Mutual-Assured Destruction:
The Arms Race between Risk-Based and Leverage Capital Regulation

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Abstract

Data and studies surveyed in this research note indicate that – in sharp contrast to U.S. policy goals – the enhanced supplementary leverage ratio is a binding constraint for the majority of assets held by U.S. GSIBs and will become increasingly binding across the industry absent continued escalation of the risk-based rules. We assess the specified regulatory purposes laid out for the SLR to evaluate the extent to which they may be undermined by a binding leverage rule. We also review where overlaps between the SLR's goals and those of other regulations create unintended cumulative effects. We conclude that adverse and already-evident effects – risk-taking, market-illiquidity, and obstacles to monetary-policy transmission – will be exacerbated as the leverage rule becomes an increasingly binding constraint. Further, attempting to cure for this with escalating risk-based capital requirements is likely to lead to still more unintended results, including accelerated migration of financial-intermediation services outside the banking sector.

It is thus suggested that U.S. policy-makers review the cumulative impact of their capital and related requirements to ensure a balanced capital regime in which risk-based capital reasserts itself as the binding constraint. Further divorcing total U.S. regulatory capital from economic risk is likely to have significant unintended and adverse market-structure, financial-stability, and monetary-policy impact.

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Earlier this year, Federal Financial Analytics (FedFin) issued a major report assessing the unintended consequences of post-crisis regulation on the ability of the Federal Reserve to execute monetary policy and to impose the macroprudential rules needed to ensure long-term financial stability.[1] Based on the 112 sources in that paper and relevant new research, we have proceeded to address specific critical policy challenges amenable to rapid response by the Federal Reserve and other U.S. policy-makers under current law, also taking into account pressing policy and political developments. We do so through a series of research notes that point to immediate challenges requiring either additional research or, where research is already compelling, action. Prior papers assess the impact of U.S. monetary and regulatory policy on income inequality, laying out data that suggest linkage and exploring potential remedies,[2] as well as the effect of Basel's proposal to revise the operational risk capital rules and its incentive-distorting effects.[3]

We here turn to another immediate challenge: the merits of imposing high leverage-capital requirements on the largest banks either in addition to risk-based capital (RBC) requirements or, as proposed by House Financial Services Committee Chairman Jeb Hensarling (R-TX) and passed out of his committee,[4] as a replacement for them in concert with an exemption from many prudential, merger-and-acquisition, and resolution regulations.

Leverage capital – a flat amount of high-quality capital measured against on- and off-balance sheet assets – sounds simple and thus is often seen as a desirable alternative to the more complex RBC approach. Some fear that risk-based capital could be gamed by sophisticated banks, might be set to meet policy – not prudential – objectives, or may result in low capital thresholds that promote too-big-to-fail (TBTF) banking. Complex RBC models required under the advanced approaches also have significant problems, including complexity, cost, and retrospective focus. RBC showed all of these weaknesses in the run-up to the 2008 crisis. However, the extent to which reliance on RBC was tinder to that conflagration is far from clear once stress at non-banks, lack of ready resolution solutions, and other factors are considered.

The value of leverage-capital standards must also be considered in light of the fact that there was one in place in the U.S. for decades prior to 2008. This requirement, still recognized by the Dodd-Frank Act's

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[1] Federal Financial Analytics, *Square Pegs and Round Holes: The Effectiveness of Monetary Policy and Macroprudential Regulation in the Post-Crisis Regulatory Regime* (May 18, 2016), available at http://www.fedfin.com/images/stories/client_reports/FedFin%20White%20Paper%20on%20The%20Effectiveness%20of%20Monetary%20Policy%20and%20Macroprudential%20Regulation%20in%20the%20Post-Crisis%20Regulatory%20Regime.pdf.

[2] Federal Financial Analytics, *Income Inequality: U.S. Monetary-Policy and Regulatory Wealth-Distribution Drivers* (September 19, 2016), available at http://www.fedfin.com/images/stories/client_reports/FedFin%20Paper%20on%20Income-Inequality%20U.S.%20Monetary-Policy%20and%20Regulatory%20Wealth-Distribution%20Drivers.pdf.

[3] Federal Financial Analytics, *Capital's Cast-Off: Operational Risk-Based Capital and Its Critical Implications* (September 30, 2016), available at http://www.fedfin.com/images/stories/client_reports/FedFin%20Paper%20on%20Operational%20Risk-Based%20Capital%20and%20Its%20Critical%20Implications.pdf.

[4] Financial CHOICE Act of 2016, H.R. 5983, 114th Cong. (2016), available at http://financialservices.house.gov/uploadedfiles/bills-114hr-hr5983-h001036-amdt-001.pdf.

"Collins Amendment,"[5] ranges between three and five percent of on-balance sheet assets depending on a bank or bank holding company's (BHC) supervisory rating. One may well argue that this leverage requirement needed to be updated in light of the off-balance sheet assets that were increasingly significant exposures as financial-market complexity grew. However, one reason for this complexity, addressed in testimony FedFin presented to Congress at the time,[6] was that the RBC rules then in place discounted the risk of off-balance sheet commitments, creating strong capital incentives to acquire them. This problem is corrected in the U.S.[7] and global Basel III RBC requirements.[8]

Further, seductive though a simple leverage substitute may be, it poses significant challenges that warrant close examination to ensure that the benefits of simple, comparable regulatory-capital standards are not outweighed by costs, which demonstrably increase when leverage-capital requirements (LR) are considered in the broader context of other regulations.

In the wake of the crisis, U.S. rules now have at least twelve capital "dials"[9] within the broader prudential framework governing large-bank liquidity, derivatives activities, stress testing, and orderly resolution. Perhaps unsurprisingly, the purposes cited for one of these capital rules – the stringent U.S. "enhanced supplementary leverage ratio" (SLR) governing the very largest U.S. banks[10] – show the

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[5] Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203 (Jul. 21, 2010), § 171, available at https://www.gpo.gov/fdsys/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf.

[6] Karen Shaw Petrou, Testimony before the U.S. House Financial Services Subcommittee on Financial Institutions and Consumer Credit, Washington DC: Next Steps for the Basel II Rules, 9 (September 28, 2005), available at http://www.fedfin.com/images/stories/press_center/Testimony_Basel_Final_9-28-05.pdf. See also Karen Shaw Petrou, Testimony before the U.S. House Financial Services Subcommittee on Domestic and International Monetary Policy, Trade, and Technology, Financial Institutions and Consumer Credit, Washington, DC: Basel II: Policy Issues in Complex Proposal Warrant Congressional Scrutiny (February 27, 2003), available at http://www.fedfin.com/images/stories/press_center/ksp_testimony.pdf; Karen Shaw Petrou, Testimony before the U.S. Senate Committee on Banking, Housing, and Urban Affairs, Washington, DC: Basel II: Baby in the Bath Water Worth Saving (June 18, 2003), available at http://www.fedfin.com/images/stories/press_center/Petrous_senate_testimony_061803.pdf; Karen Shaw Petrou, Testimony before the U.S. House Financial Services Subcommittee on Financial Institutions and Consumer Credit and Subcommittee on Domestic and International Monetary Policy, Washington, DC: Basel II Regulation: U.S. Market and Competitiveness Implications (May 11, 2005), available at http://www.fedfin.com/images/stories/press_center/Testimony_Basel_5-11-2005.pdf; Karen Shaw Petrou, Testimony before the U.S. House Financial Services Subcommittee on Financial Institutions and Consumer Credit, Washington, DC (September 14, 2006), available at http://www.fedfin.com/images/stories/press_center/Basel_Testimony_091406.pdf.

[7] Office of the Comptroller of the Currency (OCC) and Federal Reserve Board (FRB) Regulatory Capital Rules: Regulatory Capital, Implementation of Basel III, Capital Adequacy, Transition Provisions, Prompt Corrective Action, Standardized Approach for Risk-Weighted Assets, Market Discipline and Disclosure Requirements, Advanced Approaches Risk-Based Capital Rule, and Market Risk Capital Rule, 12 C.F.R. §§ 3, 5, 6, 165, 167, 208, 217 & 225 (2013), available at https://www.gpo.gov/fdsys/pkg/FR-2013-10-11/pdf/2013-21653.pdf.

[8] Basel Committee on Banking Supervision (BCBS), *Basel III: A global regulatory framework for more resilient banks and banking systems* (June, 2011), available at http://www.bis.org/publ/bcbs189.pdf.

[9] Hugh Carney, *Attempt to 'Simplify' Basel May Add More Complexity*, American Banker, July 19, 2016, at http://www.americanbanker.com/bankthink/attempt-to-simplify-basel-may-add-more-complexity-1090251-1.html.

[10] OCC, FRB, and Federal Deposit Insurance Corporation (FDIC) Regulatory Capital Rules: Regulatory Capital, Enhanced Supplementary Leverage Ratio Standards for Certain Bank Holding Companies and Their Subsidiary Insured Depository Institutions, 12 C.F.R. §§ 6, 208, 217 & 324 (2014), available at https://www.gpo.gov/fdsys/pkg/FR-2014-05-01/pdf/2014-09367.pdf.

overlap between LR and the broader prudential framework, clouding analysis of leverage-capital requirements and their impact on a stand-alone basis.

Given all of these rules and the SLR, the interplay between RBC and LR in the U.S. is particularly challenging. U.S. regulators other than FDIC Vice Chairman Hoenig have made it clear that they believe RBC – not the LR – should be the U.S. binding constraint. Indeed, the SLR states that "...[T]he agencies believe that the proposed enhanced supplementary leverage ratio standards should broadly preserve the historical relationship [i.e., risk-based capital as the binding constraint] between the tier 1 leverage and risk-based capital levels for covered organizations, rather than fundamentally alter such a relationship..."[11] However, as demonstrated below, the SLR is now in fact the binding constraint for the majority of the assets held by the largest U.S. banking organizations.

Regulators hope to correct for this by tightening the RBC surcharge applicable to GSIBs and/or doing the same with stress tests so that RBC is a scenario-adjusted constraint. Indeed, this may well be the objective of the significant changes proposed for CCAR recently unveiled by FRB Gov. Tarullo[12] also described in a pending FRB proposal.[13] However, pile-on of capital requirements may lead to significant unintended consequences especially when the interplay between higher RBC standards and the SLR is considered.

Indeed, action on August 4, 2016 by the Bank of England[14] demonstrates the problematic impact of the LR. In conjunction with monetary policy actions taken to stimulate the U.K. economy, the Bank of England's prudential regulators decided to exclude from the U.K. leverage ratio excess reserves banks hold at the central bank. As discussed below, the U.K. has also identified adverse LR consequences with significant impact on financial stability. No evidence that U.S. regulators have considered the impact of escalating capital requirements has been found, although there is some evidence that the agencies believe the sum total of all these rules diminishes the "negative externalities" possible following large-bank distress. The relationship between this goal for higher RBC and those of the overall U.S. resolution regime are unclear given that the stated objective of the resolution rules is eliminating adverse systemic impact by ensuring that no large U.S. banking organization is too big to fail.

Because of all these moving pieces and numerous other rules, U.S. prudential regulation for the largest banks is in constant flux at the same time that financial markets are rapidly evolving. It is thus at best unclear where the arms race between risk-based and leverage capital in the U.S. will end. It is also uncertain if, when the all-clear sounds, the resulting binding capital constraint – whatever it may be – is economically viable for continued credit and capital formation.

In this paper, we review the current relationship between the U.S. RBC and LR requirements, moving on to assess the interplay between the LR as a binding constraint with other rules. We focus particularly on the relationship of LR to the U.S. liquidity regulations, noting how holdings of the high-quality assets

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[11] *Id.*

[12] FRB Governor Daniel Tarullo, Remarks at the Yale University School of Management Leaders Forum: "Next Steps in the Evolution of Stress Testing," New Haven, CT (September 26, 2016), available at https://www.federalreserve.gov/newsevents/speech/tarullo20160926a.htm.

[13] FRB Amendments to the Capital Plan and Stress Test Rules, 12 C.F.R. §§ 225 & 252 (2016), available at https://www.gpo.gov/fdsys/pkg/FR-2016-09-30/pdf/2016-23629.pdf.

[14] Prudential Regulation Authority (PRA), *Statement on the Leverage Ratio* (August 4, 2016), available at http://www.bankofengland.co.uk/pra/Documents/publications/reports/prastatement0816.pdf.

required by the liquidity rules and the capital charge assigned to them affect the ability of larger U.S. banks to provide loans and otherwise hold the productive, moderate-risk assets essential for economic recovery and equitable wealth distribution. We then proceed to consider the impact of a binding LR in this broader context on several critical financial-stability elements and on the ability of the Federal Reserve to transmit monetary policy to the greatest and most efficient macroeconomic effect. We conclude by evaluating the impact of ever-rising U.S. capital ratios for the largest banks, finding that forward-looking consideration of the cumulative impact of capital regulation in the context of other requirements is required before new rules are imposed. In the absence of such an analysis, significant unintended consequences appear likely.

I. Costs and Benefits of the U.S. Leverage-Capital Framework

In summary, regulatory-capital requirements in the U.S. are generally significantly more stringent than those applicable under the broader global regime established by the Basel Committee on Banking Supervision (BCBS). This results not only from the specific requirements noted below, but also because of the unique nature of a surcharge imposed on the largest U.S. banks found to be global systemically-important banks (GSIBs)[15] and a counter-cyclical capital buffer (CCyB) also unique to the U.S.[16] A partial list of relevant current and prospective capital requirements also includes:

- Risk-based capital standards[17] that may come under new floors and other changes following final action by the Basel Committee. The Dodd-Frank Act[18] also requires U.S. banks that use the advanced, models-based rules to stay above older, simpler risk-based standards under the "Collins Amendment;"
- the SLR.[19] The U.S. SLR is considerably more stringent than the global leverage standards,[20] which have also yet to be widely implemented. The U.S. SLR is based on the definition of assets and exposures now used by the BCBS.[21] This is subject to global revision pending a Basel 2016 consultation[22] that the U.S. may well also adopt with greater impact given the higher SLR;

[15] FRB Regulatory Capital Rules: Implementation of Risk-Based Capital Surcharges for Global Systemically Important Bank Holding Companies, 12 C.F.R. §§ 208 & 217 (2015), available at https://www.gpo.gov/fdsys/pkg/FR-2015-08-14/pdf/2015-18702.pdf.

[16] FRB Regulatory Capital Rules: The Federal Reserve Board's Framework for Implementing the U.S. Basel III Countercyclical Capital Buffer, 12 C.F.R. § 217 Appendix A (2016), available at https://www.federalreserve.gov/newsevents/press/bcreg/bcreg20160908b1.pdf.

[17] OCC and FRB Implementation of Basel III, 12 C.F.R. §§ 3, 5, 6, 165, 167, 208, 217 & 225, *op. cit*.

[18] Dodd-Frank Act, (Jul. 21, 2010), § 171, *op. cit.*

[19] OCC, FRB, and FDIC Enhanced Supplementary Leverage Ratio Standards, 12 C.F.R. §§ 6, 208, 217 & 324, *op. cit.*

[20] BCBS, *Basel III leverage ratio framework and disclosure requirements* (January, 2014), available at http://www.bis.org/publ/bcbs270.pdf.

[21] OCC, FRB, and FDIC Regulatory Capital Rules: Regulatory Capital, Revisions to the Supplementary Leverage Ratio, 12 C.F.R. §§ 3, 217, & 324 (2014), available at https://www.fdic.gov/news/board/2014/2014-09-03_notice_dis_c_fr.pdf.

[22] BCBS, *Consultative Document: Revisions to the Basel III leverage ratio framework* (April, 2016), available at https://www.bis.org/bcbs/publ/d365.pdf.

- trading-book requirements[23] soon to be revised in the U.S. under the Basel "fundamental review of the trading book" standards;[24]
- operational risk-based capital requirements,[25] soon to be revised by a new standardized global approach the U.S. also seems poised to adopt;[26] and
- stringent stress tests set by the Federal Reserve known as the Comprehensive Capital Analysis and Review (CCAR). Under CCAR, which dividends and other capital distributions are permitted only if a large bank demonstrates adequate risk-based and leverage capitalization even under acute-stress scenarios in which it is assumed nonetheless to continue to make loans, take on other exposures, and make previously-approved capital distributions. For stress-test purposes, RBC is generally the binding constraint, but covered BHCs must nonetheless hold the higher of the leverage or the RBC required by the stress test.

How much do all of these capital standards cost? Even though the cumulative benefit may well be warranted if it can be demonstrated that all of them are needed to ensure sustainable financial stability, no meaningful cost-benefit assessment can be made without an understanding of these costs and their likely impact then on bank credit-formation capacity, market liquidity, and the extent to which the financial-intermediation chain may come to be dominated by non-banks exempt from like-kind capital regulation or robust resolution requirements.[27]

To date, the only global effort to undertake this type of cost-benefit analysis comes from the BIS, which published the results of a study on optimal leverage ratios and their implications for credit availability in 2015.[28] After demonstrating the importance of the risk-weighting approach in RBC, this analysis concludes that LRs should backstop – not bind – risk-based capital. Using historical data, this study finds that a five percent LR (the requirement for BHCs named as GSIBs under the SLR) is constraining about seventy percent of the time with a meaningful reduction also found in the likelihood of bank failure. At a six percent LR (the SLR requirement for GSIB insured depositories), banks would have been constrained by the LR over ninety percent of the time in the seventeen years surveyed, far in excess of what can reasonably be considered a backstop. This BIS paper goes on to conclude that overly-stringent binding LRs have perverse implications for risk-taking and reduce credit availability without offsetting financial-stability benefit.

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[23] OCC, FRB, and FDIC Risk-Based Capital Guidelines: Market Risk, 12 C.F.R. §§ 3, 208, 225, & 325 (2012), available at https://www.fdic.gov/news/board/2012/2012-06-12_notice_dis-a.pdf.

[24] BCBS, *Standards: Minimum capital requirements for market risk* (January, 2016), available at http://www.bis.org/bcbs/publ/d352.pdf.

[25] FRB, FDIC, OCC, and Office of Thrift Supervision (OTS), *Interagency Guidance on the Advanced Measurement Approaches for Operational Risk* (June 3, 2011), available at http://www.federalreserve.gov/boarddocs/srletters/2011/sr1108a1.pdf.

[26] BCBS, *Consultative Document: Standardised Measurement Approach for operational risk* (March, 2016), available at http://www.bis.org/bcbs/publ/d355.pdf.

[27] For an extensive discussion of changes to U.S. financial intermediation and the impact of post-crisis regulation on both deposit-taking and loan origination, see the FedFin paper noted in footnote 1.

[28] Ingo Fender and Ulf Lewrick, *Calibrating the Leverage Ratio* (December 6, 2015), available at http://www.bis.org/publ/qtrpdf/r_qt1512f.htm.

A recent study from the European Central Bank (ECB)[29] also finds that LRs that are "not set at an excessive level" and thus do not constrain most banks will reduce expected loss and the LR thus would achieve its financial-stability objectives.[30] However, this study, like the BIS one, also demonstrates that a binding LR across more than a few banks may well have perverse risk-taking and other results.

The European Banking Authority (EBA) has monitored the impact of the leverage ratio,[31] but its study has very limited value in assessing the U.S. rule's impact because the EBA has decided to keep the applicable LR at three percent and may well make additional changes to Basel's calculation methodology.[32] Basel has committed to conducting a quantitative impact survey (QIS)[33] of the LR (still set at three percent in the international standards) once it finalizes the denominator criteria out for public comment. Basel's QIS study will be more instructive since it will include U.S. banks. However, most Basel QIS survey so many banks so broadly under Basel-specific criteria as to make U.S.-specific conclusions very difficult.

U.S. regulators have so far limited themselves only to very preliminary assessments of the impact of individual leverage regulations in the body of each rule, taking into account only factors evident at the time a rule is finalized (e.g., when the SLR was finalized in 2014). This point-in-time approach means that rules implemented after the SLR have not been factored into meaningful, forward-looking assessments of the cost, benefit, and cumulative impact of the U.S. leverage-capital regime.

In the absence of third-party forward-looking QIS, we turn to those prepared by industry sources in the course of commenting on the new regulatory framework. These are instructive not only with regard to total cost, but also on the extent to which the LR may become the binding constraint on large banks despite the global and U.S. view that it should work in tandem with RBC to serve as a floor below any distortions that the LR might otherwise engender.

QIS conclusions in an industry-conducted study indicate that, for U.S. banks, the effect of the SLR made it the binding capital constraint in 2013 for 67 percent of the total assets held by the eight designated U.S. GSIBs.[34] Further, the combined impact of the U.S. SLR and Basel's 2013 proposed denominator revisions would require U.S. advanced approaches banks to hold $202 billion in additional capital, a sum reduced to a still significant $185 billion if some risk-based changes are omitted from this calculation. Alternatively, banks could reduce exposures by $3.7 trillion to reach compliance.[35]

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[29] European Central Bank (ECB), *Financial Stability Review*, 121-133 (November, 2015), available at https://www.ecb.europa.eu/pub/pdf/other/financialstabilityreview201511.en.pdf.
[30] *Id.*, at 124.
[31] European Banking Authority (EBA), *CRD IV – CRR/Basel III Monitoring Exercise*, 5 (March 2, 2016) available at http://www.eba.europa.eu/documents/10180/1360107/CRDIV-CRR+Basel+III+Monitoring+Exercise+Report.pdf/a1e5e866-39de-4f75-9286-fd555cabbd66.
[32] EBA, *Report on the Leverage Ratio Requirements under Article 511 of the CRR* (August 3, 2016) available at http://www.eba.europa.eu/documents/10180/1360107/EBA-Op-2016-13+%28Leverage+ratio+report%29.pdf.
[33] BCBS, *Consultative Revisions to the Basel III leverage ratio*, *op. cit.* at 11.
[34] Letter from David Wagner, Executive Managing Director & Head of Finance Affairs, The Clearing House Association, to the Basel Committee on Banking Supervision, 3 (September 20, 2013), available at https://www.theclearinghouse.org/~/media/files/association%20documents/20130920%20comments%20to%20basel%20on%20leverage%20ratio.pdf.
[35] *Id.*

Because of an array of U.S.-specific requirements (see the "dials" discussed above), most banks hold capital buffers above the minimum levels required of them. The 2013 QIS also finds that a 200 basis point buffer requires an additional $345 billion to $501 billion in still more regulatory capital based on how the denominator is finalized.[36]

Importantly, these quantitative effects – significant as indeed they are – are preliminary ones that do not take into account the relationship between RBC and the LR because of the many pending changes to both requirements described briefly above. The sum total cost of newly-standardized risk-based charges for credit, market, and operational risk could well reassert the risk-based rules as the binding constraint for most, if not all banks. However, this would result only if the total amount of risk-based capital is significantly raised, which Basel has said it does not plan to do despite the sweeping nature of all of these proposals.[37]

RBC requirements also raise challenges for the proposed changes to the LR's denominator because some of the risks to be captured by the revised denominator – e.g., the risk of failed securities transactions – are also captured by the market and operational RBC requirements with or without change. Coverage of cash, sovereign securities, and other no- or low-risk assets in the LR is often defended because of potential structuring that alters this risk profile. However, when this is done, RBC for credit, market, and operational risk comes into play.

Are these costs worth their benefits? In the preamble to the final U.S. SLR regulation, the FRB cites the following benefits, which we note below in the context of other current and pending rules also aimed at these same objectives:

- placing greater amounts of private capital ahead of the FDIC. However, pending requirements for total loss-absorbing capacity (TLAC)[38] are intended to do so in any resolution of a very large banking organization, and this is also the primary purpose of the underlying capital standards which are intended to ensure a buffer against taxpayer risk in resolution at both the holding-company and insured-depository levels;
- improving the ability of a bank to support macroeconomic growth under stress scenarios. This is expressly required in the Federal Reserve's stress tests for the largest banks.[39] The new counter-cyclical capital buffer[40] is also intended to ensure that the largest banks have still more capital with which to preserve credit availability in stress scenarios;
- reducing the likelihood of resolution and permitting regulators better to "tailor" resolution actions. Much global and U.S. regulation is aimed at this objective, most notably in an array of U.S. requirements for large-bank "living wills" that permit the FRB and FDIC to break up banks if

[36] *Id.,* at 20.
[37] BCBS, *Consultative Document: Standardised Measurement Approach for operational risk*, *op. cit.* at 2.
[38] FRB Total Loss-Absorbing Capacity, Long-Term Debt, and Clean Holding Company Requirements for Systemically Important U.S. Bank Holding Companies and Intermediate Holding Companies of Systemically Important Foreign Banking Organizations; Regulatory Capital Deduction for Investments in Certain Unsecured Debt of Systemically Important U.S. Bank Holding Companies, 12 CFR Parts §§ 217 & 252 (2015), available at https://www.gpo.gov/fdsys/pkg/FR-2015-11-30/pdf/2015-29740.pdf.
[39] FRB Amendments to the Capital Plan and Stress Test Rules, 12 C.F.R. §§ 225 & 252 (2015), available at https://www.gpo.gov/fdsys/pkg/FR-2015-12-02/pdf/2015-30471.pdf.
[40] FRB Framework for Implementing the U.S. Basel III Countercyclical Capital Buffer, 12 C.F.R. § 217 Appendix A, *op. cit.*

plans are deemed not credible.[41] Each such plan is by rule tailored to each banking organization that files. Liquidity regulations – the liquidity coverage ratio (LCR) as finalized[42] and the net stable funding ratio (NSFR) as proposed[43] – are also intended to reduce the likelihood of resolution by preventing liquidity shortfalls from turning into solvency crises for individual banks and the broader banking system; and

- a counter-balance to "possible funding cost advantages" for the largest banks based on TBTF expectations. This is an objective of the array of rules imposed on the largest U.S. banking organizations, including the GSIB capital surcharge[44] even though the FRB believes that the Dodd-Frank rules once implemented should effectively solve for TBTF, at least for banks.

II. Unintended Consequences

Building on our prior research and recent studies, we now turn to how the sum total of all of these RBC and LR capital rules – current and proposed – intersects with the LCR and the NSFR as well as other significant non-capital prudential standards. Many of these interactions are likely to prove still more problematic if a leverage ratio of ten percent were adopted, although the Hensarling bill is premised on eliminating most of these requirements for qualifying banking organizations. This might resolve some of the financial-stability and monetary-policy problems discussed below, albeit at potential overall risk to the U.S. financial system and macroeconomic growth.

Consistent with the brief nature of this research note, we proceed to a discussion of specific concerns. Each of them is described as definitively as space permits to demonstrate the need for additional research and careful cumulative-impact consideration ahead of action.

A. Risk-Taking Incentives

As a frequent critic of large banks has opined:

> Less leveraged firms have lower returns on equity, all else being equal. Therefore, in order to compete for capital with more leveraged firms, a less leveraged firm has to assume greater risks in order to equal the more leveraged firms' return on equity. Put another way, market discipline on share prices is likely to encourage excessive risk-taking at firms that opt-out of Basel III [i.e., that come under a ten percent leverage standard in the proposed bill].[45]

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[41] FRB and FDIC Resolution Plans Required, 12 C.F.R. §§ 243 and 381 (2011), available at https://www.gpo.gov/fdsys/pkg/FR-2011-11-01/pdf/2011-27377.pdf.

[42] OCC, FRB, and FDIC Liquidity Coverage Ratio: Liquidity Risk Management Standards (LCR), 12 C.F.R. §§ 50, 249, & 329 (2014), available at https://www.gpo.gov/fdsys/pkg/FR-2014-10-10/pdf/2014-22520.pdf.

[43] OCC, FRB, and FDIC Net Stable Funding Ratio: Liquidity Risk Measurement Standards and Disclosure Requirements, 12 C.F.R. §§ 50, 249, & 329 (2016), available at https://www.fdic.gov/news/board/2016/2016-04-26_notice_dis_c_fr.pdf.

[44] FRB Implementation of Risk-Based Capital Surcharges for Global Systemically Important Bank Holding Companies, 12 C.F.R. §§ 208 & 217, *op. cit.*

[45] Adam J. Levitin, Testimony before U.S. House Committee on Financial Services, Washington DC: Making a Financial Choice: More Capital or More Government Control, 7 (July 12, 2016), available at http://financialservices.house.gov/uploadedfiles/hhrg-114-ba00-wstate-alevitin-20160712.pdf.

Risk-based capital is intended to solve this problem by capturing the earnings incentives for undue risk-taking with high – sometimes punitive – requirements for higher-risk assets. For example, the U.S. version of the Basel III risk-based rules cited above includes a weighting of 1,250 percent for high-risk securitization positions that, taking into account the ten percent RBC required for well-capitalized status in the U.S., means that banks must hold more capital than the actual amount of these exposures. The LR treats cash identically to these high-risk securitizations, creating the earnings incentives described above. These result in "barbell" risk distributions concentrated at the lowest-risk ones demanded for other purposes (see below) and the high-risk ones needed to offset the LR's earnings impact on low risk assets such as cash and central-bank reserves that are in essence riskless. Prudent loans and conservative exposures in the middle of the barbell generally do not offer returns high enough to offset the cost of the LR (which offer low returns due to their low risk). Mortgages with low loan-to-value ratios, loans to established small and mid-size businesses, and similarly-conservative exposures suffer, and indeed capital is already scarce in these and other sectors due to "yield-chasing."

The earnings equation thus becomes a duck-and-cover one of trying to out-maneuver the total cost of capital with high-yield assets that compensate for these costs and still provide an attractive enough return on shareholder equity to sustain a viable banking franchise. Recent research[46] has demonstrated that franchise value has dropped at U.S. banking organizations, especially the largest one subject to the SLR. This research notes the significant prudential risk of lost franchise value. We would add that the forces created by high capital and market demand create a conundrum in which the SLR and other high regulatory costs lead large banks to take higher risks where they can, leading to new rules to block these risks as they occur and resulting in still more franchise-value damage and still-weaker U.S. banks.

Several new studies reinforce this concern. The first comes from staff at the FRB, ECB, and International Monetary Fund, work particularly pertinent to current market conditions because it assesses the impact not only of higher capital requirements, but also implications of this higher capital in periods of low interest rates.[47] Based on confidential FRB data on U.S. bank business lending from 1997 to 2011, the study finds that banks not only take more risks when the FRB decreases interest rates, but also that better-capitalized banks take more risk. The paper is principally a data analysis and thus does not analyze causality for these correlations. However, the authors posit that the cost of capital leads banks to maximize return on assets to the greatest extent possible. When rates are low even on very safe assets, risk-taking to preserve earnings accelerates – i.e., yield chasing. There is, therefore, additional evidence of the barbell effect, one shown to be even more problematic during periods of ultra-low rates.

Another new study from the Federal Reserve examining the link between higher capital requirements and unemployment reinforces and adds to these challenges.[48] The paper finds that higher capital requirements have historically had at least a temporary impact on unemployment, especially for smaller businesses where ready substitutes for bank loans (e.g., access to the capital market through bond issues) are not feasible. Although capital is only one factor affecting employment, the study seeks to

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[46] Natasha Sarin & Lawrence Summers, *Have big banks gotten safer?* (September 15-16, 2016), available at https://www.brookings.edu/wp-content/uploads/2016/09/2_sarinsummers.pdf.

[47] Giovanni Dell'Ariccia, Luc Laeven & Gustavo A. Suarez, *Bank leverage and monetary policy's risk-taking channel: evidence from the United States* (May 2016), available at http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1903.en.pdf?17ecd6a759787404e7fa0ede3a8ec8c3.

[48] Seung Jung Lee & Viktors Stebunovs, *Bank Capital Pressures, Loan Substitutability, and Nonfinancial Employment* (April 2016), available at http://www.federalreserve.gov/econresdata/ifdp/2016/files/ifdp1161.pdf.

control for this by focusing on manufacturing (particularly dependent on credit because of the cost of the physical infrastructure required for expansion and thus for new hires). The paper concludes that, "These stricter capital standards [i.e., Basel III in the U.S.] are set with the hope of buttressing the banking sector to withstand any future crises, but likely with real costs to firms and households."[49] This substantiates the barbell challenge described above, especially when the LR is as great a binding constraint as studies to date suggest.

As demonstrated in the aforementioned FedFin paper on income inequality (which also addresses credit scarcity in other moderate-risk sectors),[50] credit in the middle of the low-versus-high risk asset spectrum is critical to wealth accumulation and thus to more equal income distribution. That paper and the larger one also referenced above provide detail on these credit shortages and the challenges presented if the role of banks is filled to a considerable degree by non-banks exempt from or under far less stringent LR capital, resolution, and prudential requirements.

Finally, the BIS has just released new work assessing the implications of binding LRs.[51] It argues that RBC should be the most stringent constraint with LR functioning as a countercyclical backstop. Setting the LR as a floor is found in this study to limit undue capital decreases during boom periods (when RBC is a lagging indicator that does not capture growing risk). However, if the LR is the binding constraint, the risk-taking incentives described above during slow-growth, low-rate situations adversely affect recovery.

The studies described above and the validation of them in current market conditions might lead some to suggest that risk-based and/or leverage capital should be set lower than they have been in the wake of the crisis. None of this work nor recent events confirm any such conclusion, instead pointing to both the importance of robust regulatory capital and the need to understand the trade-offs between higher capital – especially higher capital resulting from a binding LR – and risk.

B. Financial-System Fragility

As the last crisis demonstrated with costly, destructive effect, macroeconomic growth depends on stable financial intermediation. In turn, financial intermediation relies on an array of little-noticed, but still-critical infrastructure services such as custody, payment, clearing, and settlement. Like lending, each of these services in U.S. banks is currently covered by regulatory-capital requirements, many of which contribute to the binding nature of the leverage requirement. The sum total of all of these rules is thus in part intended to ensure not just continued credit availability, but also stable market operations.

The scope of this note does not permit a detailed discussion of how imposition of the LR on specific asset and exposure classes affects the ability of large banks to perform custody, prime brokerage, market-making, clearing-and-settlement, and similar services that have long been the bedrock of transactions on which macroeconomic functions (e.g., product purchases, investment) depend. However, it is important to note that riskless and low risk assets such as cash and government securities are intrinsic to all of these activities because they are sound stores of value likely to prove highly-liquid under stress. As a result, it is these assets that are generally posted as collateral, used to fulfill margin

[49] Seung Jung Lee & Viktors Stebunovs, *Bank Capital Pressures, op. cit*. at 3.
[50] Federal Financial Analytics, *Income Inequality, op. cit.*
[51] Leonardo Gambacorta & Sudipto Karmakar, *Leverage and Risk Weighted Capital Requirements* (September 2016), available at http://www.bis.org/publ/work586.pdf.

requirements, and held by custody banks to assure clients that funds are well secured. The impact of the leverage rule on these activities is thus a fundamental financial-stability challenge.

The no- or low-risk hypothesis for asset holdings in these sectors and across the banking system is also the foundational principal of the HQLA requirement built into the LCR and NSFR. However, the larger the amounts of HQLAs that banks are required to hold and the more the LR becomes a bank's binding constraint, the greater the incentives for risk-taking described above. This is because of the heightened burden of capital requirements on HQLAs that bear no relationship to risk.

The scope of this challenge is already evident – an industry group has found that U.S. large banks now hold approximately thirty percent of their balance sheets in HQLAs,[52] amounts so large as to make it challenging for banks to make loans that contribute to economic growth and undertake the other activities essential to a functioning, stable financial system. In short, their balance sheet capacity is limited by the LR and (for the largest banks) the SLR because they cannot hold requisite HQLAs and also make loans without raising significant amounts of new capital likely to come at considerable cost.

Further, when the leverage rule is a binding constraint, it and the liquidity rules in concert with current ultra-low interest rates lead large U.S. banks increasingly to decline to accept large cash deposits, challenging efforts to raise rates as well as increasing macroprudential risk. Arguably, the LR could adversely affect the deposit-taking capacity of some banks but not the industry as a whole, because banks for which the LR is not a constraint (especially foreign banks under less stringent leverage rules) and non-banks offering "shadow liabilities" would step in. However, even a modest reduction in the supply of bank deposit-taking capacity would heighten the price on deposits – i.e., raise rates – because demand would shift to fewer deposit and deposit-like providers. This would have clear financial-stability consequences.

Further, when a central bank wants to lower rates to stimulate economic growth without sparking inflation, as the FRB and other central banks are now attempting, the financial-stability consequences of the flight of funds outside regulated banks are compounded by monetary-policy problems. Banks hold excess reserves at the central bank and the interest paid on them serves as the floor below which they are not likely to reduce deposit rates. Non-banks without these excess reserves are less constrained in lowering rates to attract funds and thus can drop rates. When interest rates are ultra-low, as they now are, any move by these non-banks to drop rates can quickly force rates to zero or even into negative territory, a move with high-risk consequences.[53]

The LR's impact on deposit-taking capacity is particularly pronounced at custody banks where the LR is already a binding constraint, an issue discussed in more detail in a 2015 FedFin report.[54] Recent

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[52] Greg Baer, Testimony before the U.S. Senate Committee on Banking, Housing, and Urban Affairs, Washington, DC: Bank Capital and Liquidity Regulation Part II: Industry Perspectives, 3 (June 23, 2016), available at http://www.banking.senate.gov/public/_cache/files/53257b19-de9a-4734-8fde-beead88a2de6/440F70F96DF111ADCEF153AFE8650672.062316-baer-testimony.pdf.

[53] Federal Financial Analytics, *What Negative Rates Do to Financial Stability* (September 8, 2015), available at http://www.fedfin.com/images/stories/client_reports/FedFin%20Policy%20Brief%20-%20What%20Negative%20Rates%20Do%20to%20Financial%20Stability.pdf.

[54] Federal Financial Analytics, *Where The Money Goes and Why it Matters: The Market and Policy Impact of Reduced Custody-Bank Deposit Capacity* (August 4, 2015), available at http://www.fedfin.com/images/stories/client_reports/FedFin%20Study%20-

developments such as the 2016 Basel proposal to redefine the LR denominator and still more stringent stress testing have only exacerbated regulatory pressures that limit deposit-taking capacity.

In addition, starting in October of this year, the SEC has required that prime money-market funds (MMFs not invested in sovereign and similar assets) value investor shares at a floating net asset value (NAV), not the prior, fixed one.[55] Outflows from these funds have totaled a stunning $700 billion since the start of the year.[56] Market sources are already seeing significant funding shifts that cannot be accommodated due in part to the leverage rule and the inability of banks to take on the low-risk, high-cost assets in which funds rightly wish to house their cash.[57] These sources also report rapid growth in "structured" bank deposits placed at smaller banks – i.e., chains of funds cut into pieces to ensure FDIC coverage that may well offset some of the deposit restrictions at the largest banks under the SLR, but do so at risk to the FDIC.

Market liquidity may also be challenged when banks exit key activities due to the leverage rule. A new Federal Reserve Bank of New York staff report is very instructive in this regard, examining the impact of the leverage capital rule on the ability of dealer banks to hedge bond risk with credit default swaps.[58] This might sound like the type of speculative activity banks simply should eschew, but the study notes that it corrects for price dislocations and thus stabilizes the market – when trading drops, pricing becomes more volatile. To assess the impact of the leverage rule, the study maps the return of a theoretical trade against the return-on-equity (ROE) banks must achieve to remain viable market participants. At a one-percent leverage ratio, banks earn a sixteen percent ROE on these transactions – consistent with their prior returns and above the cost-of-capital marker (usually set at ten percent). At the current SLR ratio of six percent for GSIB insured depositories, the ROE drops to three percent, making these market-stabilizing transactions a major money-loser and another adverse factor on franchise value. Spreads would have to change dramatically, the study concludes, for banks to re-enter this arena.

Repurchase agreements (repos) are another product class with significant market-stabilization impact in which banks are increasingly reducing their presence and thus the benefit of their more resilient regulatory-and-resolution framework. A recent study has plotted the spread between the general collateral financing (GCF) and tri-party Treasury repo rates.[59] The assets exchanged in these transactions are very low risk (e.g., Treasury securities), and because of this they generally bear a zero RBC requirement. However, as noted, these assets are covered by stringent leverage capital requirements under the SLR. This study finds that, as the implementation date of the SLR approached, the spread in this market more than doubled. This spread, while still small in comparison to those experienced during the financial crisis, is also found by this work to have contributed to increasing

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%20The%20Market%20and%20Policy%20Impact%20of%20Reduced%20Custody-Bank%20Deposit%20Capacity.pdf.

[55] Securities and Exchange Commission (SEC) Money Market Fund Reform; Amendments to Form PF, 17 C.F.R. §§ 230, 239, 270, 274 and 279, 713 (2014) available at https://www.sec.gov/rules/final/2014/33-9616.pdf.

[56] Office of Financial Research (OFR), *OFR Monitor Shows Accelerating Shift to Government Money Market Funds* (September 22, 2016), available at https://financialresearch.gov/from-the-management-team/2016/09/22/ofr-monitor-shows-accelerating-shift-to-government-money-market-funds/.

[57] Alexandra Harris, *Money Fund Alternatives Surfacing Amid Compliance Rush: Fitch*, Bloomberg, July 22, 2016.

[58] Nina Boyarchenko, Pooja Gupta & Jacqueline Yen, *Trends in Credit Market Arbitrage* (July 2016), available at https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr784.pdf?la=en.

[59] The Clearing House Association, *Shortcomings of Leverage Ratio Requirements* (August 9, 2016), available at https://www.theclearinghouse.org/-/media/tch/documents/20160809_tch_research_note_leverage_ratio.pdf.

dislocations in the Treasury yield curve "fitting error." Although the role of rules such as the SLR in potential Treasury-market illiquidity remains uncertain in the eyes of the Treasury Department and U.S. regulators,[60] these data do suggest cause for concern.

As banks reduce their repo role due to new regulations, non-banks such as MMFs and insurance companies are increasingly becoming direct lenders, in large part because the leverage rules do not apply to them and they can thus hold large balances of low-risk obligations without punitive capital cost. The Office of Financial Research (OFR) has recently documented this trend,[61] with press reports also suggesting a significant repo-market shift from U.S. banks subject to the SLR to banks in nations with less-stringent leverage rules.[62]

Another threat to resilience is the incentive created by the leverage rule, especially in concert with the LCR and NSFR, for banks to hold unsecured assets. This is particularly true when the leverage rules combine with high RBC requirements unless the bank obtains a credit-risk mitigation instrument fully recognized by RBC (often difficult) and RBC – not leverage – is the binding capital constraint. In fact, certain types of credit-risk transfer structures which arbitrage the current LR/RBC relationship have been highlighted by the OFR[63] and the Basel Committee[64] as emerging risks.

The Bank of England and the International Organization of Securities Commissions (IOSCO)[65] have raised additional LR concerns focusing on the application of the LR to no- and low-risk assets in settlement-and-clearing activities. These echo those frequently expressed by the chairman of the U.S. Commodity Futures Trading Commission.[66] The U.K. central bank's Financial Policy Committee (FPC) has recently concluded that the LR denominator should be changed with regard to netting cash receivables and cash payables from unsettled securities sales, and also allowing initial margin posted with a bank to reduce potential future exposure. The effect of these two changes would be, the report says, to "avoid

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[60] Treasury Department, FRB, Federal Reserve Bank of New York (FRB-NY), SEC, and Commodity Futures Trading Commission (CFTC), *Statement Regarding Progress on the Review of the U.S. Treasury Market Structure since the July 2015 Joint Staff Report* (August 2, 2016), available at http://www.federalreserve.gov/newsevents/press/other/20160802a.htm.

[61] OFR, *U.S. Money Market Fund Monitor* (accessed September 26, 2016), available at https://financialresearch.gov/money-market-funds/.

[62] Katy Burne, *'Direct' Repo Loans Gaining Traction as Banks Step Back*, Wall Street Journal, July 20, 2016 at http://www.wsj.com/articles/direct-repo-loans-gaining-traction-as-banks-step-back-1469037601.

[63] Jill Cetina, John McDonough, & Sriram Rajan, *OFR Brief Series 15-04: More Transparency Needed For Bank Capital Relief Trades* (June 11, 2015), available at https://financialresearch.gov/briefs/files/OFRbr-2015-04-bank-capital-reflief-trades.pdf.

[64] BCBS, *The Joint Forum, Credit Risk Transfer*, 26 (July, 2008), available at http://www.bis.org/publ/joint21.pdf.

[65] International Organization of Securities Commissions (IOSCO) Secretary General Paul Andrews, *Speech at the "9th Annual FIA International Derivatives Expo,"* London, England (June 8, 2016), available at https://idx2016.fia.org/articles/idx-video-iosco-targets-clearing-issues.

[66] The chairman of the U.S. CFTC, Timothy Massad, has observed that, "there is a concern that the requirements are driving business decisions, such as about whether a clearing firm can afford to maintain certain customers, or be in the business at all. And if the clearing member industry becomes weaker, then it may become harder to address the very concerns about clearinghouse resiliency that these workstreams are considering."[67]

[67] CFTC Chairman Timothy Massad, Speech at the CME Group Global Financial Leadership Conference, Naples, FL: Remarks of Chairman Timothy Massad (November 16, 2015), available at http://www.cftc.gov/PressRoom/SpeechesTestimony/opamassad-34.

unnecessarily discouraging activities that support market liquidity in core financial markets… [or] central clearing of derivatives — a core element of the post-crisis reform agenda."[68]

The FPC report further raises significant macroprudential issues also assessed in a study from the Committee on the Global Financial System (CGFS) of the Bank for International Settlements (BIS), the central bank of central banks.[69] The U.K. body "encourages the Basel Committee to review carefully any possible unintended effects of forthcoming leverage ratio standards on the ability of the banking system to cushion shocks and to draw on central bank liquidity facilities as necessary."[70] Key to the FPC and CGFS papers is the role the LCR has on the ability of banks to hold the reserves and HQLAs needed to ensure resilience under stress. The less well-capitalized a bank becomes, especially as judged by the leverage rule, the less likely it will be to hold reserves and HQLAs because of their capital cost. Without HQLAs or reserves in excess of minimum amounts, the bank will have less of a buffer with which to absorb risk and fewer HQLAs that it can encumber as collateral for central-bank liquidity draws in compliance with non-emergency requirements.

It might be said that some or all of these challenges will abate as rates normalize. However, the interaction of the leverage and liquidity rules also forces banks to hold the large percentage of their balance-sheet devoted to HQLAs in longer-dated maturities to avoid capital-ratio volatility as well as to preserve net interest margin (NIM) under normal yield curves. Incentives for these longer-term holdings arise despite resulting interest-rate risk because both the RBC and LR rules reflect unrealized gains and losses when this is required under applicable accounting rules. U.S. accounting rules (GAAP) require that unrealized gains or losses must be recognized for assets held as available for sale, but not those held to maturity. When unrealized gains or losses are included in the capital numerator, a bank's capital can rise or fall – sometimes dramatically – based on factors unrelated to actual risk. For example, market changes in the interest rates of securities such as U.S. Treasury bonds run through the capital ratio even though the bank has not in fact experienced any loss. Holding assets to maturity reduces the volatility forced by capital recognition of accounting changes and thus the potential that banks will suddenly need to raise capital under market or idiosyncratic stress situations.

Due to the combined total of all of these capital, liquidity, and accounting rules, larger U.S. banks are thus holding longer-dated securities intended for ready liquidity that would argue for the AFS portfolios instead in HTM portfolios subject to significant earnings penalties if prematurely sold. Banks may thus be reluctant to sell more HQLAs than necessary to improve liquidity unless or until severe stress forces dispositions. Such sales may occur when earnings can no longer sustain accounting loss and investor-risk perceptions create significant damage to franchise value and, thus, stability.

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[68] Bank of England Financial Policy Committee (FPC), *Financial Stability Report*, 34 (July 2016), available at http://www.bankofengland.co.uk/publications/Documents/fsr/2016/fsrjul16.pdf.

[69] Bank for International Settlements (BIS) Committee on the Global Financial System (CGFS) Market Committee, *CGFS Papers No. 54: Regulatory change and monetary policy* (May, 2015), available at http://www.bis.org/publ/cgfs54.pdf.

[70] FPC, *Financial Stability Report, op. cit.*

C. Limits to Effective Monetary Policy

Our 2016 in-depth paper[71] explores in detail the interactions of the new regulatory framework, including those affecting the leverage-capital requirement. Here, we note a significant recent development, address two important new studies, and recap several conclusions.

In addition to the Bank of England's concerns about the adverse macroprudential impact of the leverage ratio, the U.K. central bank as noted also took dramatic action related to it on August 4, 2016. In concert with dropping rates to a historic low in response to growing post-Brexit economic stress, the Bank of England also unilaterally removed excess reserves held at it from the U.K. LR (now generally set at three percent).[72] The Bank of England's Financial Policy Committee made it clear that excess reserves are riskless and thus unsuitable even for the LR[73] and the Bank of England then promptly acted even as it reaffirmed the importance of the LR and restated the need to keep risk-based capital as the binding constraint in the U.K.

The monetary-policy rationale for eliminating the LR on excess reserves derives from the fact that excess reserves cannot be deployed for profit-making uses and on their own earn negligible rates of return that, after calculating the cost of the LR, make excess reserves a drain on bank earnings. Banks use excess reserves to house deposits, but the LR's cost may lead them simply to decline to accept these deposits when they cannot find alternative assets into which to intermediate deposit flows. If these deposits go elsewhere and the central bank's hopes for a lower bound on interest rates are not sustained in the market, overall interest rates could plunge into negative territory. In fact, when announcing the change to the LR, Bank of England Governor Mark Carney emphasized the importance of keeping U.K. rates above the ZLB. Negative rates would, as noted, would pose significant inflationary problems as well as divert funds from the banking system on which economic recovery depends.

As discussed in more detail elsewhere, the LR for excess reserves poses still greater challenges in the U.S. than the U.K. and in other nations now using negative interest on excess reserves or other extremely accommodative policies. Unlike these central banks, the FRB has strict limits on the collateral it accepts in return for providing liquidity (for example, it does not accept selected types of corporate loans as the ECB now does or use exchange-traded funds like the Bank of Japan). Further, migration of financial intermediation to non-banks is also unlikely to support effective monetary-policy transmission channel since non-banks lack access to the Federal Reserve. Financial-stability considerations resulting from growing FRB reliance on non-banks through substitute facilities like the "reverse repo program" (RRP) also warrant careful review, as noted recently by the director of the OFR.[74] Growing fears about the role of non-banks in critical financial infrastructure have led some at the Federal Reserve to contemplate creating either a *de facto* or *de jure* "market-maker of last resort" lending facility[75] despite significant market-structure and moral-hazard implications.

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[71] Federal Financial Analytics, *Square Pegs and Round Holes*, *op. cit*.
[72] PRA, *Statement on the Leverage Ratio, op. cit.*
[73] FPC, *Record of the Financial Policy Committee Meeting* (July 25, 2016), available at http://www.bankofengland.co.uk/publications/Documents/records/fpc/pdf/2016/record1608.pdf.
[74] OFR Director Richard Berner, *Remarks at the Conference on New Research and Outlook on Credit Markets*, *New York, NY* (May 24, 2016), available at https://financialresearch.gov/public-appearances/2016/05/24/conference-new-research-and-outlook-on-credit-markets/.
[75] Federal Reserve Bank of New York President and CEO William Dudley, *Remarks at the New York Bankers Association 2013 Annual Meeting and Economic Forum: "Fixing wholesale funding to build a more stable financial system," New York, NY* (February 1, 2013), available at http://www.bis.org/review/r130204a.pdf.

Another concern builds on the financial-structure risks related to repos described above. The CGFS study found that:

> New regulations, such as the leverage ratio, may disincentivize certain low-margin arbitrage activities, such as banks' matched repo book business. This reduction would tend to weaken, and make more uncertain, the links between policy rates and other interest rates, weakening the transmission of monetary policy impulses along the yield curve as well as to other asset prices relevant for economic activity.[76]

In fact, the role of the RRP and the question of how non-banks interact with the Federal Reserve is a critical issue for U.S. central-bank policy in 2017. Chair Yellen indicated in late August that the central bank will examine an array of new tools to transmit U.S. monetary policy to better effect in the post-crisis market framework.[77] Two papers that drew widespread attention at the time focused on the role of the SLR, each making it clear how dramatically the new rules affect monetary-policy transmission by laying out solutions – albeit dramatically different ones – to guide the FRB's new thinking.

In what is admittedly the first draft of a complex paper, former FRB Governor Jeremy Stein and two Harvard colleagues assess the dramatic increase in the FRB's portfolio and of the role of excess reserves in the context of post-crisis U.S. rules including the SLR to enhance monetary-policy transmission.[78] Acknowledging that the SLR reduces the role of large banks in the Treasury-repo market, the paper considers this a "relatively benign" tax and proposes to have both an SLR and liquid Treasury-repo market with a simple yet startling fix: the FRB itself would take on the role of bank dealers and perform more RRP transactions against its own now-larger holdings to conduct monetary policy. Noting that the exit of banks from the critical Treasury-repo market would create financial-stability risk if the market simply shifted to non-banks as it already has begun to do (see above), the paper says an increased FRB role would offset this risk – in essence, the government would become the nation's largest prudent Treasury-repo market intermediator, preventing systemic risk by virtue of its governmental status. A "small number of very large hedge funds" might come to act as a conduit between smaller funds and the money-market might come to play a more critical role, but the paper believes this would not create systemic risk due to the SLR – how this might work is not clearly explained.

Under the Stein, et al. approach, the FRB would substitute for banks in the repo market and then rely on non-banks through the RRP to set interest rates. The second influential, new paper is from a pair of Stanford researchers and addresses the same significant problem – disintermediation in the Treasury-repo market due to the SLR.[79] However, it suggests a very different policy response. The paper also

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[76] CGFS Market Committee, *CGFS Papers No. 54: Regulatory change and monetary policy, op. cit.* at 2.

[77] FRB Chair Janet Yellen, *Remarks at the Federal Reserve Bank of Kansas City Symposium: "Designing Resilient Monetary Policy Frameworks for the Future," Jackson Hole, WY* (August 26, 2016), available at http://www.federalreserve.gov/newsevents/speech/yellen20160826a.htm.

[78] Robin Greenwood, Samuel Hanson, & Jeremy Stein, *The Federal Reserve's Balance Sheet as a Financial-Stability Tool* (September, 2016), available at https://www.kansascityfed.org/~/media/files/publicat/sympos/2016/econsymposium-greenwood-hanson-stein-paper.pdf?la=en.

[79] Darrell Duffie & Arvind Krishnamurthy, *Passthrough Efficiency in the Fed's New Monetary Policy Setting* (August, 2016), available at https://www.kansascityfed.org/~/media/files/publicat/sympos/2016/econsymposium-duffie-krishnamurthy-paper.pdf?la=en.

finds that the SLR discourages dealer banks from the Treasury-repo market, noting – unlike the Harvard paper – that this change could adversely affect the supply of safe assets across the financial market as rates rise. Acknowledging also that the SLR is likely to remain, this paper suggests policy responses such as the introduction of central counterparties (CCPs) to replace dealer banks in the Treasury-repo market and even higher Treasury issuance of short-term obligations to support market liquidity.

Federal Reserve officials[80] are generally supportive of establishing central clearing facilities for the repo market, but they also acknowledge significant challenges – some of which derive from a major concern among the global regulators that CCPs pose their own significant systemic risk. We would note that more Treasury issuance of short-term notes would link fiscal and prudential/monetary policy in unprecedented fashion as well as likely increase the cost of taxpayers of funding the U.S. Government. The Standard paper also finds that the RRP increases disintermediation from bank deposits into money funds and short-term Treasury obligations. As noted above, a decrease in the supply of bank deposits may not support monetary-policy transmission, especially in expansionary efforts.

Another monetary-policy challenge arises because the LR, especially in the SLR, may heighten rate volatility due to lower volumes of cash-equivalent transactions which widen bid-ask spreads. When banks hold smaller reserves due to capital cost, sudden events that require larger reserves that banks cannot post may affect rates and make them volatile with adverse implications not only for monetary policy, but also for market liquidity.

The LR also appears to create a disincentive for bank reliance on fed funds now replaced by large holdings of excess reserves due to current, idiosyncratic conditions (e.g., ultra-low rates, slow growth). As noted, interest on excess reserves is meant to serve as a floor below which market interest rates do not fall. However, when banks or others can avoid relying on funding from the interbank market and obtain it instead from non-banks that are not constrained by the FRB-desired floor, rates may well drop farther, possibly even into dangerous negative territory.

In the U.S. Fannie Mae, Freddie Mac, and Federal Home Loan Banks (FHLBs) are now the principal lenders of fed funds. They are also major providers of funds to banks, including those constrained by the LR. Although these entities may not earn interest on the reserves at the FRB, they do have accounts with the central bank that create an additional incentive for liabilities outside the direct reach of traditional monetary policy. Further, obligations of the GSEs are backed by either an "effective" or implicit U.S. Government guarantee with potential taxpayer and systemic risk all its own. It is thus thoroughly unclear how monetary policy will function with a binding U.S. leverage rule once interest rates normalize.

III. Conclusions

Finally, it is important in assessing the relationship between LR and RBC to see how these work in practice as predictors of bank failure. Recent quantitative analysis has assessed the correlation between RBC and LR levels and the likelihood of failure in the last U.S. financial crisis.[81] Using the RBC and LR

[80] FRB Governor Jerome Powell, *Remarks at the 2015 Roundtable on Treasury Markets and Debt Management: "Evolution of Treasury Market and Its Implications,"* New York, NY (November 20, 2015), available at http://www.federalreserve.gov/newsevents/speech/powell20151120a.htm.

[81] The Clearing House Association, *Shortcomings of Leverage Ratio Requirements, op. cit.*

capital levels of 8,000 U.S. commercial banks, the study assessed which ratio proved the most reliable indicator of failure at the 400 banks that collapsed from 2007 to 2011. It found that surviving banks had an RBC ratio approximately thirty percent higher than failed institutions; the leverage ratio of surviving banks was only slightly higher than the failures, with 125 of the failures found to have had leverage ratios at or above ten percent in 2006. This is unsurprising in light of the barbell issues noted above as well as the disincentive created by the LR for banks to hold any more no- or low-risk assets than absolutely necessary. Given that the post-crisis liquidity rules did not apply, there was no constraint in the lead-up to the crisis on the ability of banks to post high LR ratios without holding many stabilizing HQLAs, and thus these ratios suggested resilience without in fact capturing risk in positions such as subprime mortgage securities.

These findings and the many others presented here demonstrate not only the significance of the LR as a binding constraint, but also the unintended and risky consequences likely to result if U.S. regulatory-capital policy remains so unbalanced. We find that the SLR has become the binding constraint for the majority (over two-thirds) of assets held at U.S. GSIBs in the most recent public survey data available (2013). As a result, it is clear that the SLR is, in fact, a significant binding constraint under current rules and that pending changes to the LR will, as demonstrated by more recent data, make it still more likely that LRs will govern a significant segment of U.S. banking-system assets.

This is contrary to express U.S. regulatory policy premised on RBC as a binding constraint and has already demonstrated considerable unintended consequences for risk-taking, resilience, and monetary policy. Global regulatory studies assessing optimal LR levels confirm that these effects should be anticipated given where the SLR now is set. The more the LR becomes a binding constraint, the greater these adverse results are likely to be due in part to heightened velocity of the negative feedback loop between leverage-capital requirements and growing amounts of HQLAs on bank balance sheets.

U.S. regulators have suggested that they will solve the LR binding-constraint problem by hiking the risk-based capital requirements, most immediately doing so by adding the GSIB surcharge to the capital thresholds the largest BHCs must exceed under CCAR. However, such an arms race between LR and RBC may well not solve the fundamental problem of high LR requirements and indeed only compound it by further divorcing regulatory capital from the economic risk on which it is theoretically premised.

Very high total regulatory-capital requirements might lead to a result some advocate – breaking up big banks – but it could also lead to significantly more product migration to non-banks, a shriveled U.S. banking system, an illiquid Treasury-repo market, still greater frustrations in transmitting monetary policy, and increased systemic risk. Without forward-looking, cumulative analysis of what the SLR has done to date and what it would be if changed further, it is simply impossible for U.S. regulators to assure themselves that still more capital makes the financial system even safer.