liquid funds to solvent banks. In short, in propping up an operating system that was supposed to help it to act according to Bagehot's advice, the Fed found itself honoring that advice only in the breach.

The Fed's decision to support primary dealers was motivated, not so much by its desire to preserve them as direct agents for monetary policy, but by its fear that their failures could threaten the tri-party repo system by exposing one of the clearing banks to large losses. As Brickler, Copeland, and Martin (2011) explain,

> To give dealers access to their securities during the day, the clearing banks settle all repos early each day, returning cash to cash investors [including the Fed] and collateral to dealers. Because of the delay in settlement, the clearing banks wind up extending hundreds of billions of intraday credit to the dealers until new repos are settled in the evening.

A clearing bank might therefore refuse to continue transacting with a troubled dealer, making it impossible for that dealer to meet its obligations. JPMorgan Chase appears to have taken this step with Lehman, refusing to process its payment instructions and in effect freezing $17 billion in Lehman's assets it held as collateral, the night before Lehman's failure (Duffie 2009: 39). The Fed then worried, not only that other primary dealers were in danger of failing, but that either of the two clearing banks might be exposed to large losses if a large broker-dealer defaulted (Tuckman 2010). The clearing banks themselves thus became "hot spots for systemic risk and taxpayer bailout" (Fricker 2011), and it was largely for their sake that primary dealers were rescued. The rescue of Bear Stearns and the subsequent establishment of the PDCF, in particular, appear to have been motivated not so much by Bear's heavy involvement in the market for mortgage-backed securities as by its status as a big player in the tri-party repo market.

Whether or not they were justified by dealers' systematic importance, the Fed's primary dealer rescues can only have contributed to surviving dealers' inclination—as well as that of the clearing banks—to take excessive risks. As Duffie (2009: 43–44) has observed, "Although the various new government facilities that appeared during the financial crisis of 2007–09 may have prevented some extremely damaging failures, some of these facilities may turn out to be costly to taxpayers and are likely to increase moral hazard in the risk taking of large dealer banks going forward, absent other measures."

The Prescriptions

To improve the Fed's current operating framework and reduce the chances for another financial crisis, I offer the five following prescriptions, all of which embody a Bagehotian perspective: (1) abolish the primary dealer system, (2) limit or abolish repos, (3) abandon "Treasuries only," (4) revive the Term Auction Facility, and (5) stop last-resort discount window lending.

Abolish the Primary Dealer System

The most obvious operating system reform suggested by the crisis is to replace the primary dealer system with one in which numerous financial firms, and perhaps even some nonfinancial firm, take part in the Fed's open market operations.

There are good reasons for the Fed to dispense with its primary dealer system, even putting aside the dangers of relying upon it during crises. "In central banking terms," as Giles and Tett (2008) observe, despite its long pedigree the Fed's primary dealer system "is decidedly old-fashioned," having, as Eisenbeis (2009: 2) explains, "evolved prior to the advent of electronics and computerization of the bid and auction process when institutions relied upon messengers to transmit paper bids to the [System Open Market] Desk." Today, Eisenbeis goes on to observe, there's no reason why a much larger number of qualified firms "could not take part in the daily Open Market transaction process through the System's electronic bidding process." The orthodox arrangement, he adds, "is neither necessary nor in the best interest of taxpayers."

Eisenbeis's conclusion echoes that of a pre-crisis IMF working paper devoted to reviewing the pros and cons of primary dealers for developing countries. According to that paper's authors, Marcone Arnone and George Iden (2003: 8), "automation gives a means to handle large numbers of participants in auctions that was not previously possible," while "electronic markets can offer information on market conditions and prices" that primary dealers were uniquely capable of supplying. Indeed, Arnone and Iden conclude that primary dealers are unnecessary, not just for monetary policy but also for direct sales of government securities, except in less developed economies with as-yet poorly developed securities markets.[4] In short, as a vehicle for the conduct of U.S. monetary policy the primary dealer system is, at best, an anachronism.

The Shadow Financial Regulatory Committee, of which Eisenbeis is a member, has recommended that the Fed take advantage of modern technology to adopt an approach similar to that of the ECB, which routinely conducts open market operations "with more than 500 counterparties throughout the Euro Zone," and which might deal with more than twice as many. Doing so, the committee maintains, "would increase the efficiency of the SOMA transaction process, lower costs, reduce dependence upon a geographically concentrated set of counter parties, and enhance the monetary policy transmission process" (Shadow Financial

[4]A few years earlier McConnachie (1996), observing that there were then no formally designated primary dealers in Australia, Japan, Netherlands, and New Zealand, reached the same conclusion.

Regulatory Committee 2009). Electronic trading could also preserve the anonymity of firms seeking funds from the Fed.[5] Such improvements, it bears noting, would supply a rationale for doing away with the primary dealer system even if primary dealers' soundness were never in doubt.

So far as outright open market purchases are concerned, there is no reason at all for the Fed to restrict the number of its counterparties, even by limiting participation in open market operations to financial firms, since it doesn't expose itself to counterparty risk in making outright purchases. The only risk it takes on is that connected with depreciation of the securities it acquires, which is of course a function, not of the counterparties it deals with, but of the securities it chooses to buy.

Insofar as they rely upon repos rather than outright security purchases and sales, temporary open market operations pose a somewhat greater challenge, in part because repos, being in effect securitized loans, do expose the Fed to counterparty risk, and so warrant it in taking measures to guard against such risk. But the view that relying exclusively upon primary dealers is itself such a measure, based as it is on the assumption that primary dealers are "the soundest of sound" financial institutions, is no longer tenable.[6] Instead the opaque nature of broker dealers' undertakings, their high leverage, and the fact that they aren't subject to Fed oversight make such firms particularly risky ones for the Fed to contract with.

Rather than pretend to limit its exposure to the risk of a counterparty's failure by severely limiting the number of counterparties it deals with, the Fed can achieve a genuine reduction in risk by doing just the opposite, diversifying its counterparties so as to greatly reduce its exposure to losses in the event of any single counterparty's failure. A simple way to accomplish this, while further limiting the Fed's risk exposure and guarding against adverse selection, would

[5]"The central bank should take the lead . . . in encouraging market practices conducive to competitive trading. It could, for instance, encourage a computerized system of bids and offers for securities that protects anonymity" (Axilrod 1997).

[6]The failure of MF Global, one of two February 2011 additions to the Fed's primary dealer list, ought to settle any remaining doubts concerning the truth of this declaration. It's worth noting how, even at the time of its admission to the primary dealers club, MF Global was known for being very highly leveraged, and how the Fed waited until October 31st, the date on which MF Global filed for Chapter 11 bankruptcy protection, to terminate its primary dealer status.

be to open participation to any financial institution with a CAMEL score 1 or 2.[7] Such a broadening of Fed counterparties would, as Hoenig (2011: 9) observes, also "enable nearly all banks to play a role in the conduct of monetary policy," leveling the credit-allocation playing field while simultaneously making the largest banks considerably less systematically important. Though since the crisis the Fed has agreed to have several new counterparties, including a number of money market funds, take part in reverse repos it eventually intends to employ in mopping up excess base money, it has not otherwise departed from its traditional primary-dealer-based operating framework.[8]

Although counterparty diversification might itself limit clearing banks' exposure to risk in connection with the Fed's repo-operations,

[7]Since the Fed need never advertise its list of banks participating in its open market operations, the procedure need not undermine the confidential nature of CAMEL ratings. On the general reliability of CAMEL ratings as indicators of banks' soundness see Cole and White (2010).

Counterparty diversification along the lines suggested here seems far preferable to the alternative favored by Hoenig (2011: 8), among others, of restoring Glass-Steagall-like provisions to the extent of preventing primary dealers from having commercial bank affiliates. "It is not necessary," Hoenig observes, "that primary dealers be affiliated with banks. It is only necessary that they be institutions that deal in U.S. Treasuries and participate in auctions of U.S. government debt." Hoenig's solution might prevent primary dealers from exploiting genuine economies of scope. Moreover, it was not dealers' involvement in commercial banking, but their other undertakings, that got them in hot water. Neither Lehman Brothers nor Bear Stearns had commercial bank affiliates when they failed.

A less draconian way, also recommended by Hoenig, to limit risk taking by the Fed's prospective counterparties, and by broker dealers in particular, consists of "rolling back the bankruptcy law for repo collateral to the pre-2005 rules" so as to "discourage the use of mortgage-related assets as [private-market] repo collateral and reduce the potential for repo runs." According to Acharya and Öncü (2010: 336), had MBS-based repos been subject to automatic stay, as they would have been under pre-2005 rules, "the Bear Stearns funds could have filed for bankruptcy and the forced fire sale of their assets could have been avoided." As Perottti (2010: 4) observes, "bankruptcy exceptions lead to a surrendering of public control over the money supply, which becomes endogenous to the private sector's short-term funding preferences (as *any private security* may be funded with repo). This highlights the urgency of measures to contain the private creation of liquidity risk."

[8]In its December 14, 2009, report the SFRC criticizes the Fed's move to expand the list of reverse-repo counterparties to include some MMMFs, noting that this move "continues its [the Fed's] dependence upon a small number of institutions and risks creating a two tiered set of money market mutual funds—those that are and those that are not eligible to deal with the desk and potentially eligible for financial support and special treatment during times of financial stress" (Eisenbeis 2009: 2).

the clearing banks would still be heavily exposed to any primary dealer failure, and could consequently remain "hotspots for systemic risk" and for potential Fed operating system failure, through their involvement in the private repo market (Tuckman 2010). Here Chairman Bernanke himself has suggested a solution, consisting of replacing the present private clearing-bank duopoly with a centralized clearing platform or "utility" (Bernanke 2008; see also Singh 2011 and Penney 2011). According to a Financial Economist Roundtable report, the present arrangement

> lacks transparency, has virtually no federal regulatory oversight, raises potential issues of conflicts of interest by virtue of the duopoly's unique access to information on counterparty transactions and ability to meet capital requirements, and poses systemic risks should either of these institutions experience financial distress in their other operations.... If ever there was a question of what firms might be determined too-big-to-fail, the operators of the tri-party repo market fit the bill (Financial Economists Roundtable 2011: 9).

"Policymakers," the report continues, "should explore policies to encourage the movement of tri-party repo transactions to organized exchanges and centralized clearing and settlement systems to eliminate the potential conflicts of interest and systemic risk associated with the present arrangement . . . . The objective should be to avoid the transfer of risk from either of these institutions to the broader market."

Limit or Abolish Repos

A more radical way for the Fed to avoid exposing its operations to repo-related risk would be for it to substantially reduce its use of repos, or even, as Milton Friedman (1982) once proposed, dispense with them altogether.

Repos are convenient devices for conducting temporary open market operations. But they are hardly necessary. Having invented them in 1917, the Fed, as we have seen, largely managed without them until after 1951; and although the Bank of Canada has also been using repos since the 1950s, it was not until the 1990s that other major central banks—including those of England, Japan, Germany Sweden, and Switzerland—began making routine use of them (FRS Study Group 2002: 30). In the United States just prior to the crisis,

although repos were the mainstay of the Fed's daily open market operations, they accounted for just 3 percent of the Fed's assets, almost 90 percent of which consisted of outright holdings of U.S. Treasury debt.

The larger the market for the securities in which open market operations are conducted, and the greater the range of maturities available, the more practical it becomes for a central bank to dispense with repos, because a sufficiently deep market allows it to do so without causing unwanted price distortions (Cheun, Köppen-Mertes, and Weller 2009: 11), and because astute management of the SOMA portfolio can provide for a substantial degree of automatic accommodation of seasonal changes in reserve demand without resort to outright sales. The breadth and depth of the market for U.S. Treasuries of all maturities therefore makes the Fed a prime candidate for dispensing with repos.

According to Axilrod (1997: 14), the chief advantage of repos (and reverse repos) compared to outright purchases and sales is that they "tend to enhance liquidity in the underlying securities, helping to develop a more active secondary market" while "encouraging participants to develop as many alternative sources of short-term lending and borrowing as possible." It is hard to resist concluding that, in the United States at least, this advantage is no longer relevant. The market for Treasuries is quite liquid and thick enough, though very large Fed purchases and sales will admittedly still affect their prices and there is surely no need to further encourage private market participants to take advantage of repos for short-term lending and borrowing.

On the contrary: in introducing repos to the U.S. market, the Fed inadvertently encouraged private-market innovations that played a central role in the unfolding of the crisis. "The notion of a repurchase agreement," Henry Liu (2005: 10) trenchantly observed before the crisis,

> was a fiction dreamed up to minimize the impact of such transactions on bank and broker-dealer capital requirements. If these transactions had been called loans, then banks (and broker-dealers) would be required to set aside cash (or perhaps other capital, if a broker-dealer) against such loans. By inventing the fiction of calling what is actually a loan by some other name, banks and other broker-dealers were able to bypass banking regulation and reserve less cash/capital against

> such activities. . . . Repos obviously increase systemic risk in the banking system as well as in the monetary system, particularly when the daily repos volume has grown to $5 trillion and is rising by the week.

In developing repos, in short, the Fed played a Frankenstein-like part, inadvertently transforming primary dealers into so many overleveraged financial industry monsters.

As we have seen, repos do make it easier for the Fed to target interest rates. But this hardly makes them indispensable. On the contrary, it supplies further grounds for reconsidering the Fed's reliance upon a monetary policy instrument that itself appears, in light of recent experience, to be seriously flawed (see Sumner 2011).

Abandon "Treasuries Only"

Although the proposals so far might be undertaken without altering the Fed's "Treasuries only" policy for open market operations, there are good reasons for combining them with a broadening of the set of securities used in its temporary, if not in its permanent, open market operations.[9] In particular, there are good reasons for having the Fed engage in temporary purchases of some of the private market securities it has traditionally accepted as collateral for discount window loans, provided that it subjects those securities to "haircuts" sufficient to protect it against potential credit risk while otherwise adhering to the classical rule of supplying credit only on relatively stiff terms.[10]

Conducting open market operations in a variety of securities, and not just in Treasuries, would increase the ability of such operations to

[9]Although the Fed has long been legally authorized to purchase securities issued or guaranteed by various U.S. government agencies, including the TVA, the Small Business Administration, and the U.S. Postal Service, it made little use of this authority until December 2008, when it began acquiring substantial quantities of housing-agency debt—as well as much larger quantities of housing-agency mortgage-backed securities.

[10]For the relative merits of various private securities for open market operations see Board of Governors (2002: section 2). Although the Fed offers its desire to avoid credit risk among reasons for adhering to a Treasury's only rule, the precise threat such risk poses to it is of a vague sort, since central banks need not be particularly concerned about adverse shocks to their capital, and might even operate temporarily with negative capital (cf. Bindseil et al. 2004). On the other hand, Steil (2011) points out the limits of a central bank's ability to function with negative capital without risking hyperinflation.

take the place of both discount-window lending and emergency credit facilities during financial crises. It would therefore allow the Fed to perform its last-resort lending duties during such crises without departing substantially from "business as usual," and especially without allowing the performance of those duties to interfere with the conduct of ordinary monetary policy. An expanded list of securities would also allow the Fed to spread its tri-party repo settlement risk across more than two clearing institutions (Board of Governors 2002, section 2: 3–4). Finally, security diversification would be a natural complement to counterparty diversification: taken together, the two innovations would allow the Fed to satisfy in a straightforward manner Bagehot's requirement that central banks supply liquid funds *freely*, on *any* good collateral—a requirement which (as we have seen) isn't necessarily satisfied by channeling funds through a handful of privileged firms only, and only in exchange for Treasuries.[11]

Here again the ECB supplies a useful counterexample, for it does not normally distinguish between collateral eligible for last-resort (standing facility) lending and collateral eligible for use in its temporary open market operations (Cheun, Köppen-Mertes, and Weller 2009: 18).[12] Partly for this reason, the European system was able to meet the exceptional liquidity needs of the first year of the financial crisis "with relatively few adjustments" to its standard operating framework. The Fed, in contrast, was compelled to introduce new collateralized lending programs, including the TAF, TSLF, and PDCF, that served, in effect, to temporarily modify its operating framework so as to make it functionally more akin to the ECB's (Cheun, Köppen-Mertes, and Weller 2009: 23–25; Duffie 2009: 41).[13]

[11]During the late 1990s and early 2000s the possibility of having the Fed deal in non-Treasury securities was broached in response to the fear that continuing surpluses might render such securities too scarce for the Fed's needs. Although that particular prospect is, unhappily, no longer present, the fact that it might eventually arise again is yet another reason for reconsidering Treasuries only.

[12]The ECB ordinarily accepts a variety of euro-denominated private securities, including corporate and bank bonds and mortgage-backed securities, with rating of A- or better, as collateral for both its repos and its standing facility loans. However, in the aftermath of Lehrman's failure it lowered the minimum rating to BBB-.

[13]In contrast, the Fed's later CPFF and TALF programs went "beyond the scope of the Eurosystem's measures," by having the Fed engage in primary-market purchases of commercial paper and by having it take part in what amounted to outright purchases of asset-backed securities (Cheun, Köppen-Mertes, and Weller 2009: 38).

The Fed's "Treasuries only" policy distinguishes it, not only from most major central banks, but also from its own former self. As David Marshall (2002: 45, 49) observes, at the time of the Fed's establishment its designers equated the purchasing of government debt with "lending to the crown," which they feared would undermine the Fed's independence and open the door to inflation. Consequently, they sought to confine the Fed's credit-granting activities to the discounting of commercial paper.[14] Despite this intent, the Fed soon found itself playing handmaiden to the Treasury, until formally released from the obligation to do so by the 1951 Treasury Accord.[15]

One argument against open market operations using private securities is that such purchases are risky. Although outright purchases would not expose the Fed to counterparty risk, even these would expose it to the risk of security issuers' default. It is partly because losses from such defaults ultimately translate into reduced Treasury revenues that Marvin Goodfriend (2010: 6), among others, claims that the Fed should stick to holding risk-free Treasuries. But the argument isn't entirely compelling, because (with respect to repos) the risk can be kept negligible by means of sufficient "haircuts," and because, if last-resort lending is desirable at all—if it is a genuine public good—there's no reason for not having taxpayers shoulder some of the potential cost of providing it, just as they shoulder the cost of supplying emergency assistance to victims of natural disasters. Indeed, the argument for having taxpayers cover losses connected to last-resort lending is the stronger of the two, insofar as such lending may avert a systematic crisis that could end up having financial costs exceeding those of almost any earthquake.

A second, related argument against Fed purchases of private securities is that such purchases will distort credit markets by favoring certain securities over others. "If the Fed purchases private securities," David Marshall (2002: 52) observes, "it might be seen as

[14]The Fed's founders themselves erred, on the other hand, in adhering to the "real bills doctrine"—a doctrine that, besides limiting the sorts of private collateral upon which the Fed was willing to extend credit, caused it to surrender control of monetary policy to a badly programmed "automatic pilot."

[15]The scale of the Fed's recent outright Treasury security purchases has, however, revived fears of renewed Fed financing of deficit spending, prompting the Fed and the Treasury to release a March 23, 2009, joint statement reaffirming the Fed's independence.

selectively approving those obligors whose paper it purchases." It was owing to this concern that the Fed made its final transition to a Treasuries-only policy, between 1977 and 1984, by gradually phasing out purchases of bankers' acceptances.

But a Treasuries-only policy seems neither necessary nor sufficient for the avoidance of Fed favoritism. It isn't necessary because the Fed, rather than arbitrarily favoring certain securities or issuers, might (once again following the ECB's lead—and to some extent that of its own discount-window facility) demarcate a set of eligible securities using various objective criteria, such as issuers' (risk-adjusted) capital and private-agency security ratings; it isn't sufficient because, by dealing with Treasuries only, the Fed plays favorites with the U.S. Treasury. [16]

Here my prescription resembles, and is partly inspired by, Willem Buiter and Anne Sibert's (2007) suggestion that central banks serve as "market makers of last resort," by either buying outright or accepting as repo collateral "systematically important" private financial instruments that have become illiquid, perhaps ceasing to have any market price at all, owing to a breakdown of the markets in which such instruments usually trade. In particular, Buiter (2008a) has proposed that during financial market disruptions the Bank of England (and other central banks, presumably) should offer to purchase or accept as repo collateral "a slightly extended version of what the ECB currently accepts," to wit, any security "rated at least in the single A category." To discover the value of illiquid instruments, and avoid subsidizing their sellers, the Bank can purchase them by means of a "reverse Dutch auction," in which an initial, minimum purchase price is raised progressively until either no buyers are left or the predetermined purchase amount is met (see also Buiter 2007, 2008b).

Buiter and Sibert's proposal has come under criticism for assuming that central banks can, by means of appropriately designed auctions, determine efficient prices even for heterogeneous financial instruments, such as mortgage-backed securities, that lack deep markets and so may not assure multiple auction offers

[16]In this respect the "pet securities" argument for Treasuries only reminds one of the similarly question-begging "pet banks" charge leveled at Andrew Jackson when he transferred the government's deposits from the Second Bank of the United States to various state banks.

(Smith 2007). My proposal differs both in limiting auctions to such private securities as do not pose the difficulty just mentioned, and in being intended to inform the conduct of open market operations both during crises and in ordinary times, so as to eliminate any need for "emergency" rule changes.

The procedure I have in mind, if only in the crudest of outlines, involves simultaneous reverse (single price) auctions for a set of different securities.[17] The Fed would first have to decide what security types are eligible, favoring those for which holdings are sufficiently dispersed to provide for competitive bidding, and (to further discourage adverse selection) indicating maximum values of total and individual security purchases that it is prepared to make from a single participant.[18] The list of such securities could be compiled, and regularly updated, using reports regularly submitted by prospective counterparties as one requirement for eligibility. Next the Fed would announce the total value of an intended purchase, along with reference prices (reflecting risk-based "valuation haircuts") for particular securities. It would then hold simultaneous reverse auctions, with descending prices *expressed as reference-price percentages*, for each security type, allowing individual counterparties to take part in any or all auctions. The auction continues, through descending-price rounds, until the total nominal value of securities offered at an announced price equals the intended aggregate purchase.

Although this auction procedure may seem cumbersome, thanks to modern technology developing the necessary software to implement it should be well within the Fed's capabilities. Its virtues, as I indicated, are twofold. First, because it pits bidders offering different securities against each other, it can assist in establishing appropriate prices for, and hence enhance the liquidity of, similar securities that might not themselves qualify for direct Fed purchases. Second and more importantly, it allows the *composition* of open market purchases to adjust automatically with changing market conditions, with few if any central bank purchases of relatively high-risk and long-maturity instruments taking place in normal times, and more such

[17]Some countries, including France, routinely make use of multiple security auctions for primary market issues of government securities.

[18]Under the TAF, bidding by individual participants was limited to 10 percent of total amounts being auctioned.

purchases—perhaps substantially more—occurring during times of financial distress. To assure this outcome, and thereby make a single set of open-market rules suffice to consistently conform to Bagehot's rule, while still guarding against adverse selection, the Fed need only take care to set sufficiently low reference prices.[19]

These prescriptions, taken together, might be summarized by paraphrasing Bagehot as follows: the Fed should at all times be prepared to buy good securities freely, outright or subject to repurchase, at competitively determined prices that reflect, but are generally lower than, the values those securities would normally command in the private marketplace.

Revive the Term Auction Facility

A revived TAF, like the one established by the Fed on December 12, 2007, in response to commercial banks' apparent reluctance to borrow from its discount window, and considerably expanded in March 2009, could also serve as a ready-made means for the Fed to implement several of the prescriptions suggested above. Using the TAF the Fed auctioned off predetermined amounts of credit to depository institutions, for terms of either 28 or 84 days, against the same collateral accepted at its discount window, financing the sales by selling Treasury securities. Banks with surplus reserves that were reluctant (owing to perceived counterparty risk) to lend them in the federal funds market, could use the funds to buy the Treasury securities that the Fed sold, while banks that were short of reserves, but unwilling to borrow from the discount window, could bid for TAF funds. So long as the interest the Fed earned on TAF credit exceeded the interest on Treasuries it

[19]After sketching out my auction plan I discovered much more carefully thought-out proposals in the same spirit by Lawrence Ausubel and Peter Cramton (2008) (for implementing the TARP) and Paul Klemperer (2010) (to assist the Bank of England in combatting the post-Northern-Rock credit crunch). In particular, the Ausubel and Cramton proposal goes beyond mine in including enhancements designed to allow for open market purchases of securities for which efficient reference prices are initially unascertainable. In soliciting the Klemperer proposal, the Bank of England asked that the design be one that it could also employ in normal times; in fact it has been using the procedure regularly since the crisis. For further discussion of the challenges involved in designing multiple-security central bank auctions, see Koulischer and Struyven (2011).

sold, the program did not expose the Fed to any significant risk, although it did expose taxpayers to potential losses (Goodfriend 2009: 12–13).[20]

Although not, strictly speaking, a vehicle for open market operations, the TAF was something of a cross between such operations and discount window lending: like the former it had counterparties taking part in the auctioning of new reserves, thus allowing borrowers to avoid the stigma connected to discount window borrowing, while letting the Fed maintain control of the total stock of bank reserves and limiting its involvement in the allocation of credit. On the other hand the TAF lent on the same relatively generous collateral accepted by the discount window, and was open to depository institutions other than primary dealers.

A shortcoming of the original TAF was that it appeared to violate Bagehot's principles by extending credit at subsidy rather than penalty rates. According to Thornton (2008), whereas the Fed set its discount window primary credit rate at 100 basis points above its target federal funds rate, its lending rate under TAF—the so-called stop-out rate that sufficed to exhaust whatever amount of funds it placed on auction—was often below its primary credit rate. Since the primary credit rate is itself often a subsidy rather than penalty rate, TAF lending was itself effectively subsidized, and TAF for that reason cannot be said to have functioned solely as a vehicle for last-resort lending. To avoid this shortcoming, a revived TAF might

[20]Just how effective TAF was is controversial. Taylor and Williams (2008), Cecchetti (2009), and Mamun, Hassan, and Johnson (2010) claim TAF was ineffective. McAndrews, Sarkar, and Wang (2008), Christensen, Lopez, and Rudebusch (2009), and Wu (2011) offer more positive appraisals. At least some of the TAF's apparent ineffectiveness appears to stem from the fact that the Fed chose to sterilize TAF lending, financing it, in effect, by selling Treasury securities to prospective lenders in the federal funds market. Consequently, rather than increase the overall supply of liquidity to financial institutions, prior to Lehman's failure the Fed merely forced a reallocation of liquidity to institutions that took advantage of the TAF and PDCF (Thornton 2009a, 2009b). According to Thornton (2009b), if instead the Fed had "pursued a policy of increasing the total supply of credit (the monetary base)," that is, had it engaged in quantitative easing before September 2008, "financial market participants would have been better able to adjust to a decline in house prices," and the failures of Bear Stearns, Lehman Brothers, and AIG as well as the need for TARP might have been avoided.

maintain a penalty minimum bid rate, while retaining the option of increasing the frequency or size of its auctions when stop-out rates substantially exceed the minimum. Although the presence of such a minimum acceptable bid might prevent the facility from making its announced maximum advance, any difference could be made up by the open market desk, which would in any case have to coordinate its operations with those of the TAF.[21]

Stop Last-Resort Discount Window Lending

It may seem paradoxical to conclude a list of purportedly "Bagehotian" prescriptions by recommending that the Fed altogether cease to engage in direct last-resort lending. But Bagehot wrote at a time when private securities markets were as yet undeveloped, and when central banks made no use at all of open market operations as these are presently understood. Consequently in his day it was only by means of direct lending that the Bank of England could be expected to supply credit "freely" in exchange for good (but mostly unmarketable) collateral.

Today of course all this has changed. Though a "Bagehotian" case can still be made for occasional direct Fed lending so long as the Fed's open market operations are confined, not only to a small number of counterparties but also to a small subset of "good" securities, that case would no longer be valid were the scope of such operations expanded in the manner suggested above. Instead, under such an expanded open market framework, direct extended-term lending (as opposed to "adjustment" and seasonal lending) would be more likely than ever to violate Bagehot's Rule, because it would be unlikely to serve any purpose other than to supply credit to individual banks (and perhaps to other firms) that lack good securities of any sort, and are therefore almost certainly insolvent. As Armantier et al. (2011: 27) observe, even under the Fed's present, constrained open-market framework, banks' discount-window visits carry a stigma severe enough to render discount-window lending almost useless

[21]For further details concerning how a revived TAF or similar "Auction Credit Facility" might operate, see Board of Governors (2002, section 3: 3–7 and 35–39).

as a means for preserving liquidity during financial crises. "One may," they conclude, "question the ability [sic] of the DW [discount window] as a channel to supply liquidity simultaneously to a broad set of banks."[22]

Conclusion

In 1873, Bagehot confessed:

> I know it will be said that in this article I have pointed out a deep malady, and only suggested a superficial remedy. I have tediously insisted that the natural system of banking is that of many banks keeping their own cash reserve, with the penalty of failure before them if they neglect it. I have shown that our system is that of a single bank keeping the whole reserve under no effectual penalty of failure. And yet I propose to maintain that system, and only attempt to mend and palliate it.

Today, so might I confess. But while Bagehot saw his remedy as an alternative to radical reform, I see mine as a step toward such reform: by reducing the need for ad-hoc changes to the Fed's operating framework, the prescriptions offered here should make it easier to base monetary policy, including last-resort lending, on strict rules, paving the way in turn toward further, more fundamental reforms that might eventually render the FOMC (and hence the Fed itself, understood as an agency exercising *discretion* over U.S. monetary conditions) obsolete.

[22]For an intriguing, contrary perspective, see Bindseil and Würtz (2007), who claim that open market operations are dispensable, and that monetary policy might better be implemented by means of standing-facility lending. Besides overlooking the stigma problem connected to standing-facility lending, this argument assumes a lack, not only of last-resort standing-facility credits, but also of overnight ("adjustment") and seasonal credits. The need for the latter types of discount-window lending is, moreover, itself largely a consequence of legal restrictions, including statutory reserve requirements and the Fed's monopoly of paper currency. Concerning the role of reserve requirements see Ely (1997), who observes that the volatility of the federal funds rate is mainly due to "the biweekly scramble of banks . . . to meet their reserve requirements for the just-ended two-week reserve computation period." Concerning currency monopoly as a cause of seasonal credit market pressures in the absence of accommodative central bank policies, see Selgin (1986).

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