The Value-Add of Advanced-Approach U.S. Capital Requirements: A Marginal Cost-Benefit Analysis

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ABSTRACT

This paper is the first study to assess the marginal benefit of requiring U.S. banks and bank holding companies with assets over $250 billion or more than $10 billion in foreign exposures to adhere to the Basel III advanced-approach capital requirements in addition to all the other capital requirements specific to the United States. It thus goes beyond prior work which assesses the cost of all of the regulatory capital requirements taken altogether in relation to sum total benefits such as economic output. We here evaluate the extent to which one particular rule's implementation and adverse policy costs (e.g., increased model reliance, diverted management and supervisory resources) are outweighed by prudential benefits (i.e., safer large U.S. banking organizations as a result of larger capital buffers). Based on an analysis of the most current data and regulatory requirements, we conclude that the advanced approach does not marginally improve safety and soundness at large, non-complex U.S. banking organizations because U.S. rules already require companies to hold the higher of the standardized or advanced approaches and these Basel III ratios are in turn preempted by other standards as well as supervisory stress tests when still more capital is demanded (as is found often to be the case). The costs of advanced-approach compliance are also assessed, with this study finding that the complexity of the advanced approach combined with the penalties for failure to ensure that complex governance requirements are met drain valuable bank risk-management and governance attention as well as increase the likelihood that supervisors will be over-burdened by these rules and thus miss significant emerging risks. Capital is found not to be the sole measure by which safety and soundness or resilience under stress should be measured, making it uncertain the extent to which any instances where the advanced approach may result in additional regulatory capital above that already required under all these other rules enhances safety and soundness enough to outweigh other prudential and policy costs.

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This paper assesses the impact of applying the advanced risk-based capital rules to regional banks and bank holding companies (BHCs), laying out the costs of doing so versus the benefits of these complex requirements as they apply in the United States. Although research continues on the critical question of the optimal capital requirement to assure large-bank resilience, this paper analyzes a more immediate and real-world problem: whether one more capital rule atop all the others applied to large U.S. banks will meaningfully improve safety and soundness at reasonable cost in terms of credit availability, wealth distribution, the competitiveness of mid-size banks, and the structure of the U.S. financial system. To date, most U.S. regulatory cost-benefit analyses (CBAs) have been done on a one-off basis for each new rule, providing little insight into actual benefits taking other rules into account. Further, most regulatory-agency CBAs measure costs in terms of implementation and compliance burden, not the more significant potential implications of a new rule on credit availability, market liquidity, and consumer and macroeconomic cost. Some of these costs are passed on in ways that enhance the competitiveness of "shadow banking" firms, creating financial-stability risks different than those that caused the 2008 great financial crisis (GFC) but perhaps at least as lethal given the growing risk-profile of U.S. shadow banking.[1] Using traditional definitions of both quantitative start-up costs and qualitative systemic benefits, virtually every rule has passed CBA muster, at least according to the regulator that issued it.

A marginal CBA approach, in contrast, puts direct and indirect costs into a broader context to assess them in relation to the existing regulatory framework to determine if one more rule in fact is worth its cost in light of its ability to enhance financial-market stability and other social-welfare and financial-market objectives. In theory, all rules that enhance stability are worth their cost, but in practice each rule has real costs because no rule nor any combination of them can assure a risk-free financial system. Even if finance were somehow to be made risk-free, the resulting impact of any such bedridden financial system would clearly warrant careful consideration in light of offsetting costs to growth, innovation, and wealth distribution.

This paper is the first effort at a marginal cost-benefit analysis of a significant U.S. capital regulation. It is informed by academic and governmental research but goes beyond it to assess marginal costs and benefits of a specific capital requirement for a specific group of banks. Importantly, the consensus of literature surveys conducted by global regulators about the net costs and benefits of the capital rules are far less confident of benefits than the U.S. CBA approach described above. For example, a 2015 study found that, "In conclusion, both theoretical and empirical studies are not conclusive as to whether more (stringent) capital (requirements) reduces banks' risk-taking and makes lending safer."[2] A more recent paper from the Federal Reserve Bank of San Francisco looking at data from seventeen countries from 1870 to 2013[3] finds that higher capital (at least as measured without reference to risk) not only does not promote financial stability, but also may make financial crises more likely.

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[1] Financial Stability Board (FSB), *Global Shadow Banking Monitoring Report 2016* (May 10, 2017), available at http://www.fsb.org/wp-content/uploads/global-shadow-banking-monitoring-report-2016.pdf.

[2] Natalya Martynova, *Effect of bank capital requirements on economic growth: a survey*, (March, 2015), available at https://www.dnb.nl/binaries/Working%20paper%20467_tcm46-319679.pdf.

[3] Òscar Jordà, Björn Richter, Moritz Schularick, and Alan M. Taylor, *Federal Reserve Bank of San Francisco Working Paper 2017-06: Bank Capital Redux: Solvency, Liquidity, and Crisis* (March, 2017), available at http://www.frbsf.org/economic-research/files/wp2017-06.pdf.

Findings of this FedFin paper include:

- U.S. rules make the higher of the standardized or advanced options a large bank's binding capital constraint. Supervisory stress-tests are also often a binding constraint above and beyond the higher of these two risk-based capital requirements. Large banks must also model risk to ensure that they hold sufficient capital for their specific risks under rules governing economic capital allocation. Given that the advanced approach is often not a binding constraint and that supervisors can also impose add-on capital charges to any bank that still fails to meet their expectations, the cost of the advanced approach is not offset by sufficient instances in which it may be the best tool to capture risk, especially at non-complex banking organizations regardless of size.
- Although U.S. regulators indicated in 2007 that they would study the net impact of the advanced approach, this has not been done in any fashion made public nor have the agencies assessed the cumulative impact of all of their capital rules to determine the extent to which any may be revised without adverse prudential effect. Since 2007, the U.S. capital rulebook has been filled with standards not anticipated when the advanced approach was finalized, warranting an immediate cumulative-impact assessment.
- An assessment of public-sector and academic research demonstrates that the marginal prudential value of the complex models needed to comply with the advanced approach is small given all the other stringent U.S. requirements and residual U.S. regulatory authority to demand still more capital at any bank or bank holding company.
- Academic and regulatory research also demonstrates no clear link between more capital and safer banking. Indeed, research suggests that capital may be a false indicator of risk that, especially when determined by complex models without clear relation to additional risk, detracts management and supervisory attention from emerging macroeconomic, credit, liquidity, concentration, and risk-management failings with far more consequence to long-term solvency. The advanced approach is also found to heighten macroeconomic risk because it encourages destructive boom-bust cycles in credit availability.

Section 1 of this paper assesses the advanced approach and other U.S. regulatory capital requirements for BHCs over $250 billion in assets or otherwise covered by the advanced approach. It notes that adding capital increases costs that may mitigate effective risk management, citing also recent research concluding that capital ratios are a poor predictor of actual risk.

Section 2 analyzes the full array of U.S. regulatory capital rules governing banks and BHCs with assets over $250 billion, explaining the relationship among all of these capital rules and demonstrating which requirement(s) are generally the binding constraints for banking organizations now required also to adhere to the advanced approach. It is shown that other rules are generally the binding constraint for these companies and, where this may not be the case, regulators have considerable discretion to mandate capital add-ons without at the same time imposing all the costs associated with the advanced approach.

Section 3 assesses the benefits regulators have ascribed to the advanced approach. It finds that these have not been re-evaluated since 2007 and are overtaken by all of the post-crisis capital requirements analyzed in the prior section, most notably the new large-BHC stress tests. Research from governmental agencies finding no ascertainable advanced-approach benefits are also described, as is

a new study finding that the advanced approach undermines financial stability by increasing the likelihood of procyclicality.

Section 4 analyzes the risks presented by large, non-complex BHCs to assess the extent to which these are so great as to warrant requiring use of the advanced approach in addition to all of the capital requirements described above regardless of their likely binding impact. Noting recent governmental research finding a lowered and generally non-systemic risk profile for these BHCs, it describes the resolution requirements and other standards that make it very unlikely that any regional BHC or a combination of them would fail with so much systemic consequence as to threaten U.S. financial stability or economic growth.

Section 5 analyzes the costs of higher capital requirements. A detailed analysis of all of the governance rules associated with the advanced approach demonstrates that the diversion of management and supervisory resources is likely to be considerable. Credit-availability impacts due to higher capital is unlikely to be material for non-complex regional BHCs subject to the advanced approach because, as noted above, it is unlikely that the advanced approach will prove to be their most binding constraint and thus be a potential damper on credit availability. Potential regulatory cost analyses are found to be largely qualitative, but assumptions in them anticipating reduced cost of capital as requirements rise are contradicted by recent data showing that anticipated cost reductions due to higher capital have not in fact materialized.

Section 6 concludes the paper. It notes that applying the advanced approach to large, non-complex banking organizations in the U.S. fails a marginal cost-benefit test because the benefits regulators anticipate or those perhaps likely from the advanced approach are outweighed by direct implementation, supervisory, maintenance, and governance costs as well as by indirect costs to U.S. financial-system stability and regional credit availability.

Table of Contents

I. The Role of Regulatory Capital

Do large amounts of capital and/or capital required in hopes of precise calibration to the risks regulators believe lie in complex instruments make the U.S. financial system so much safer as to warrant any adverse effects on economic output (i.e., to the growth and productivity essential for opportunity)? Considerable debate continues as to whether capital should be the principal bulwark of bank safety and soundness or if other regulatory actions play at least as large a role. Putting the advanced approach in the context of this discussion is essential to understanding if the putative benefits of the advanced approach – models that capture the idiosyncratic risk at each large banking organization – contribute to the policy goal of solvent banks that pose less risk to both financial stability and economic output.

The U.S. has historically relied on prudential policies that combine specific, quantitative capital standards with supervision – i.e., on rules targeted at risks across the banking system and on examination of each insured depository and its holding company to ensure not only that all of these requirements are met, but also that specific risks are addressed through additional capital, enhanced liquidity, better governance, and other actions. As discussed below, undue reliance on specific capital metrics may well mask risk and at the same time distract both bank management and supervisors from emerging hazards not offset by regulatory-capital buffers. Recent research from the Board of Governors of the Federal Reserve System (FRB) found that supervisory standards governing leveraged corporate lending had at least as much of a risk-reduction effect for large banking organizations as the capital rules embodied in the stress tests (which are as discussed below usually a large BHC's binding constraint).[4] Another recent paper has also suggested that banks in fact respond more meaningfully to downgrades in their supervisory ratings than to higher capital in reducing their credit risk.[5] A recent presentation by Federal Reserve staff also notes that business development companies (BDCs) bear fifty percent capital requirements but are in fact quite risky.[6]

Further, bank failures may well result from causes not directly captured in the capital requirements – for example, failure may well be due to liquidity risk now governed by numerous U.S. rules that require banks and BHCs with over $50 billion in assets to hold "high-quality liquid assets" (HQLAs) against possible funding outflows so that they can readily handle unexpected funding inflows during significant market disruptions. Importantly, these HQLAs reside on a bank's balance sheet and, as discussed in more detail below, bear high cost due to the application of stringent U.S. leverage ratios (LRs) that impose capital regardless of the no- or low-risk nature of these assets. Recent Federal Financial Analytics research has analyzed this question in more detail.[7]

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[4] Paul Calem, Ricardo Correa, and Seung Jung Lee, Federal Reserve Board (FRB) *Prudential policies and their impact on credit in the United States*, (December 2016), available at https://www.federalreserve.gov/econresdata/ifdp/2016/files/ifdp1186.pdf.

[5] Paul Kupiec, Yan Lee and Claire Rosenfeld, *Does Bank Supervision Impact Bank Loan Growth?*, (November 21, 2016), available at https://www.aei.org/wp-content/uploads/2016/12/Kupiec-Does-bank-supervision-impact-bank-loan-growth.pdf.

[6] Mark Carey, *Capital Regulation: How Much Capital is Needed?* (November 3, 2016), available at https://www.chicagofed.org/~/media/others/events/2016/international%20banking%20conference/carey-110316-pdf.pdf.

[7] Federal Financial Analytics, *Mutual-Assured Destruction: The Arms Race Between Risk-Based and Leverage Capital Regulation*, (October 13, 2016), available at http://www.fedfin.com/images/stories/client_reports/FedFin%20Paper%20on%20Mutual-

Operational risks, such as those that shook the U.S. financial system on 9/11 – may also threaten stability. The advanced approach includes a capital charge for operational risk. However, as discussed in another recent Federal Financial Analytics paper,[8] operational risk is best addressed through internal controls and resilient and redundant systems – not capital stockpiles that may cushion the financial impact created by events such as a natural disaster after the fact but that do not ensure the continuing operation of critical U.S. financial infrastructure. Supervision to ensure effective operational-risk management – not advanced-approach capital – is a proven approach to ensuring BHC resilience. Indeed, an array of new requirements governing both banks and non-banks providing this infrastructure is principally focused on stress testing, liquidity, and operational resilience – not capital.[9]

It is of course theoretically possible that banks could respond to all of these emerging risks, meet all the new supervisory requirements, and remain resilient and still hold large amounts of additional capital determined by models that require capital above and beyond that mandated by all the other new rules. For this to be possible, the added cost of capital must be less than its likely benefit. Regulators had in fact expected that the cost of capital would drop in concert with higher requirements, essentially compensating banks for at least some of the costs of all the post-crisis rules. However, capital costs have not in fact dropped and instead have risen significantly since the GFC. More capital acquired at higher cost may well undermine the ability of banks to handle other risks by depriving them of the resources needed to build costly operational buffers against cyber-risk and similar threats, an issue recently highlighted by the Office of Financial Research (OFR) director[10] and in industry analyses of growing technology vulnerabilities.[11]

The costs of more capital also contributes to a transformation of the U.S. financial system from one largely relying on regulated entities to one from which credit comes increasingly from non-banks sometimes called "shadow" institutions. The most recent OFR report found that non-banks now supply more U.S. credit than insured depositories, concluding that this is in part the result of higher, more costly capital requirements and is a cause of emerging U.S. systemic risk.[12] OFR has also observed that credit risk is rising, macroeconomic fundamentals have "deteriorated," incentives for financial risk-taking are heightened, and improvements in U.S. financial-market resilience are "uneven."[13]

Assured%20Destruction%20-%20The%20Arms%20Race%20between%20Risk-Based%20and%20Leverage%20Capital%20Regulation.pdf.

[8] 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.

[9] Committee on Payments and Market Infrastructures (CPMI) & the Board of the International Organization of Securities Commissions (IOSCO), *Consultative Report: Resilience and recovery of central counterparties (CCPs): Further guidance on the PFMI*, (August, 2016), available at http://www.bis.org/cpmi/publ/d149.pdf.

[10] John Heltman, *Regulators Cautiously Embrace Revisiting Post-Crisis Regs*, American Banker, November 30, 2016 at http://www.americanbanker.com/news/law-regulation/regulators-cautiously-embrace-revisiting-post-crisis-regs-1092630-1.html.

[11] Telis Demos, *Banking Technology Vendors Feel the Pinch*, Wall Street Journal, November 7, 2016 at http://www.wsj.com/articles/banking-technology-vendors-feel-the-pinch-1478530257.

[12] Office of Financial Research (OFR), *2016 Financial Stability Report*, 15 (December, 2016), available at https://www.financialresearch.gov/financial-stability-reports/files/OFR_2016_Financial-Stability-Report.pdf.

[13] OFR, *2015 Financial Stability Report*, *op. cit.* at 7.

II. U.S. Regulatory-Capital Framework: Where Does the Advanced Approach Fit In?

It is thus clear that there is no linear benefit associated with continuing additions of larger amounts of regulatory capital. The next issue to consider is how to determine where the appropriate threshold lies for maximizing the prudential value of capital without imposing so many costs as to make the result of all this capital counter-productive for safety and soundness or other high-priority policy objectives. A marginal cost-benefit analysis of one mandated requirement based only on a banking organization's size – not its risk – must consider it in the context of all other applicable standards to determine the extent to which yet one more requirement atop all the others so enhances the intended result of the total regulatory framework as to warrant its quantitative and qualitative cost. As former FRB Governor Daniel Tarullo has said, "the aims of prudential regulation for traditional banking organizations should vary according to the size, scope, and range of activities of the organizations. By specifying these aims with more precision, we can shape both a more effective regulatory system and a more efficient one."[14]

The starting point for evaluating the need for one more capital requirement – the advanced risk-based capital approach for U.S. BHCs with assets over $250 billion or more than $10 billion in foreign assets – is thus to understand first the business models of affected banks and then the direct and indirect costs of this standard taking into account all of the others also designed to achieve the same policy goals and prudential benefits. In the discussion below, we focus on U.S. banking organizations with assets over $250 billion that thus make them subject to an array of rules discussed in more detail below. We refine the analysis also to focus on BHCs and their subsidiary banks that, while above this arbitrary asset-size threshold, are not complex as determined by the studies discussed below. This lack of complexity derives from the fact that these large, non-complex BHCs do not generally operate across national borders, are not controlled by a foreign banking organization or a non-traditional parent company (i.e., an insurer), and are focused principally on traditional deposit-taking and lending services.

A. U.S. Capital Framework

Regulatory-capital requirements are premised on a ratio of capital instruments versus assets, with each criterion counted by rule. As a result, capital requirements generally serve only as a bulwark against credit risk – that is, the risk that obligors (e.g., borrowers) of assets (e.g., loans) against which capital is measured do not honor their obligations. Recognizing that loss derives from other causes, capital regulation now includes charges against operational risk (i.e., systems failure) and market risk (i.e., trading loss). These requirements are in some cases embedded in the broader U.S. Basel III framework and in others issued in freestanding form. As shall be discussed below, these capital requirements are meant to apply only to large, complex banks with significant operational and trading exposures, but the current U.S. framework in fact may apply them more generally to less complex banking organizations with uncertain prudential benefit and at considerable additional burden.

As noted, other non-capital requirements also apply to all banking organizations, with the most stringent since the GFC applied to banks and BHCs with assets over $50 billion. A key part of this

[14] FRB Governor Daniel Tarullo, *Speech at the Federal Reserve Bank of Chicago Bank Structure Conference, Chicago, IL: Rethinking the Aims of Prudential Regulation* (May 8, 2014), available at https://www.federalreserve.gov/newsevents/speech/tarullo20140508a.htm.

additional prudential framework addresses liquidity risk – i.e., that a bank may run short of funds with which to meet obligations even though it remains solvent. The U.S. has finalized one key aspect of global liquidity regulation, the liquidity coverage ratio (LCR)[15] and is working to complete the net stable funding ratio (NSFR),[16] with each of these rules structured so that modified requirements affect BHCs with assets between $50 billion and $250 billion and the toughest standards applied to BHCs over this threshold.

These and other prudential rules are meant to work in tandem with the capital standards, but in significant ways complicate and even compete with them. These concerns have been evident as the post-GFC regulatory framework took early shape,[17] but remain unaddressed because U.S. regulators have not assessed the cumulative impact of the new regulatory framework. This is in sharp contrast not only to regulators in other areas,[18] but also a new request for comment from the over-arching global regulator (the Financial Stability Board) to assess cumulative issues such as the impact of new rules on income distribution.[19]

What is the advanced approach? Also called the advanced internal ratings-based (A-IRB) approach, it is one facet of the global accord finalized in 2004 known as Basel II,[20] issued as a final rule in the U.S. in 2007,[21] and then significantly revised after the crisis in 2010 to form the Basel III Accord.[22] The FRB, Office of the Comptroller of the Currency (OCC), and Federal Deposit Insurance Corporation (FDIC) then finalized these global rules in a U.S.-specific version of Basel III in 2013.[23] This sweeping rule – which mandates both risk-based and leverage capital standards for all U.S. banking organizations – is

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[15] Office of the Comptroller of the Currency (OCC), FRB, & Federal Deposit Insurance Corporation (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.

[16] OCC, FRB, & FDIC Net Stable Funding Ratio: Liquidity Risk Measurement Standards and Disclosure Requirements, 12 C.F.R. §§ 50, 249, & 329 (2016), available at https://www.federalreserve.gov/newsevents/press/bcreg/bcreg20160503a1.pdf.

[17] Federal Financial Analytics, *A New Framework for Systemic Financial Regulation: Simple, Transparent, Enforceable and Accountable Rules to Reform Financial Markets*, (November, 2011), available at http://www.fedfin.com/images/stories/client_reports/complexityriskpaper.pdf.

[18] European Commission, *Call For Evidence: EU Regulatory Framework for Financial Services* (October, 2015), available at http://ec.europa.eu/finance/consultations/2015/financial-regulatory-framework-review/docs/consultation-document_en.pdf.

[19] FSB, *Proposed Framework for the Post-Implementation Evaluation of the Effects of the G20 Financial Regulatory Reforms, Consultation document on main elements* (April 11, 2017), available at http://www.fsb.org/wp-content/uploads/Framework-for-the-post-implementation-evaluation-of-the-G20-financial-regulatory-reforms.pdf.

[20] Basel Committee, *International Convergence of Capital Measurement and Capital Standards*, (June, 2004), available at http://www.bis.org/publ/bcbs107.pdf.

[21] OCC, FRB, FDIC, & Office of Thrift Supervision (OTS) Risk-Based Capital Standards: Advanced Capital Adequacy Framework – Basel II, 12 C.F.R. §§ 3, 208, 225, 325, 559, 560, & 567 (2007), available at https://www.gpo.gov/fdsys/pkg/FR-2007-12-07/pdf/07-5729.pdf.

[22] Basel Committee, *Basel III: International framework for liquidity risk measurement, standards and monitoring*, (December, 2010), available at http://www.bis.org/publ/bcbs188.pdf.

[23] OCC & FRB Regulatory Capital Rule: 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.

now being implemented in concert with numerous other global and U.S. capital, prudential, and resolution standards. The Trump Administration has begun to review these rules and possible unintended consequences, but they remain binding standards for U.S. banking organizations unless or until repealed or revised.

B. Where Does the Advanced Approach Fit into the Capital Framework?

The A-IRB is supposed to fit into the total capital framework and add value by requiring the largest, most complex banks and BHCs to use internal models to ensure that risk-based capital (RBC) comports with the probability of default (PD), loss given default (LGD), exposure at default (EAD) and (for wholesale exposures) the maturity (M) associated with each exposure no matter how structured. All of the supervisory assumptions that went into these calculations in the U.S. 2007 rule were based in large part on the Basel 2004 standards, leading the agencies to indicate that they would revisit many of them after the Basel II rules had been in effect for some period of time. While the 2013 U.S. Basel III rules made many changes to the capital framework discussed in more detail below, they did not change underlying Basel II assumptions about the advanced approach except where risk weightings were raised for targeted instruments. There thus has been no quantitative, qualitative, or cumulative assessment of the overall framework of the A-IRB or how it works given that U.S. banks – unlike those in most other nations – must hold the higher of the advanced or standardized capital charges unless one or more of the other capital rules described below preempts it.

C. U.S. Capital Requirements

The U.S. A-IRB is part of a capital framework that includes as many as twenty-eight different requirements.[24] In addition to all of these, U.S. BHCs generally hold buffers against whichever of the capital rules is their binding constraint because the market volatility and potential penalties described below lead most BHCs to hold a capital margin of error above and beyond the requirements needed to ensure designation as a "well-capitalized" BHC.

Applicable capital rules across the spectrum of BHCs with assets over $250 billion include:

- Basel III's far more stringent definitions of the equity instruments that count as capital for purposes of the regulatory ratios and significantly higher amounts of total required capital. Even if all of the risk weightings imposed on banks stayed the same as they were under Basel II (which they have not), the new capital requirements would be far tougher than those in effect before the GFC;
- supervisory reservations of authority in Basel III and most other rules, meaning that any of the federal banking agencies may require a bank or BHC to hold more capital than stipulated under any of the rules described below for any reason the regulator determines

[24] The Clearing House (TCH), *The Capital Allocation Inherent in the Federal Reserve's Capital Stress Test*, 6 (January, 2017), available at https://www.theclearinghouse.org/-/media/tch/documents/tch%20weekly/2017/20170130_tch_research_note_implicit_risk_weights_in_ccar-final.pdf?la=en.

appropriate under its broad safety-and-soundness powers.[25] Banks and BHCs that disregard any such orders do so at peril of significant enforcement actions, including activity restrictions and public censure;

- economic capital requirements in effect since at least 1999.[26] These require large banks and BHCs not only to comply with all of the rules described here, but also to reach their own judgments based on their own models about likely risk. If a bank's models suggest an asset is less risky, the higher regulatory requirements prevail. If the economic-capital allocation models dictate still more capital than the standardized or advanced approach, then this still higher requirement applies;
- "Collins Amendment" provisions of Dodd-Frank that require not only that large banks now hold at least as much risk-based and leverage capital as they did before the crisis as well as as much capital as smaller banks do for like kind assets. Collins minimum requirements also must be calculated taking into consideration of various surcharges applied to larger BHCs (see below);
- the standardized approach (SA) in the Basel III rules that assign risk-weighted asset (RWA) values for purposes of applying the capital requirements. As noted, U.S. banks and BHCs must hold the higher of the SA or A-IRB, meaning that standardized RWAs trump model-driven ones when models otherwise would suggest lower risk weightings even if a bank's relevant asset is safer than the SA's assumptions. This provision is mandated by the U.S. even though the global Basel rules permit banks to choose the lower of their SA or A-IRB weightings;
- a capital-conservation buffer of 2.5 percent of RWAs designated under the higher of the SA or A-IRB to ensure that banks are subject to sanctions on dividends and discretionary bonuses above and beyond any other restrictions that might apply if capital falls below levels well above minimum standards;
- a counter-cyclical capital buffer (CCyB) applied to all BHCs with assets over $250 billion or otherwise subject to the A-IRB. This CCyB is a discretionary capital requirement the FRB may deploy when it determines that market conditions are becoming dangerously overheated, with the CCyB removed when the Board believes stability has returned;[27]
- a market risk-based capital requirement governing risks housed in a bank's trading book. These standards apply to any bank or BHC with trading assets or liabilities equal to ten percent or more of company assets or over $1 billion in trading assets;[28]
- a series of leverage capital requirements that assign capital based on assets calculated generally without regard to risk. In addition to the Collins Amendment leverage requirement noted above, banks and BHCs with assets over $250 billion are subject to a

[25] OCC & FRB Regulatory Capital Rule: 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, 78 Fed. Reg. 62018, 62030 (2013), available at https://www.gpo.gov/fdsys/pkg/FR-2013-10-11/pdf/2013-21653.pdf.

[26] Assessing Capital Adequacy in Relation to Risk at Large Banking Organizations and Others with Complex Risk Profiles, Fed. Res. Bull. SR 99-18, (1999), available at http://senverb.boun.edu.tr/htm/Assesing%20Capital%20Adequacy%20SR.htm.

[27] 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.

[28] 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.

supplementary leverage ratio (SLR) in the Basel III rules that imposes a three percent requirement on both on- and off-balance sheet assets. GSIBs are subject to an "enhanced" SLR – five percent for the BHC and six percent for the parent holding company;[29]

- a risk-based capital surcharge for GSIBs;[30]
- stress tests. As discussed in more detail below, these require banks and BHCs with assets over $10 billion to conduct stress tests that become increasingly stringent and subject to FRB supervisory requirements and the Board's models for BHCs with assets over $50 billion.[31] The purpose of these tests is to ensure that banks and BHCs have capital not only in full compliance with all of the other standards, but also sufficient to ensure continued compliance even under acute stress; and
- prompt corrective action (PCA) standards that require banks to be well-capitalized to ensure that regulators permit continued operation along the company's desired lines. PCA rules also stipulate increasingly-severe sanctions including deposit-insurance revocation and charter termination if capital ratios fall below thresholds.[32] BHCs with assets over $50 billion regardless of whether they are under the SA or A-IRB also come under Dodd-Frank's early-remediation requirements to make PCA still more stringent if any risk-based or leverage ratios falter.[33]

Importantly, capital requirements are not the only buffers banks hold against credit risk. U.S. banks are also required to maintain allowances for loan and lease losses (ALLL) – i.e., loan-loss reserves. Under new accounting standards,[34] reserves are to be calculated on the basis of expected loss over the life of a loan. This is a significant reserve requirement and credit-risk buffer that puts downward pressure on regulatory-capital ratios because troubled assets against which reserves are held also bear increasingly high risk-based capital requirements. Reserves are thus a double charge for troubled credit exposures, a double-charge not offset in capital ratios because reserves count only to a very limited extent for one part (known as Tier 2) of the overall U.S. Basel III rules.

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[29] OCC, FRB, & 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.

[30] 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.

[31] Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank), Pub. L. No. 111-203, § 165, 124 Stat. 1376, 1423 (July 21, 2010), available at https://www.gpo.gov/fdsys/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf.

[32] FDIC Improvement Act § 131, Pub. L. No. 102-242, 105 Stat. 2253 (1991), available at https://www.gpo.gov/fdsys/pkg/STATUTE-105/pdf/STATUTE-105-Pg2236.pdf.

[33] Dodd-Frank § 166, Pub. L. No. 111-203, 124 Stat. 1376 (July 21, 2010), available at https://www.gpo.gov/fdsys/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf.

[34] Financial Accounting Standards Board (FASB), *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, (June, 2016), available at http://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1176168232528&acceptedDisclaimer=true.

D. Additional A-IRB Capital Requirements

In addition to requiring banks over $250 billion in assets and those with more than $10 billion in foreign assets to calculate their RBC ratios according to internal models structured in compliance with applicable rules (see below), the advanced approach includes several additional features important to consider in assessing costs versus marginal benefits. These additional requirements include:

1. Mandatory Adjustment of Regulatory Capital:

The A-IRB requires that capital balances be revised to reflect unrealized gains and losses under mark-to-market accounting rules. This requirement has the effect of ensuring that capital is not unrealistically portrayed as high ahead of losses that, if recognized, deplete this critical buffer. However, losses that are quickly reversed lead to swings in capital with significant balance-sheet and even strategic impact. Counting unrealized gains as *de facto* capital also creates capital "booms" that may disappear if unrealized gains evaporate, forcing banks quickly to recapitalize or curtail operations under stress. This provision thus helps to make the advanced approach procyclical, as shall be discussed in more detail below.

Because banks over $50 billion must now hold under the liquidity rules large balances of high-quality liquid assets such as Treasury securities, mark-to-market adjustments now play a larger role in profitability accounting for even the most traditional of regional BHCs. Banks holding HQLAs in available-for-sale books will see considerable capital volatility. This can be avoided to some extent if banks hold HQLAs in their accounting "held to maturity" book, but such banks are then unable to rebalance positions as market conditions change, exposing them to interest-rate risk.

2. Operational Risk-Based Capital

The advanced approach addresses not only credit risk, but also includes an additional capital requirement for operational risk (i.e., system failure, legal and reputational risk, fraud, and man-made or natural crises such as power outages and terrorist attacks).

Non-complex regional BHCs are generally no more susceptible to this than other banks – indeed, they are usually less susceptible due to the added contingency-planning, living-will, and risk-management standards applicable to banks and BHCs with assets over $50 billion. Like all other banks, these BHCs must also establish reserves for legal risk so that capital is not impaired by any costly legal settlements or enforcement penalties. To be sure, there are some instances in which a non-complex regional BHC may have an unusual operational-risk exposure due to a large business in activities such as credit-card processing and mortgage servicing. These payment-and-settlement services join others at all banking organizations to create vulnerabilities for both customers and the banks themselves, although no activity of this sort at any regional BHC is likely to pose the systemic risks resulting from service interruptions in GSIB payment, settlement, and clearing operations on which the global financial system depends.

It might thus seem warranted to impose these advanced operational-risk capital rules on at least some large regional BHCs. However, the advanced operational-risk capital charge provides no offset for

costly risk mitigations, essentially double-charging banks for possible risk.[35] There is thus considerable debate about the extent to which these added capital charges enhance operational-risk management or perversely instead add still more capital costs that create additional earnings pressure that then serves as a perverse incentive to risk management due to the inability of banks to add costly operational-risk protections such as those essential to ensure cyber-security.

3. Internal Capital Allocation

As noted, large banks have been required for almost twenty years to determine on an "economic" – not regulatory – basis how much credit risk they take and then to allocate capital accordingly. Further, banking organizations under the A-IRB are also required to calculate capital based on internal models that may or may not comport with those mandated by the advanced approach. Lower capital determined by economic or "ICAAP" calculations does not reduce total risk-based capital requirements, but any additions must be added to the supervisory, "Pillar 2" element of the total risk-based requirements.[36]

As a result, large banks must hold the higher of their internal or regulatory requirements, making it clear that even where the SA under-estimates idiosyncratic risk at a particular large bank, the economic-capital requirements – which are not triggered by mandatory A-IRB and ICAAP coverage – apply. Stress tests (see below) have to some degree taken over from these requirements under the company-run models, but this has only increased the stringency of these economic capital-allocation standards because of the requirement that any bank that failed in the past to stress-test its assumptions do so in accordance with regulatory expectations and, in many cases, scenarios.

E. Does the Advanced Approach Bind Large BHCs?

1. Economic Capital Requirements

The most detailed discussion of how regulators think the A-IRB will work is to be found in the final U.S. Basel II rules. There, the agencies indicate that:

> The IRB approach is broadly similar to the credit VaR approaches used by a number of banks as the basis for their internal assessment of the economic capital necessary to cover credit risk. It is common for a bank's internal credit risk models to consider a one-year loss horizon and to focus on a high loss threshold confidence level. As with the internal credit VaR models used by banks, the output of the risk-based capital formulas in the IRB approach is an estimate of the amount of credit losses above ECL over a one-year horizon that would only be exceeded a small percentage of the time.… As noted above, the supervisory model of credit risk underlying the IRB approach embodies specific assumptions about the economic drivers of portfolio credit risk at banks. As with any modeling approach, these assumptions represent simplifications of very complex real-world phenomena and, at best, are only an approximation of the actual credit risks at any bank.…

[35] Federal Financial Analytics, *Capital's Cast-Off: Operational Risk-Based Capital and Its Critical Implications*, (September 30, 2016), *op. cit.*

[36] OCC, FRB, FDIC, & OTS Supervisory Guidance: Supervisory Review Process of Capital Adequacy (Pillar 2) Related to the Implementation of the Basel II Advanced Capital Framework, 73 Fed. Reg. 44620, 44620 (2008), available at https://www.gpo.gov/fdsys/pkg/FR-2008-07-31/pdf/E8-17555.pdf.

> The risk-based capital formulas into which the estimated risk parameters are inserted are simpler than the economic capital methodologies typically employed by banks, which often require complex computer simulations.[37]

It is simply unknown the extent to which the A-IRB varies enough from the economic-capital models on which it is based to make it of marginal prudential value. There may well be differences due to the addition of regulatory constraints, but it nonetheless remains that the higher of any of the capital rules governing an A-IRB bank dictates its required capital.

2. Stress Tests

Each of the federal banking agencies has promulgated rules to implement the supervisory and company-run stress tests conducted since 2009 and expanded under Dodd-Frank.[38] These tests are designed to ensure capital adequacy under even acute stress above and beyond that experienced during the GFC, making evaluation of them critical in assessing the marginal benefits of an advanced-approach mandate.

As described above, the agencies have ascribed to the advanced approach the major benefit of ensuring that each large bank's risk-based capital reflects its own risk profile. However, these stress tests require each bank and BHC to run its own exposures through an array of scenarios and assumptions to ensure this same benefit, albeit under far more stringent conditions than included in the advanced approach on its own. Importantly, a bank or BHC may be in full compliance with all of the rules described above but still not pass capital muster because it fails one or more of its stress tests.

The FRB's Comprehensive Capital Analysis and Review (CCAR) exercise has become the binding constraint for many U.S. BHCs with assets above $50 billion, although some big BHCs are bound under it by the leverage rule and others by the risk-based capital ones.[39] Results vary by year as to which of all of the rules is the binding constraint based on factors such as FRB assumptions, but research based on publically-available data indicates that CCAR is often the most critical capital constraint for large banking organizations.[40]

Indeed, even if CCAR is not binding in one year or another, large BHCs cannot anticipate the models the FRB will deploy in the next year's stress tests and thus reserve capital to ensure that CCAR results are positive and the FRB thus permits the BHC to distribute capital to investors who, if not satisfied, will punish the company's market capitalization. As a result, CCAR has essentially preempted the other U.S. capital requirements to the extent any allows for lower regulatory or economic capital allocation.

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[37] OCC, FRB, FDIC, & OTS Risk-Based Capital Standards: Advanced Capital Adequacy Framework – Basel II, 72 Fed. Reg. 69288, 69292 (2007), available at https://www.gpo.gov/fdsys/pkg/FR-2007-12-07/pdf/07-5729.pdf.
[38] Dodd-Frank § 165, Pub. L. No. 111-203, 124 Stat. 1376 (July 21, 2010), available at https://www.gpo.gov/fdsys/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf.
[39] TCH, *The Capital Allocation Inherent in the Federal Reserve's Capital Stress Test*, *op. cit.*
[40] *Ibid*.

III. Benefits of the Advanced Approach

The Basel III rules are silent as to the specific benefits of the A-IRB because the latest standards do not change the overall risk-weighting structure established under Basel II, which initially created the A-IRB. Turning to the Basel II rules for an explanation of A-IRB benefits, we find statements from the agencies confirming a GAO study (see below) indicating that these are essentially unmeasurable because capital could go up or down in concert with the A-IRB but do so for reasons that have nothing to do with the advanced approach. The agencies thus defend the A-IRB on qualitative grounds, stating that it will, among other things:

- better allocate capital and reduce moral hazard;
- reduce regulatory arbitrage;
- improve the ability of capital to signal risk;
- encourage banks to improve credit-risk management;
- make capital use more efficient;
- address product innovations; and
- govern operational risk.

However, the U.S. rules were finalized in 2007, well before many of the other changes to the U.S. capital rules described above also aimed at these objectives. The U.S. rules at that time also did not include all of the standards applied by the Dodd-Frank Act to BHCs with assets over $50 billion, which mandated not only the capital and liquidity standards described above, but also extensive risk-management and governance mandates aimed at the same goals articulated for the Basel II advanced approach.

Basel III was of course enacted in the U.S. in concert with all of the GFC reforms. However, the 2013 rule appears to take the need for advanced approaches as given and is focused principally on making the Basel II advanced approach more stringent with regard to targeted assets (e.g., credit valuation adjustments associated with complex derivatives positions) seen as playing a major, adverse role in the financial crisis. As a result, these standards provide no insight into the net benefit of using the A-IRB versus the standardized approach for covered banking organizations, focusing instead on how the new framework would affect community banks.

A more recent assessment of the benefits of the A-IRB came from former then-FRB Gov. Tarullo in 2014. Taking stress testing and related reforms into account, he concluded that:

> The combined complexity and opacity of risk weights generated by each banking organization for purposes of its regulatory capital requirement create manifold risks of gaming, mistake, and monitoring difficulty. The IRB approach contributes little to market understanding of large banks' balance sheets, and thus fails to strengthen market discipline. And the relatively short, backward-looking basis for generating risk weights makes the resulting capital standards likely to be excessively pro-cyclical and insufficiently sensitive to tail risk. That is, the IRB approach – for all its complexity and expense – does not do a very good job of

advancing the financial stability and macroprudential aims of prudential regulation.[41]

There is limited research with regard to one specific benefit ascribed to the advanced approach – i.e., the potential that the A-IRB better captures risk in widely-held asset classes. However, a GAO report to Congress concluded that it is simply not possible to determine if the A-IRB results in more and/or better disciplined regulatory capital than the SA.[42] A new GAO study tries to go beyond this with regard to just one asset class – mortgages – but found little difference between SA and A-IRB requirements.[43]

IV. How Risky are Large Regional Banks?

We shall turn below to the costs of advanced-approach implementation to weigh them against the benefits regulators cite in defense of the A-IRB rules. However, the GFC has shown that financial crises can be so catastrophic to national well-being as to offset almost any burden new prudential and resolution rules impose on banks, especially the largest and most systemic banks. U.S. regulators use this approach to cost-benefit analysis not only in the few quantitative efforts made in the course of all the post-GFC rules, but also in defending some of the most costly requirements. Numerous Federal Reserve officials speak frequently of the "negative externalities" of large-BHC failure – i.e., macroeconomic and social-welfare costs – using these to warrant stringent rules such as the GSIB capital surcharge and costly new total loss absorbing capacity (TLAC) requirements.[44] Could a BHC with assets over $250 billion or more than $10 billion in foreign assets pose like-kind negative externalities in the event of failure?

A. General Risk Profile

In its most recent assessment of the implications of post-GFC reforms, the GAO used its indicators of systemic risk to assess U.S. BHCs with assets over $50 billion.[45] This report finds little and decreasing negative externalities are likely to result from the failure of any BHC with assets below $500 billion. From 2010 to the second quarter of 2016:

- the median size of BHCs with assets below $500 billion decreased, as did the market share of BHCs with assets between $50 billion and $500 billion. The GAO does not attribute this

[41] FRB Gov. Tarullo, *Rethinking the Aims of Prudential Regulation*, *op. cit.*
[42] Government Accountability Office (GAO), *Bank Capital Reforms: Initial Effects of Basel III on Capital, Credit, and International Competitiveness*, (November 20, 2014), available at http://www.gao.gov/assets/670/667112.pdf.
[43] GAO, *Mortgage-Related Assets: Capital Requirements Vary Depending on Type of Asset*, (December 15, 2016), available at http://www.gao.gov/assets/690/681647.pdf.
[44] 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, 12 C.F.R. § 252 (2016), available at https://www.federalreserve.gov/newsevents/press/bcreg/bcreg20161215a1.pdf.
[45] GAO, *Dodd-Frank Regulations: Agencies Efforts to Analyze and Coordinate Their Recent Final Rules*, (December, 2016), available at http://www.gao.gov/assets/690/681868.pdf.

change to any particular regulatory cause, but it may well result at least in part from the cost of the new capital framework (see below);
- the inter-connectedness of all U.S. BHCs with assets above $50 billion decreased;
- complexity decreased across the board for U.S. BHCs with assets over $50 billion;
- BHCs with assets over $50 billion are less leveraged, making them more resilient. During the period studied by GAO, the median total equity as a percentage of total assets for BHCs with assets between $50 billion and $500 billion rose from 11.55 percent to 12.79 percent; and
- short-term liabilities as a percentage of total liabilities dropped and holdings of liquid assets rose, making all BHCs with assets above $50 billion more liquid and therefore still more resilient.

OFR has taken another approach to considering systemic risk using reports U.S. BHCs with assets over $50 billion file each year with the FRB to support designation of U.S. GSIBs.[46] Going beyond GAO's approach, the OFR review also looked at the activities these BHCs conduct to identify complexity and concentration. Viewed this way, relatively small BHCs in some cases had large concentrations in systemic activities – for example, the smallest BHC by assets in the group (a subsidiary of a foreign bank that would not be considered a non-complex regional BHC for purposes of this study) had one of the largest concentrations of all of the 33 BHCs examined with regard to payment activities. Nonetheless, activities judged by OFR and global regulators as guides to complexity – derivatives, trading assets, and illiquid assets – are highly concentrated in the six largest BHCs.

Going into detail, the OFR review provides in-depth data on the systemic importance indicators only for BHCs with assets over $250 billion. Of these twelve BHCs, only three fit the criteria of a non-complex regional BHC as detailed above: Capital One Financial Corporation, PNC Financial Services, and U.S. Bancorp. These three institutions score as the least risky of all twelve BHCs based on OFR's criteria.

B. Size and Risk Correlation

Both the GAO and OFR analyses demonstrate that large, non-complex regional BHCs are most unlikely to pose the negative externalities posited by the Federal Reserve Board as the rationale for most of its rulemaking governing the largest U.S. BHCs and laid out in the qualitative rationale for the A-IRB. A new paper from the Bank for International Settlements – the central bank for central banks – looks at this issue from another perspective.[47] Looking only at the U.S. and basing its conclusions on an array of models, this paper finds that smaller BHCs could be about one-third more highly leveraged than the largest banks without posing risk to the U.S. financial system.

To be sure, some smaller BHCs can be very risky. Even if they do not on their own or taken together (see below) pose systemic risk, the U.S. has seen several BHCs with assets well below $500 billion that

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[46] Meraj Allahrakha, Paul Glasserman, & H. Peyton Young, OFR, *OFR Brief 15-01: Systemic Importance Indicators for 33 U.S. Bank Holding Companies: An Overview of Recent Data*, (February 12, 2015), available at https://www.financialresearch.gov/briefs/files/2015-02-12-systemic-importance-indicators-for-us-bank-holding-companies.pdf.

[47] Tirupam Geol, Bank for International Settlements (BIS), *BIS Working Papers No 599: Banking Industry Dynamics and Size-Dependent Capital Regulation*, (December, 2016), available at https://www.bis.org/publ/work599.pdf.

have failed at considerable cost to the FDIC. However, it is at best unclear if the A-IRB would have made any difference at all in each of these cases.

For example, the 2008 failure of Washington Mutual (WaMu), a savings association with $307 billion in assets when it failed, was due to its large holdings of high-risk mortgages. Because A-IRB risk weights are driven by the historical performance of a group of loans, the advanced approach would likely have generated relatively low risk weights for WaMu's portfolio because the look-back period would have been over an unusually benign period, understating the actual risks of the assets. Higher A-IRB weightings might have captured these over time as models reflected changing market circumstances, but WaMu's real risk derived not from its lack of capital, but rather from its huge concentration in one high-risk asset class which made it especially vulnerable due to the sudden drop in mortgage value accompanying the GFC.

One advantage of the A-IRB cited in the Basel II rules is that these standards include a correlation factor designed to add capital as risks within a bank become increasingly correlated as was the case at Washington Mutual. But, that rule notes that, "…the historical data available for estimating correlations among retail exposures, particularly for non-mortgage retail exposures, was more limited than was the case with wholesale exposures. As a result, supervisory judgment played a greater role…. [The correlation factors for] residential mortgage exposures is based largely on supervisory experience with and analysis of traditional long-term, fixed-rate mortgages."[48]

Thus, these correlation formulas – one major reason the agencies adopted the A-IRB – are uncertain for the largest exposures at non-complex BHCs focused largely on retail and corporate finance, not wholesale capital-markets activities.

Further, as former Gov. Tarullo noted, risk-based models can be procyclical, meaning that WaMu might well have collapsed even had its A-IRB models adjusted in time to the sudden post-2008 reality of U.S. mortgage finance because no amount of pre-crisis capital is sufficient on its own to save a large bank with a single bet on one asset class. A new study from the Federal Reserve Bank of Philadelphia[49] provides analytical support for this procyclicality concern. It assesses the impact of the A-IRB on mortgage portfolios over the full business cycle, finding that the advanced approach is in fact likely to lead to WaMu-style failures in mortgage finance and poses similar risk in other retail-finance sectors.

C. Correlated Failures

Given the persuasive evidence that smaller BHCs are unlikely to pose systemic risk, some have still opposed providing relief on grounds that a large group of BHCs with assets over as little as $50 billion could fail all at once and thus pose systemic risk. Scenarios for how this might occur are not often provided. Cases such as WaMu are sometimes cited to assert that small-bank holdings of large

[48] OCC, FRB, FDIC, & OTS Risk-Based Capital Standards: Advanced Capital Adequacy Framework – Basel II, 72 Fed. Reg. 69288, 69293 (2007), available at https://www.gpo.gov/fdsys/pkg/FR-2007-12-07/pdf/07-5729.pdf.
[49] José J. Canals-Cerdá, *FRB Philadelphia Working Paper No. 17-09: Endogenous/Exogenous Segmentation in the A-IRB Framework and the Pro-Cyclicality of Capital: An Application to Mortgage Portfolios* (March, 2017), available at https://www.philadelphiafed.org/-/media/research-and-data/publications/working-papers/2017/wp17-09.pdf?la=en.

enough quantities under like-kind assets results in correlated failures that could have systemic consequence. However, as demonstrated above, to the extent this is possible with assets such as residential mortgages, the advanced approach in fact makes such correlated failure more likely.

Independent of incentives resulting from regulatory requirements, the business model of smaller, non-complex BHCs also protects against correlated failure because credit risk at such banks is usually diversified across a range of borrowers in enough geographic areas to make it difficult outside of a great financial crisis scenario for any credit risk captured only by the A-IRB held in large amounts by all of these banks to hit in the same way for all smaller BHCs in all parts of the United States all at the same time. Importantly, the principal reason the GFC hit banks of all sizes in all parts of the country so hard was not because of this type of correlated credit risk, but rather due to the sudden shut-down in financial markets that sharply curtailed liquidity, a challenge now best addressed by the liquidity regulations described above.

Further, even if credit risks do correlate as some might fear and the liquidity rules are insufficient, other post-crisis reforms have made smaller BHCs far more resilient. Each BHC over $50 billion is now required to undertake extensive resolution planning to ensure it can be resolved through use of the U.S. Bankruptcy Code and the FDIC has its own, still tougher resolution-planning requirements for the insured-depository subsidiaries of these BHCs.[50]

V. Advanced-Approach Costs

A. Regulatory Calculations

Just as the agencies had difficulties calculating the benefits of the A-IRB in Basel II along with any of the improvements asserted under Basel III, cost assumptions rely largely on qualitative conclusions. The Basel II rules for example note that, "Because banks are constantly developing programs and systems to improve how they measure and manage risk, it is difficult to distinguish between expenditures explicitly caused by adoption of this final rule and costs that would have occurred irrespective of any new regulation."[51] Taking this caveat into account, the estimates provided for direct implementation costs were small (somewhere in the range of $20 million per bank to implement the A-IRB and $2.5 million or so a year to continue it). A subsequent GAO study assessing the compliance costs of Basel III is inconclusive because, as with the U.S. Basel II rules, GAO notes that it is difficult to disaggregate compliance costs for this rule from all of those associated with all of the other capital rules.[52] Interestingly, a recent study of the cost of implementing one model-driven rule – new Basel standards for the market risk-based requirements known as the "Fundamental Review of the Trading Book"[53] – anticipate implementation costs (excluding those due to higher capital itself) of as much as $200 million for each covered bank.[54]

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[50] Dodd-Frank § 165, *op. cit.*

[51] OCC, FRB, FDIC, & OTS Risk-Based Capital Standards: Advanced Capital Adequacy Framework – Basel II, 72 Fed. Reg. 69288, 69392 (2007), available at https://www.gpo.gov/fdsys/pkg/FR-2007-12-07/pdf/07-5729.pdf.

[52] GAO, *Bank Capital Reforms: Initial Effects of Basel III*, *op. cit.* at 32.

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

[54] Laura Noonan, *Biggest banks each set to be hit with $200m trading rule costs*, Financial Times, January 10, 2017 at https://www.ft.com/content/94fdf6d0-d41b-11e6-9341-7393bb2e1b51.

The Basel II rules did not generally attempt to anticipate credit availability or competitive implications because the framework at the time when the rule was finalized in 2007 would have permitted some significant reductions in risk-weighted assets. With all the additional requirements adopted since 2008 and the 2013 requirement that banks hold the higher of the SA or A-IRB, this is no longer likely. However, simply assuming that the advanced approach leads to more regulatory capital and thus possible costs is also inaccurate due to all of the other capital requirements likely to supersede it as a binding constraint.

B. Governance

All banks and BHCs under all of the rules described above are required to ensure that capital compliance, management, maintenance, and planning meet an array of express governance standards with significant penalties applied to companies that fail to comply. Capital is also a key component in the so-called CAMELS ratings – i.e., safety-and-soundness judgements – examiners make about each bank and BHC, ratings with significant enforcement implications all their own that research has shown may actually be better predictors of safety and soundness than simple capital ratios.[55]

However, despite this complex and formidable array of capital governance rules, A-IRB banking organizations are required to adhere to many additional requirements. These are largely designed to ensure that advanced-approach models accurately reflect realistic PD, LGD, and other assumptions, with a detailed description of all of these standards provided in an appendix to this paper.

In essence, all of these governance requirements reference all of the models underpinning the A-IRB even though all of the standards other than the A-IRB often preempts reliance on the A-IRB even as supervisors can mandate higher risk weightings for higher-risk positions or higher-risk banks.

Governance requirements of the A-IRB are contained in the Basel II rule[56] implementing the advanced framework as well as in guidance on supervisory review for capital adequacy,[57] general model risk management,[58] independent verification,[59] notification of material changes to advanced systems,[60]

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[55] Kupiec, Lee, & Rosenfeld, *Does Bank Supervision Impact Bank Loan Growth?*, (November 21, 2016), *op. cit*.
[56] OCC, FRB, FDIC, & OTS, Risk-Based Capital Standards: Advanced Capital Adequacy Framework – Basel II, *op. cit*.
[57] OCC, FRB, FDIC, & OTS Supervisory Review Process of Capital Adequacy (Pillar 2), *op. cit*.
[58] FRB, OCC Guidance on Model Risk Management, SR 11-7 (April 4, 2011), available at https://www.federalreserve.gov/bankinforeg/srletters/sr1107a1.pdf.
[59] FRB Basel Coordination Committee Bulletin, Guidance for Independent Verification of a Banking Organization's Advanced Approaches Systems, BCC 13-3 (May 2, 2013), available at https://www.federalreserve.gov/bankinforeg/basel/files/bcc1303.pdf.
[60] FRB Basel Coordination Committee Bulletin, Guidance Relating to Notifications of Material Changes to Advanced Systems and Modeling Changes, BCC 14-2 (October 10, 2014), available at https://www.federalreserve.gov/bankinforeg/basel/files/bcc1402.pdf; OCC Guidance on Advanced Approaches, Guidance Relating to Notifications of Material Changes to Advanced Systems and Modeling Changes, GAA 2014-02 (October 10, 2014), available at https://occ.gov/topics/capital-policy/gaa-2014-2-guidance-on-advanced-approaches.pdf.

and capital planning for large banking organizations.[61] In summary, banks are subject to the following governance requirements:

- Implementation Plan: This must be approved by a bank's board of directors no later than six months after the bank meets one of the criteria triggering mandatory use of the advanced approaches. These plans must include analysis of where the bank falls short of qualification requirements as well as a plan to address gaps.
- Rating Reviews: Internal ratings for wholesale exposures must be reviewed and updated by the bank whenever it receives new, material information, and must also be reviewed at least annually by the bank. Internal ratings for retail exposures likewise must be reviewed by the bank whenever it receives new, material information and must also be reviewed at least quarterly, although high-quality exposures may be reviewed less frequently.
- Data and Documentations: Data systems should support timely reporting of risk-based capital. Banks must maintain an inventory of models that are implemented, being developed, or recently retired, and retain thorough documentation of model development and validation.
- Control and Oversight: Senior management is responsible for ensuring that advanced systems comply with control requirements (i.e., the validation, internal audit, and stress testing requirements described below). The board or a board committee is required to review and approve advanced systems at least annually. The control and oversight system should follow standard control principles and be independent of model-development activities.
- Validation: This must occur on an ongoing basis and be reported to senior management. Validation would be applied to a bank's risk rating and segmentation systems, risk parameter quantification processes, and internal models. Validation includes an evaluation of advanced-system conceptual soundness, ongoing monitoring of systems (which includes data and process verification as well as benchmarking), and outcome analysis (which includes back-testing). Banks must also implement internal challenge processes for systems which are complex, involve subjectivity, or may impact the accuracy of reporting.
- Internal Audit: Findings from this function must be reported at least annually to the board or a board committee. Internal audit should review the effectiveness of controls, the validation process, and the risk management review process.
- Stress Testing: Advanced models must be stress tested "periodically" using severe scenarios and methods to ensure that banks are adequately capitalized throughout the economic cycle. A-IRB banks must thus conduct these stress tests in addition to those required by CCAR and other Dodd-Frank mandates.
- Vendor Models: Banks should ensure they receive developmental evidence and testing results when using third-party model. They must validate such models through sensitivity analysis and benchmarking, with any customization performed by the bank properly documented. They must also perform ongoing monitoring and outcome analysis and prepare contingency plans for when the model is no longer supported by the vendor.
- Model Changes: Banks are also required to notify supervisors of changes to modeling assumptions or changes that would result in a material risk-weighting change for certain exposures. Banks must thus have processes to identify when changes would be material and they must also implement change-control processes to justify, validate, and quantify the impact of changes.

[61] FRB, Guidance on Supervisory Assessment of Capital Planning and Positions for LISCC Firms and Large and Complex Firms, SR 15-18 (December 18, 2015), available at https://www.federalreserve.gov/bankinforeg/srletters/sr1518a1.pdf.

- ICAAP: This must be approved by the board and regularly reviewed by the board or a designated agent. Assessments produced by the ICAAP should be reviewed annually by the board or a designated agent of the board.

C. Model Cost and Complexity

All of these rules reflect the complexity of A-IRB models and the vulnerabilities of reliance on them. One architect of many of these rules, including the advanced approach, has recently acknowledged this problem. Former Federal Reserve Gov. Daniel Tarullo in his remarks shortly before retirement indicated that:

> Models-based capital requirements can better distinguish among risks to some degree, and they can be made more forward-looking than static leverage or risk-based ratios. But, to the extent that banks' internal models are used, it is difficult to monitor whether banks are intentionally or unintentionally running models that understate their risks. And, of course, they are subject to the usual limitations of models that are based only on past experience and correlations.[62]

The scope of the modeling complexity of the A-IRB can be seen in one study, which found that using the advanced approach across the full range of assets would require a bank to undertake at least 200 million calculations.[63] It is impossible to know how much this burden would be reduced for regional BHCs that have only one or another complex assets for which the A-IRB is a meaningfully higher capital ratio than the SA that are also not well captured by CCAR, the leverage ratio, and all the other capital constraints described above. However, to catch this one asset, the BHC would need to run all of its positions through all of these rules.

Interestingly, this same study (from the Bank of England) argues that the A-IRB does not fully capture risk even after 200 million calculations because key factors – e.g., confidence intervals – are either too complex to try to calculate or, as is the case with probability of default, still largely subjective. Analysts have also pointed to the inherent subjectivity of the A-IRB with regard to key drivers such as historical loss experience and business-cycle effects, with one recent report citing an otherwise non-public case in which regulators of the bank strongly disagreed with the FRB's conclusions about the BHC level on the risk of the same asset.[64]

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[62] FRB Gov. Tarullo, *Speech at the Woodrow Wilson School, Princeton University, Princeton, NJ: Departing Thoughts* (April 4, 2017), available at https://www.federalreserve.gov/newsevents/speech/tarullo20170404a.htm.

[63] Executive Director of the Bank of England Andrew G. Haldane, *Speech at the American Economic Association, Denver, CO: Capital Discipline* (January 9, 2011), available at http://www.bis.org/review/r110325a.pdf.

[64] Paul Kupiec, *Basel III is just too complex as risks outweigh benefits*, Financial Post, November 13, 2013 available at http://business.financialpost.com/fp-comment/basel-iii-is-just-too-complex-as-risks-outweigh-benefits.

D. Credit Availability

There is extensive research on the impact of regulatory-capital on credit availability.[65, 66, 67] As discussed, we do not find that requiring non-complex regional BHCs to use the A-IRB will necessarily increase their regulatory-capital requirements because the advanced approaches are unlikely to be the binding constraint for these BHCs unless they hold large balances of non-traditional assets that could disqualify them as non-complex BHCs and any other higher-risk assets addressed by the A-IRB elude all of the other capital standards and supervisory oversight. Even if the complexity screen were faulty, the role of CCAR and all the other capital requirements described above makes it most unlikely that the cost of all of the modeling and governance would be offset by meaningfully higher regulatory capital with a significant contribution to the individual BHC's resilience and to broader financial-system stability.

However, assume that none of these conditions applies – that is, non-complex regional BHCs are still somehow engaged in the activities considered complex by global and U.S. regulators that are best captured by the A-IRB that then leads to meaningfully higher risk-based capital. Recent research suggests that the marginal impact of any such higher capital standards would have an adverse effect on credit availability in the regional markets served by regional BHCs.[68] This research for the first time segregates the credit-availability impact of overall higher capital from that affected by higher capital resulting not from a bank's determinations of economic capital requirements due to risk, but rather to the add-on charges resulting from regulatory-capital regulation. It finds that credit increases only when capital increases are in "surplus" capital – that is capital above the minimum regulatory requirements. Any higher A-IRB requirements would thus likely penalize credit availability because credit diminishes when regulation diverges from risk.

From a marginal cost-benefit perspective, lost credit availability might be appropriate if the risks captured by the A-IRB and its related costs are material to the BHC or financial system; when they are not, as we find to be most likely, then any added A-IRB capital reduces credit and thus economic activity without meaningful offsets in terms of greater banking-system resilience. Because of the critical importance of mortgage and small-business lending to economic equality and the vital role of regional banks in these arenas, lost credit capacity also has material, adverse implications for U.S. economic equality.[69]

It is of course possible that lost credit provided by regional BHCs could be made up by non-banks. This would sustain economic activity, at least during benign market cycles in which these non-banks are able to attract the funding and/or to reach the secondary market needed to ensure credit activities.

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[65] Martynova, *Effect of bank capital requirements*, *op. cit.*

[66] Basel Committee on Banking Supervision (Basel Committee), *Working Paper No. 30: Literature review on integration of regulatory capital and liquidity instruments*, (March, 2016), available at http://www.bis.org/bcbs/publ/wp30.pdf.

[67] Federal Financial Analytics, *Issue Brief: Capital versus Credit: 2017's Critical Reform Questions* (March 2, 2017), available at http://www.fedfin.com/images/stories/client_reports/Issue%20Brief-Capital%20versus%20Credit%202017's%20Critical%20Reform%20Questions.pdf.

[68] TCH Research, *Is Tighter Bank Regulation Restricting Loan Growth?*, eighteen53 Blog, December 1, 2016, available at https://www.theclearinghouse.org/eighteen53-blog/2016/december/01-loan-growth.

[69] Federal Financial Analytics, *Economic Inequality: A Pivotal Question for Central Banks* (May 3, 2017), available at http://www.fedfin.com/images/stories/client_reports/Policy%20Brief-Economic%20Inequality-A%20Pivotal%20Question%20for%20Central%20Banks.pdf.

The most recent OFR report attributes significant changes to U.S. credit markets to the new, stringent capital rules, noting that this shift from banks to non-banks poses potential financial-stability risk. Non-banks are less likely to be resilient under stress because they are subject to few, if any, of the rules described above.[70] Where rules do require credit capacity – for example in commercial mortgage-backed securities due to new risk-retention requirements – OFR notes that non-banks have sharply diminished their role in ways that pose regional, if not national economic challenges because of the critical importance of sound commercial real estate markets to economic activity.

E. Cost of Capital

When the Basel III rules were finalized, regulators and analysts[71] expected that the cost of higher capital would be offset by lower funding costs. Thinking along these lines is based on a longstanding economics theory generally known as the Modigliani-Miller theorem, which posits that a firm's risk depends on its asset composition, not on its funding because asset risk is inversely correlated with funding cost.

However, this theory has numerous problems when applied to regulated banks, not the least of which is that funding must come in part from equity capital as determined not by investor risk judgments, but rather by all of the rules described above. Funding costs may thus not move in lockstep with risk because funding is not obtained at the lowest possible cost. Tax penalties applied to equity versus debt funding that cannot be offset due to regulatory requirements also skew the expected relationship between credit risk and funding cost. The new TLAC rules that create a larger amount of debt ahead of equity in a failure may further increase equity costs due to the "debt overhang."

One of the governmental studies of the overall impact of regulatory-capital research concludes that, "As a result, when banks choose to satisfy higher capital requirements by raising equity [not by reducing assets such as the loans they make], one can expect lending to decline and riskiness of bank loans to increase. The latter effect may reduce financial stability."[72]

VI. Conclusion

We have shown here that applying the advanced approaches in the U.S. version of the Basel III risk-based capital rules to non-complex BHCs regardless of size does not provide enough prudential benefits to warrant the cost of meeting this requirement. Applying the advanced approach to large, non-complex U.S. BHCs is found not to add marginal benefit because:

- There are already many other capital constraints applicable to these companies accompanied by such severe penalties that make the marginal benefit of one more rule of little, if any value. Under the U.S. rules, large BHCs and banks must hold the higher of any of their applicable

[70] OFR, *2016 Financial Stability Report*, *op. cit.*
[71] Anat R. Admati, Peter M. DeMarzo, Martin F. Hellwig, & Paul Pfleiderer, *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Socially Expensive* (rev. October 22, 2013), available at https://www.gsb.stanford.edu/faculty-research/working-papers/fallacies-irrelevant-facts-myths-discussion-capital-regulation-why.
[72] Martynova, *Effect of bank capital requirements*, *op. cit.* at 14.

capital standards. Unless the advanced approach catches large holes overlooked by all the other standards – which it does not for non-complex regional banking organizations – its benefit is at best uncertain, especially after taking its operational and governance cost into account.

- Maintaining the advanced approach only to preserve what other nations would consider U.S. adherence to global standards comes at cost to U.S. growth and resilience if the advanced approaches do not add real prudential value.
- The advanced approach applied to large, non-complex banking organizations adds little prudential value due to all the other new capital requirements governing these same firms. Stress tests are often the binding constraint on large bank holding companies, meaning that any shortfalls in the standardized approach are likely to be caught in the stress tests and corrected with higher capital.
- Model-driven regulatory-capital is accompanied by an array of mandatory model-validation and governance-integrity standards to ensure risk alignment. The cost of these requirements outweighs any prudential value obtained from the few cases in which risk-based capital under the advanced approach is higher than under the standardized option once stress testing and numerous other capital controls are taken into account.
- Despite its prudential benefits, higher capital does not necessarily make banks safer or the financial system more resilient when all the other rules affecting BHCs with assets over $250 billion are taken into account. Capital buffers are a necessary condition for the soundness of each bank and the resilience of the U.S. banking system, but more capital does not mean more safety when the cost of still more capital deprives banks of the resources with which to ensure operational, liquidity, and market sustainability, especially under stress. Higher capital for these companies may lead also to less banking-system competition and thus to still larger banks with bigger market shares in concert with still greater consumer and corporate reliance on “shadow banks.”

Appendix

Rules and Guidance Applying Governance Requirements To A-IRB Institutions

Title	Agency	Date	Pages	Description
Risk-Based Capital Standards: Advanced Capital Adequacy Framework—Basel II; Final Rule	OCC, FRB, FDIC, OTS	December 7, 2007	159	This rule lays out the IRB and AMA requirements for banks, including the banks covered, qualification requirements (which cover many of the governance requirements), and treatment of different assets.
Supervisory Guidance: Supervisory Review Process of Capital Adequacy (Pillar 2) Related to the Implementation of the Basel II Advanced Capital Framework	OCC, FRB, FDIC, OTS	July 31, 2008	9	This guidance sets a number of supervisory expectations related to the advanced approaches, including expectations for a bank's ICAAP.
Supervisory Guidance on Model Risk Management	OCC, FRB	April 4, 2011	21	This guidance covers general model risk management for all OCC- and FRB-supervised banks, supplementing previous guidance with additional supervisory expectations on model risk management. The guidance covers model development, implementation, use, and validation as well as governance and controls related to model risk.
Guidance for Independent Verification of a Banking Organization's Advanced Approaches Systems	FRB	May 2, 2013	2	This guidance addresses what the FRB viewed as inadequate independent verification and lays out its expectations in this area.
Guidance Relating to Notifications of Material Changes to Advanced Systems and Modeling Changes	OCC, FRB	October 10, 2014	3	This guidance sets requirements for how banks notify regulators of modeling changes and the documentation banks are required to retain and provide to regulators.

Guidance on Supervisory Assessment of Capital Planning and Positions for LISCC Firms and Large and Complex Firms	FRB	December 18, 2015	42	This guidance addresses capital planning for LISCC firms as well as large and complex firms, including expectations related to governance, risk management, and internal controls.