

## Jeremy C Stein: Liquidity regulation and central banking

Speech by Mr Jeremy C Stein, Member of the Board of Governors of the Federal Reserve System, at the “Finding the right balance” 2013 Credit Markets Symposium, sponsored by the Federal Reserve Bank of Richmond, Charlotte, North Carolina, 19 April 2013.

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I'd like to talk today about one important element of the international regulatory reform agenda – namely, liquidity regulation.<sup>1</sup> Liquidity regulation is a relatively new, post-crisis addition to the financial stability toolkit. Key elements include the Liquidity Coverage Ratio (LCR), which was recently finalized by the Basel Committee on Banking Supervision, and the Net Stable Funding Ratio, which is still a work in progress. In what follows, I will focus on the LCR.

The stated goal of the LCR is straightforward, even if some aspects of its design are less so. In the words of the Basel Committee, “The objective of the LCR is to promote the short-term resilience of the liquidity risk profile of banks. It does this by ensuring that banks have an adequate stock of unencumbered high-quality liquid assets (HQLA) that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30 calendar day liquidity stress scenario.”<sup>2</sup> In other words, each bank is required to model its total outflows over 30 days in a liquidity stress event and then to hold HQLA sufficient to accommodate those outflows. This requirement is implemented with a ratio test, where modeled outflows go in the denominator and the stock of HQLA goes in the numerator; when the ratio equals or exceeds 100 percent, the requirement is satisfied.

The Basel Committee issued the first version of the LCR in December 2010. In January of this year, the committee issued a revised final version of the LCR, following an endorsement by its governing body, the Group of Governors and Heads of Supervision (GHOS). The revision expands the range of assets that can count as HQLA and also adjusts some of the assumptions that govern the modeling of net outflows in a stress scenario. In addition, the committee agreed in January to a gradual phase-in of the LCR, so that it only becomes fully effective on an international basis in January 2019. On the domestic front, the Federal Reserve expects that the U.S. banking agencies will issue a proposal later this year to implement the LCR for large U.S. banking firms.

While this progress is welcome, a number of questions remain. First, to what extent should access to liquidity from a central bank be allowed to count toward satisfying the LCR? In January, the GHOS noted that the interaction between the LCR and the provision of central bank facilities is critically important. And the group instructed the Basel Committee to continue working on this issue in 2013.

Second, what steps should be taken to enhance the usability of the LCR buffer – that is, to encourage banks to actually draw down their HQLA buffers, as opposed to fire-selling other less liquid assets? The GHOS has also made clear its view that, during periods of stress, it would be appropriate for banks to use their HQLA, thereby falling below the minimum. However, creating a regime in which banks voluntarily choose to do so is not an easy task. A number of observers have expressed the concern that if a bank is held to an LCR standard of 100 percent in normal times, it may be reluctant to allow its ratio to drop below 100 percent

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<sup>1</sup> The views that follow are my own and are not necessarily shared by my colleagues on the Federal Reserve Board. I am grateful to members of the Board staff – Sean Campbell, Mark Carlson, Burcu Duygan-Bump, Michael Gibson, William Nelson, and Mark Van Der Weide – for many helpful conversations and suggestions.

<sup>2</sup> See Basel Committee on Banking Supervision (2013), [Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools \(PDF\)](#) (Basel: Bank for International Settlements, January), p. 1.

when facing large outflows, even if regulators were to permit this temporary deviation, for fear that a decline in the ratio could be interpreted as a sign of weakness.

My aim here is to sketch a framework for thinking about these and related issues. Among them, the interplay between the LCR and central bank liquidity provision is perhaps the most fundamental and a natural starting point for discussion. By way of motivation, note that before the financial crisis, we had a highly developed regime of capital regulation for banks – albeit one that looks inadequate in retrospect – but we did not have formal regulatory standards for their liquidity.<sup>3</sup> The introduction of liquidity regulation after the crisis can be thought of as reflecting a desire to reduce dependence on the central bank as a lender of last resort (LOLR), based on the lessons learned over the previous several years. However, to the extent that some role for the LOLR still remains, one now faces the question of how it should coexist with a regime of liquidity regulation.

To address this question, it is useful to take a step back and ask another one: What underlying market failure is liquidity regulation intended to address, and why can't this market failure be handled entirely by an LOLR? I will turn to this question first. Next, I will consider different mechanisms that could potentially achieve the goals of liquidity regulation, and how these mechanisms relate to various features of the LCR. In so doing, I hope to illustrate why, even though liquidity regulation is a close cousin of capital regulation, it nevertheless presents a number of novel challenges for policymakers and why, as a result, we are going to have to be open to learning and adapting as we go.

### **The case for liquidity regulation**

One of the primary economic functions of banks and other financial intermediaries, such as broker-dealers, is to provide liquidity – that is, cash on demand – in various forms to their customers. Some of this liquidity provision happens on the liability side of the balance sheet, with bank demand deposits being a leading example. But, importantly, banks also provide liquidity via committed lines of credit. Indeed, it is probably not a coincidence that these two products – demand deposits and credit lines – are offered under the roof of the same institution; the underlying commonality is that both require an ability to accommodate unpredictable requests for cash on short notice.<sup>4</sup> A number of other financial intermediary services, such as prime brokerage, also embody a significant element of liquidity provision.

Without question, these liquidity-provision services are socially valuable. On the liability side, demand deposits and other short-term bank liabilities are safe, easy-to-value claims that are well suited for transaction purposes and hence create a flow of money-like benefits for their holders.<sup>5</sup> And loan commitments are more efficient than an arrangement in which each operating firm hedges its future uncertain needs by “pre-borrowing” and hoarding the proceeds on its own balance sheet; this latter approach does a poor job of economizing on the scarce aggregate supply of liquid assets.<sup>6</sup>

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<sup>3</sup> Although bank liquidity was not regulated prior to the crisis, it played an important part in the supervisory process. For example, in the CAMELS ratings used by supervisors, the “L” stands for “liquidity.”

<sup>4</sup> For an elaboration of this argument, see Anil K. Kashyap, Raghuram Rajan, and Jeremy C. Stein (2002), [“Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-Taking,”](#) *Journal of Finance*, vol. 57 (February), pp. 33–73.

<sup>5</sup> See Gary Gorton and George Pennacchi (1990), [“Financial Intermediaries and Liquidity Creation,”](#) *Journal of Finance*, vol. 45 (March), pp. 49–71. Demand deposits may also represent a form of insurance against liquidity shocks, as argued in Douglas W. Diamond and Philip H. Dybvig (1983), [“Bank Runs, Deposit Insurance, and Liquidity,”](#) *Journal of Political Economy*, vol. 91 (June), pp. 401–19.

<sup>6</sup> See Bengt Holmström and Jean Tirole (1998), [“Private and Public Supply of Liquidity,”](#) *Journal of Political Economy*, vol. 106 (February), pp. 1–40.

At the same time, as the financial crisis made painfully clear, the business of liquidity provision inevitably exposes financial intermediaries to various forms of run risk. That is, in response to adverse events, their fragile funding structures, together with the binding liquidity commitments they have made, can result in rapid outflows that, absent central bank intervention, lead banks to fire-sell illiquid assets or, in a more severe case, to fail altogether. And fire sales and bank failures – and the accompanying contractions in credit availability – can have spillover effects to other financial institutions and to the economy as a whole. Thus, while banks will naturally hold buffer stocks of liquid assets to handle unanticipated outflows, they may not hold enough because, although they bear all the costs of this buffer stocking, they do not capture all of the social benefits, in terms of enhanced financial stability and lower costs to taxpayers in the event of failure. It is this externality that creates a role for policy.

There are two broad types of policy tools available to deal with this sort of liquidity-based market failure. The first is after-the-fact intervention, either by a deposit insurer guaranteeing some of the bank's liabilities or by a central bank acting as an LOLR; the second type is liquidity regulation. As an example of the former, when the economy is in a bad state, assuming that a particular bank is not insolvent, the central bank can lend against illiquid assets that would otherwise be fire-sold, thereby damping or eliminating the run dynamics and helping reduce the incidence of bank failure.

In much of the literature on banking, such interventions are seen as the primary method for dealing with run-like liquidity problems. A classic statement of the central bank's role as an LOLR is Walter Bagehot's 1873 book *Lombard Street*. More recently, the seminal theoretical treatment of this issue is by Douglas Diamond and Philip Dybvig, who show that under certain circumstances, the use of deposit insurance or an LOLR can eliminate run risk altogether, thereby increasing social welfare at zero cost.<sup>7</sup> To be clear, this work assumes that the bank in question is fundamentally solvent, meaning that while its assets may not be liquid on short notice, the long-run value of these assets is known with certainty to exceed the value of the bank's liabilities.<sup>8</sup> One way to interpret the message of this research is that capital regulation is important to ensure solvency, but once a reliable regime of capital regulation is in place, liquidity problems can be dealt with after the fact, via some combination of deposit insurance and use of the LOLR.

It follows that if one is going to make an argument in favor of adding preventative liquidity regulation such as the LCR on top of capital regulation, a central premise must be that the use of LOLR capacity in a crisis scenario is socially costly, so that it is an explicit objective of policy to economize on its use in such circumstances. I think this premise is a sensible one.<sup>9</sup> A key point in this regard – and one that has been reinforced by the experience of the past several years – is that the line between illiquidity and insolvency is far blurrier in real life than it is sometimes assumed to be in theory. Indeed, one might argue that a bank or broker-dealer that experiences a liquidity crunch must have some probability of having solvency problems as well; otherwise, it is hard to see why it could not attract short-term funding from the private market.

This reasoning implies that when the central bank acts as an LOLR in a crisis, it necessarily takes on some amount of credit risk. And if it experiences losses, these losses ultimately fall

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<sup>7</sup> See Diamond and Dybvig, "Bank Runs," in note 5.

<sup>8</sup> The underlying premise of solvency is captured in Bagehot's famous dictum for use of the LOLR: In times of crisis, the central bank should lend freely (and at a penalty rate) to banks, provided that the banks are solvent and that the loans are adequately collateralized. See Walter Bagehot ([1873] 1999), *Lombard Street: A Description of the Money Market* (London: King; reprint, New York: Wiley).

<sup>9</sup> This is, of course, not to say that the LOLR should not be used in extreme circumstances – only that doing so comes with a cost, so policy should seek to reduce the likelihood that it will have to be used.

on the shoulders of taxpayers. Moreover, the use of an LOLR to support banks when they get into trouble can lead to moral hazard problems, in the sense that banks may be less prudent *ex ante*. If it were not for these costs of using LOLR capacity, the problem would be trivial, and there would be no need for liquidity regulation: Assuming a well-functioning capital-regulation regime, the central bank could always avert all fire sales and bank failures *ex post*, simply by acting as an LOLR.

This observation carries an immediate implication: It makes no sense to allow unpriced access to the central bank's LOLR capacity to count toward an LCR requirement. Again, the whole point of liquidity regulation must be either to conserve on the use of the LOLR or in the limit, to address situations where the LOLR is not available at all – as, for example, in the case of broker-dealers in the United States.<sup>10</sup>

At the same time, it is important to draw a distinction between priced and unpriced access to the LOLR. For example, take the case of Australia, where prudent fiscal policy has led to a relatively small stock of government debt outstanding and hence to a potential shortage of HQLA. The Basel Committee has agreed to the use by Australia of a Committed Liquidity Facility (CLF), whereby an Australian bank can pay the Reserve Bank of Australia an up-front fee for what is effectively a loan commitment, and this loan commitment can then be counted toward its HQLA. In contrast to free access to the LOLR, this approach is not at odds with the goals of liquidity regulation because the up-front fee is effectively a tax that serves to deter reliance on the LOLR – which, again, is precisely the ultimate goal. I will return to the idea of a CLF shortly.

## **The design of regulation**

Once it has been decided that liquidity regulation is desirable, the next question is how best to implement it. In this context, note that the LCR has two logically distinct aspects as a regulatory tool: It is a mitigator, in the sense that holding liquid assets leads to a better outcome if there is a bad shock; it is also an implicit tax on liquidity provision by banks, to the extent that holding liquid assets is costly. Of course, one can say something broadly similar about capital requirements. But the implicit tax associated with the LCR is subtler and less well understood, so I will go into some detail here.

An analogy may help to explain. Suppose we have a power plant that produces energy and, as a byproduct, some pollution. Suppose further that regulators want to reduce the pollution and have two tools at their disposal: They can mandate the use of a pollution-mitigating technology, like scrubbers, or they can levy a tax on the amount of pollution generated by the plant. In an ideal world, regulation would accomplish two objectives. First, it would lead to an optimal level of mitigation – that is, it would induce the plant to install scrubbers up to the point where the cost of an additional scrubber is equal to the marginal social benefit, in terms of reduced pollution. And, second, it would also promote conservation: Given that the scrubbers don't get rid of pollution entirely, one also wants to reduce overall energy consumption by making it more expensive.

A simple case is one in which the costs of installing scrubbers, as well as the social benefits of reduced pollution, are known in advance by the regulator and the manager of the power plant. In this case, the regulator can figure out what the right number of scrubbers is and require that the plant install these scrubbers. The mandate can therefore precisely target the optimal amount of mitigation per unit of energy produced. And, to the extent that the

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<sup>10</sup> The fact that broker-dealers do not have access to the LOLR in the United States is, of course, ultimately a policy choice, and one that can be thought of as reflecting exactly the considerations discussed here: Whatever its merits, extending the LOLR to broker-dealers would increase taxpayer exposure and potentially exacerbate moral hazard problems. Hence there may be a rationale for restricting its availability and relying on regulation instead.

scrubbers are costly, the mandate will also lead to higher energy prices, which will encourage some conservation, though perhaps not the socially optimal level.<sup>11</sup> This latter effect is the implicit tax aspect of the mandate.

A more complicated case is when the regulator does not know ahead of time what the costs of building and installing scrubbers will be. Here, mandating the use of a fixed number of scrubbers is potentially problematic: If the scrubbers turn out to be very expensive, the regulation will end up being more aggressive than socially desirable, leading to overinvestment in scrubbers and large cost increases for consumers; however, if the scrubbers turn out to be cheaper than expected, the regulation will have been too soft. In other words, when the cost of the mitigation technology is significantly uncertain, a regulatory approach that fixes the quantity of mitigation is equivalent to one where the implicit tax rate bounces around a lot.

By contrast, a regulatory approach that fixes the price of pollution instead of the quantity – say, by imposing a predetermined proportional tax rate directly on the amount of pollution emitted by the plant – is more forgiving in the face of this kind of uncertainty. This approach leaves the scrubber-installation decision to the manager of the plant, who can figure out what the scrubbers cost before deciding how to proceed. For example, if the scrubbers turn out to be unexpectedly expensive, the plant manager can install fewer of them. This flexibility translates into less variability in the effective regulatory burden and hence less variability in the price of energy to consumers.<sup>12</sup>

### **Scrubbers and high-quality liquid assets**

What does all this imply for the design of the LCR? Let's work through the analogy in detail. The analog to the power plant's energy output is the gross amount of liquidity services created by a bank – via its deposits, the credit lines it provides to its customers, the prime brokerage services it offers, and so forth. The analog to the mitigation technology – the scrubbers – is the stock of HQLA that the bank holds. And the analog to pollution is the net liquidity risk associated with the difference between these two quantities, something akin to the LCR shortfall. That is, when the bank offers a lot of liquidity on demand to its customers but fails to hold an adequate buffer of HQLA, this is when it imposes spillover costs on the rest of the financial system.

In the case of the power plant, I argued that a regulation that calls for a fixed quantity of mitigation – that is, for a fixed number of scrubbers – is more attractive when there is little uncertainty about the cost of these scrubbers. In the context of the LCR, the cost of mitigation is the premium that the bank must pay – in the form of reduced interest income – for its stock of HQLA. And, crucially, this HQLA premium is determined in market equilibrium and depends on the total supply of safe assets in the system, relative to the demand for those assets. On the one hand, if safe HQLA-eligible assets are in ample supply, the premium is likely to be low and stable. On the other hand, if HQLA-eligible assets are scarce, the premium will be both higher and more volatile over time.

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<sup>11</sup> Even in this simple full-information case, one cannot generally attain the social optimum on both the mitigation and conservation dimensions using just a mandate to install scrubbers as the only regulatory instrument. By contrast, a tax on pollution, which decentralizes output and mitigation decisions to the firm, can, under full information, attain the optimum on both dimensions.

<sup>12</sup> On the flip side, however, the same flexibility means that there will be more variability in the total amount of pollution generated by the plant – because when costs of mitigation are high, less mitigation will be done. So in the face of uncertainty, one cannot conclude that a price-based tax regime is necessarily superior to a quantity-based mitigation regime. This reasoning follows the classic analysis of Weitzman; see Martin L. Weitzman (1974), "[Prices vs. Quantities](#)," *Review of Economic Studies*, vol. 41 (October), pp. 477–91.

This latter situation is the one facing countries like Australia, where, as I noted earlier, the stock of outstanding government securities is relatively small. And it explains why, for such countries, having a price-based mechanism as part of their implementation of the LCR can be more appealing than pure reliance on a quantity mandate. When one sets an up-front fee for a CLF, one effectively caps the implicit tax associated with liquidity regulation at the level of the commitment fee and tamps down the undesirable volatility that would otherwise arise from an entirely quantity-based regime.

Moreover, it bears reemphasizing that having a CLF with an up-front fee is very different from simply allowing banks to count central-bank-eligible collateral as HQLA at no charge. Rather, the CLF is like the pollution tax. For every dollar of pre-CLF shortfall – that is, for every dollar of required liquidity that a bank can't obtain on the private market – the bank has to pay the commitment fee. So even if there is not as much mitigation, there is still an incentive for conservation, in the sense that banks are encouraged to do less liquidity provision, all else being equal. This would not be the case if the CLF were available at a zero price.

What about the situation in countries where safe assets are more plentiful? The analysis here has a number of moving parts because in addition to the implementation of the LCR, substantial increases in demand for safe assets will arise from new margin requirements for both cleared and noncleared derivatives. Nevertheless, given the large and growing global supply of sovereign debt securities, as well as other HQLA-eligible assets, most estimates suggest that the scarcity problem should be manageable, at least for the foreseeable future.

In particular, quantitative impact studies released by the Basel Committee estimate that the worldwide incremental demand for HQLA coming from both the implementation of the LCR and swap margin requirements might be on the order of \$3 trillion.<sup>13</sup> This is a large number, but it compares with a global supply of HQLA-eligible assets of more than \$40 trillion.<sup>14</sup> Moreover, the eligible collateral for swap margin is proposed to be broader than the LCR's definition of HQLA – including, for example, certain equities and corporate bonds without any cap. If one focuses just on U.S. institutions, the incremental demand number is on the order of \$1 trillion, while the sum of Treasury, agency, and agency mortgage-backed securities is more than \$19 trillion.<sup>15</sup>

While this sort of analysis is superficially reassuring, the fact remains that the HQLA premium will depend on market-equilibrium considerations that are hard to fully fathom in advance, and that are likely to vary over time. This uncertainty needs to be understood, and respected. Indeed, the market-equilibrium aspect of the problem represents a crucial distinction between capital regulation and liquidity regulation, and it is one reason why the latter is particularly

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<sup>13</sup> To be more precise, global incremental demand coming from swap margin requirements is estimated at \$1.24 trillion; see Basel Committee on Banking Supervision and Board of the International Organization of Securities Commissions (2013), [Margin Requirements for Non-Centrally Cleared Derivatives: Second Consultative Document](#) (Basel: Bank for International Settlements and IOSCO, February). Of this \$1.24 trillion, \$810 billion reflects margin (net of collateral already collected) on uncleared swaps, and \$420 billion reflects margin on swaps that will migrate to central clearing. In addition, global incremental demand coming from the LCR is estimated at \$2.39 trillion; see Basel Committee on Banking Supervision (2012), [Results of the Basel III Monitoring Exercise as of 30 June 2011](#) (Basel: Bank for International Settlements, April). However this latter number is based on the December 2010 version of the LCR; the recalibration of the LCR in the January 2013 final version will reduce this value for U.S. banks by roughly one-third. Extrapolating this result to the global level suggests that incremental demand resulting from the LCR will fall by roughly \$800 billion to \$1.6 trillion.

<sup>14</sup> Committee on the Global Financial System (forthcoming), *Asset Encumbrance, Financial Reform and the Demand for Collateral Assets* (Basel: Bank for International Settlements).

<sup>15</sup> According to Federal Reserve Board flow of funds data, as of December 31, 2012 the total stock of U.S. Treasury securities stood at \$11.6 trillion, and the total stock of agency debt and mortgage-backed securities stood at \$7.5 trillion. A caveat here is that agency mortgage-backed securities are considered Level 2 assets, so they can count for at most 40 percent of any bank's total holdings of HQLA.

challenging to implement. Although capital regulation also imposes a tax on banks – to the extent that equity is a more expensive form of finance than debt – this tax wedge is, to a first approximation, a fixed constant for a given bank, independent of the scale of overall financial intermediation activity. If Bank A decides to issue more equity so it can expand its lending business, this need not make it more expensive for Bank B to satisfy its capital requirement. In other words, there is no scarcity problem with respect to bank equity – both A and B can always make more. By contrast, the total supply of HQLA is closer to being fixed at any point in time.<sup>16</sup>

## Policy implications

What does all of this imply for policy design? First, at a broad philosophical level, the recognition that liquidity regulation involves more uncertainty about costs than capital regulation suggests that even a policymaker with a very strict attitude toward capital might find it sensible to be somewhat more moderate and flexible with respect to liquidity. This point is reinforced by the observation that when an institution is short of capital and can't get more on the private market, there is really no backup plan, short of resolution. By contrast, as I mentioned earlier, when an institution is short of liquidity, policymakers do have a backup plan in the form of the LOLR facility. One does not want to rely too much on that backup plan, but its presence should nevertheless factor into the design of liquidity regulation.

Second, in the spirit of flexibility, while a price-based mechanism such as the CLF may not be immediately necessary in countries outside of Australia and a few others, it is worth keeping an open mind about the more widespread use of CLF-like mechanisms. If a scarcity of HQLA-eligible assets turns out to be more of a problem than we expect, something along those lines has the potential to be a useful safety valve, as it puts a cap on the cost of liquidity regulation. Such a safety valve would have a direct economic benefit, in the sense of preventing the burden of regulation from getting unduly heavy in any one country.

Perhaps just as important, a safety valve might also help to protect the integrity of the regulation itself, by harmonizing costs across countries and thereby reducing the temptation of those most hard-hit by the rules to try to chip away at them. Without such a safety valve, it is possible that some countries – those with relatively small supplies of domestic HQLA – will find the regulation considerably more costly than others. If so, it would be natural for them to lobby to dilute the rules – for example, by arguing for an expansion in the type of assets that can count as HQLA. Taken too far, this sort of dilution would undermine the efficacy of the regulation as both a mitigator and a tax. In this scenario, holding the line with what amounts to a proportional tax on liquidity provision would be a better outcome.<sup>17</sup>

One situation where liquid assets can become unusually scarce is during a financial crisis. Consequently, even if CLFs were not counted toward the LCR in normal times, it might be appropriate to count them during a crisis. Indeed, while the LCR requires banks to hold sufficient liquid assets in good times to meet their outflows in a given stress scenario, it implicitly recognizes that if things turn out even worse than that scenario, central bank liquidity support will be needed. Allowing CLFs to count toward the LCR in such circumstances would acknowledge the importance of access to the central bank, and this access could be priced accordingly.

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<sup>16</sup> This is not to say that banks cannot adjust on other margins if HQLA is in unexpectedly short supply. For example, they can do less liquidity provision, by terming out their funding or by extending fewer credit lines. This is like the power plant doing more conservation and less mitigation: It reduces the upward pressure on the price of scrubbers (or HQLA), at the cost of cutting back on a set of services that presumably has some social value.

<sup>17</sup> To be sure, it is possible that the rules could be diluted in the context of a price-based CLF mechanism as well, for example, through the administration of collateral-eligibility criteria or haircut requirements.

Finally, a price-based mechanism might also help promote a willingness of banks to draw down their supply of HQLA in a stress scenario. As I noted at the outset, one important concern about a pure quantity-based system of regulation is that if a bank is held to an LCR standard of 100 percent in normal times, it may be reluctant to allow its ratio to fall below 100 percent when facing large outflows for fear that doing so might be seen by market participants as a sign of weakness.

By contrast, in a system with something like a CLF, a bank might in normal times meet 95 percent of its requirement by holding private-market HQLA and the remaining 5 percent with committed credit lines from the central bank, so it would have an LCR of exactly 100 percent. Then, when hit with large outflows, it could maintain its LCR at 100 percent, but do so by increasing its use of central bank credit lines to 25 percent and selling 20 percent of its other liquid assets.<sup>18</sup> This scenario would be the sort of liquid-asset drawdown that one would ideally like to see in a stress situation. Moreover, the central bank could encourage this drawdown by varying the pricing of its credit lines – specifically, by reducing the price of the lines in the midst of a liquidity crisis. Such an approach would amount to taxing liquidity provision more in good times than in bad, which has a stabilizing macroprudential effect.

This example also suggests a design that may have appeal in jurisdictions where there is a relatively abundant supply of HQLA-eligible assets. One can imagine calibrating the pricing of the CLF so as to ensure that lines provided by central banks make up only a minimal fraction of banks' required HQLA in normal times – apart, perhaps, from the occasional adjustment period after an individual bank is hit with an idiosyncratic liquidity shortfall. At the same time, in a stress scenario, when liquidity is scarce and there is upward pressure on the HQLA premium, the pricing of the CLF could be adjusted so as to relieve this pressure and promote usability of the HQLA buffer. Such an approach would respect the policy objective of reducing expected reliance on the LOLR while at the same time allowing for a safety valve in a period of stress. The limit case of this approach is one where the CLF counts toward the LCR only in a crisis.

## Conclusion

By way of conclusion, let me just restate that liquidity regulation has a key role to play in improving financial stability. However, we should avoid thinking about it in isolation; rather, we can best understand it as part of a larger toolkit that also includes capital regulation and, importantly, the central bank's LOLR function. Therefore, proper design and implementation of liquidity regulations such as the LCR should take account of these interdependencies. In particular, policymakers should aim to strike a balance between reducing reliance on the LOLR on the one hand and moderating the costs created by liquidity shortages on the other hand – especially those shortages that crop up in times of severe market strain. And, as always, we should be prepared to learn from experience as we go.

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<sup>18</sup> This presumes that the bank in question is able to present adequate collateral to the central bank to secure the central bank credit line.