

---

# REVIEW OF NEW YORK FED STUDIES ON THE EFFECTS OF POST-CRISIS BANKING REFORMS

*Richard K. Crump and João A. C. Santos*

## OVERVIEW

- The 2007-08 financial crisis prompted a series of regulatory reforms that affected banks in particular. A decade after the crisis, New York Fed economists launched a project to assess the effects of the reforms.
- This article reviews the resulting twelve studies, which analyzed the effects of the reforms on the cost of bank equity capital, on bank profitability and risk, and on liquidity.
- Most of the findings aligned with theoretical predictions or results of earlier studies of the reforms. However, some studies produced results that contrast with evidence in the academic literature.
- On the whole, the studies showed that banks did respond actively to the new regulations, suggesting that broadening the research to assess additional outcomes would be fruitful.

The financial crisis of 2007-08 exposed many limitations of the regulatory architecture of the U.S. financial system. In an attempt to address these limitations, a series of regulatory reforms have been instituted in the post-crisis period, especially in the banking sector. These reforms include tighter bank capital and liquidity rules, new resolution procedures for failed banks, the establishment of a stand-alone consumer protection agency, new requirements governing money market funds, and a move to central clearing of derivatives. As these reforms have been finalized and implemented, a healthy debate has emerged in the policy and academic communities over their efficacy in achieving the intended goals and any unintended consequences that might have arisen.

In 2017, the Federal Reserve Bank of New York initiated a project to examine the effects of the post-crisis reforms on bank performance and vulnerability. This project, which was completed in June 2018, consisted of twelve studies evaluating a wide set of regulatory changes, including the introduction of liquidity regulation, “living wills,” the supplemental leverage ratio, market value accounting to measure bank capital, and the Consumer Financial Protection Bureau (CFPB), among others. Each study was carefully designed to

---

*Richard K. Crump is an assistant vice president and João A. C. Santos a senior vice president at the Federal Reserve Bank of New York. Email: [richard.crump@ny.frb.org](mailto:richard.crump@ny.frb.org); [joao.santos@ny.frb.org](mailto:joao.santos@ny.frb.org).*

*The views expressed in this article are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. To view the authors' disclosure statements, visit [https://www.newyorkfed.org/research/epr/2018/epr\\_2018\\_banking-reform-studies\\_crump](https://www.newyorkfed.org/research/epr/2018/epr_2018_banking-reform-studies_crump).*

identify how these regulatory changes affected the risk taking, funding costs, and profitability of banks, as well as their impact on liquidity in debt markets.

In this article, we provide a brief review of the twelve studies, grouping them into three sections according to their main objective. Section 1 reviews the studies that focus on the cost of bank equity capital. Kovner and Van Tassel (2018) estimate the cost of equity capital for banks and nonfinancial corporations, and then investigate how the cost of equity capital for banks changed in response to the introduction of the Dodd-Frank Act (DFA). Cetorelli and Traina (2018) in turn explore the extent to which the DFA living wills help address the “too big to fail” (TBTF) problem by investigating the impact of the living wills on banks’ cost of funding. Finally, Plosser and Santos (2018) ascertain the cost of bank capital regulation by studying the pricing of credit commitments with maturities below one year around the time of the Basel I and Basel II accords, making use of the differential treatment that the Basel accords gave to these commitments.

Section 2 reviews the studies that assess the reforms’ effects on bank profitability and risk. Crump, Giannone, and Hundtofte (2018) tackle the latter by exploring the impact of the DFA on banks’ overall risk as measured by the volatility of stock returns, while Choi, Holcomb, and Morgan (2018) investigate whether the supplemental leverage ratio (SLR) triggered risk shifting, possibly leading to an increase in bank risk. Fuster and Vickery (2018) investigate whether the regulatory change tying regulatory capital to securities’ market value affected the risk of bank securities portfolios, and Fuster, Plosser, and Vickery (2018) assess the impact that regulatory oversight by the CFPB had on bank risk taking and profitability. Last, Pennacchi and Santos (2018) attempt to explain why banks, starting in the late 1970s, shifted to return on equity (ROE) as a performance benchmark instead of growth in earnings per share (EPS), the measure widely used among nonfinancial corporations. They then discuss how the most recent regulatory changes might impact banks’ preferences.

Finally, in Section 3, we review the studies that investigate the liquidity effects of the post-crisis reforms. Roberts, Sarkar, and Shachar (2018) study the extent to which the liquidity coverage ratio (LCR) impaired banks’ ability to create liquidity. The remaining three studies—Boyarchenko, Eisenbach, Gupta, Shachar, and Van Tassel (2018), Adrian, Boyarchenko, and Shachar (2017), and Boyarchenko, Costello, and Shachar (2018)—in turn attempt to ascertain the extent to which the post-crisis reforms have affected liquidity in debt markets.

As we discuss below, many of the findings of these studies align with theoretical predictions or with existing studies of the effects of post-crisis banking reforms. For example, they confirm that banks have engaged in risk shifting in response to the supplemental leverage ratio. Similarly, they find that banks have adopted practices, including classifying a larger share of securities as held-to-maturity, to “shield” themselves from the regulatory change tying regulatory capital to the market value of their securities investments.

Some of the studies, however, produced unexpected results and findings that run counter to the current academic and industry consensus. For example, one study finds that living wills increased the cost of bank equity capital but did not have a similar effect on the cost of debt. Another study concludes that post-crisis reforms did lower the relative risk of the largest banks, a finding that contrasts with existing evidence in the academic literature. A third study confirms that regulatory capital is indeed costly, but not to the extent that is often claimed by the banking industry.

A prevailing theme from the twelve studies is that regulation is an important driver of the banking business—or, to put it more succinctly, banks do respond actively and rapidly to

changes in regulation—highlighting the importance of factoring in the expected responses of banks when designing regulation.

## 1. EFFECTS ON THE COST OF BANK EQUITY CAPITAL

The cost of bank equity capital has been the subject of much debate, in part because of banks' repeated claims that equity capital is expensive and that regulatory changes forcing them to use more equity capital will translate into higher interest rates on loans and mortgages. The three studies that we review in this section all speak to this debate. Kovner and Van Tassel (2018) estimate the cost of bank capital over the 1996-2017 time period and investigate how it changes in response to shifts in regulation. Cetorelli and Traina (2018) study the extent to which the DFA living wills help address the TBTF problem. Plosser and Santos (2018) in turn utilize the differential treatments that Basel I and Basel II applied to short-term commitments in order to ascertain the cost of bank capital regulation.

We start our review with Kovner and Van Tassel (2018). The authors focus on the capital asset pricing model (CAPM) for their baseline analysis, where the cost of capital is the risk-free rate plus a time-varying beta multiplied by a constant equity risk premium. In an attempt to identify the effect of regulations, they separate the last twenty years into different time periods marked by changes to bank regulation and run difference-in-differences panel regressions comparing changes in the cost of capital for banks and nonbanks. Since many recent financial regulatory reforms apply only to the largest banks, they also investigate whether changes in the cost of capital for the very largest banks relative to smaller banks are different from changes in the cost of capital for the very largest nonbanks and nonbank financials relative to smaller firms in the same industries. Last, in addition to comparing the relative cost of capital for different firms after the passage of the DFA with that in the period immediately before the DFA, they also compare it with the period before the Gramm-Leach-Bliley Act. To ensure that the results are not driven by changes to the composition of banks and public companies, they investigate a number of specifications that include firm fixed effects, as well as interest rate variables. In addition, they estimate expected returns using the Fama and French (1993) three-factor model as a robustness check.

Kovner and Van Tassel find that the cost of capital soared for banks during the financial crisis, averaging more than 15 percent on a value-weighted basis. Comparing the period following passage of the DFA with the time period immediately prior, they find that the cost of capital fell approximately 4.5 percent more for banks than for other firms. Further, the largest decline in expected returns came from the very largest banks. However, when the authors compare the post-DFA period with the period before the Glass-Steagall Act was repealed, they find that the cost of capital for nonbanks fell by 1-2 percent more than for banks. This outcome suggests that while post-crisis bank regulation may have reduced expected returns from post-crisis highs, the cost of capital for banks is higher than it was twenty years ago. Kovner and Van Tassel's finding hinges on the assumption that the relative cost of capital for banks did not change for reasons other than regulation. For example, if investors revalue the riskiness of financial intermediation assets at the same time that bank regulations are changing, these changes would be (spuriously) attributed to changes to regulation. However, when the authors compare banks

with nonbank financial intermediaries, whose systemic risk is closer to that of banks, their main conclusions are unaffected. Finally, when they investigate the impact of stress testing on the cost of capital for banks, they find some evidence that stress tests have lowered the cost of capital for the largest banks, although not for those banks added more recently to the stress-testing exercises.

Kovner and Van Tassel's study is most closely related to the literature that investigates the impact of recent regulatory changes on banks' Tobin's  $q$  (the total market value of banks' assets divided by the book value of those assets) and cost of equity capital. Minton, Stulz, and Taboada (2017) estimate the cost of capital for banks from 1987 to 2006 using both a three- and a five-factor model and argue that after the size factor is included, the price of risk for the largest banks (those greater than \$50 billion) is similar to that of smaller banks. Calomiris and Nissim (2014) attribute the changes in market-to-book values of banks after the crisis to a decline in the value of intangibles rather than a reflection of changing regulations. Huizinga and Laeven (2012) in turn argue that lower levels of market-to-book values for large banks after the financial crisis reflect asset revaluations, particularly for real estate loans at larger banks.

Cetorelli and Traina (2018) investigate the extent to which living wills help address the TBTF problem that has plagued the U.S. banking industry ever since the Comptroller of the Currency stated, following the demise of Continental Illinois Bank in 1984, that the eleven largest banks in the United States were too big to fail and would not be allowed to do so.<sup>1</sup> Section 165(d) of the DFA requires that banks with more than \$50 billion in assets submit annual resolution plans. Such plans, commonly known as living wills, must outline substantive strategies the banks will implement to achieve rapid and orderly resolution should they experience financial distress or failure. Regulators can approve a living will, or reject it until the bank develops a sufficiently robust strategy. Rejections may come with stiff penalties, such as higher capital or liquidity requirements or forced changes in organizational structure. Regardless of whether a living will passes regulatory scrutiny, the bank must disclose a substantial part of it to the public. Hence, the living will treatment (that is, the requirement to produce a living will) is arguably economically meaningful both *de jure* and *de facto* and should therefore lead to lower TBTF subsidies and a higher cost of capital.

To investigate this hypothesis, Cetorelli and Traina start by developing a method for measuring a bank's cost of capital using regulatory filings, financial statements, and analyst forecasts, applying the methodology developed by Claus and Thomas (2001) and Gebhardt, Lee, and Swaminathan (2001) to banks. To help with identification, they rely on the regulation's staggered implementation: banks at \$250 billion or more in total assets produced the first set of plans in July 2012, those with assets at or above \$100 billion did so in July 2013, and those above \$50 billion had until December 2013. Further, because treated banks are typically much larger and more complex than their untreated peers, the authors use the synthetic control approach pioneered in Abadie and Gardeazabal (2003) and Cavallo et al. (2013) to better balance the comparison between the two groups. This technique reweights untreated banks so that they match the cost-of-capital levels and trends, as well as important covariates such as size, of treated banks.

Cetorelli and Traina find that living wills reduce TBTF subsidies, and that the size of the effect is economically significant at around 20 basis points, or about 10 percent of total funding costs. Consistent with bailouts benefiting equity holders, the bulk of the effect comes from an increase in the cost of equity capital. The authors do not find evidence of a statistically

significant impact on either the cost of nondeposit debt finance or the cost of deposit funding. While the former effect is contrary to the expectation that living wills are an effective mechanism for dealing with TBTF, Cetorelli and Traina argue that the absence of an effect on the cost of deposits was expected given the presence of deposit insurance.

The authors find qualitatively similar results when they consider the date that living wills were first announced as their relevant event date. Further, their findings are robust to variations in the synthetic control methodology, particularly in the choice of matching variables. Last, they find that treated banks significantly lower their leverage ratios, a result the authors argue is consistent with treated banks reducing their expectation of being bailed out in the event of distress.

Cetorelli and Traina's paper is related to the recent literature investigating whether post-crisis banking reforms have eliminated the perception of TBTF by investors. Acharya, Anginer, and Warburton (2016) find no change in bond credit spreads in an event window around the passage of the DFA, which the authors interpret as indicating there was no change in how markets perceive TBTF as a result of the new law. Afonso, Blank, and Santos (2018) document that following the announcement of the "single point of entry" strategy in December 2013, rating agencies revised downward their expectations of government support, consistent with Cetorelli and Traina's conclusion that the DFA was effective at dealing with TBTF. However, Afonso, Blank, and Santos also find that neither bond spreads nor CDS spreads of bank parent companies have widened relative to the corresponding spreads of their affiliated banks since the announcement of the single point of entry strategy, suggesting that investors remain skeptical about the effectiveness of the DFA at dealing with TBTF.

The last study we review in this section is Plosser and Santos (2018), which estimates the cost of regulatory capital building using the differential treatments that Basel I and Basel II gave to commitments with maturities shorter than one year. The Basel I Accord, introduced in 1988, assigned a risk weight for each on-balance-sheet exposure and specified a credit conversion factor for off-balance-sheet exposures (for example, credit commitments). Commitments to lend to corporations with an original maturity in excess of one year were treated as off-balance-sheet exposures and the undrawn portion of the commitment received a 50 percent conversion factor. In contrast, commitments with an original maturity of up to one year received a 0 percent conversion factor. To the extent that bank capital is costly, this difference should have made credit lines with maturities of less than one year at origination relatively less expensive following the introduction of Basel I. The Basel II Accord, which was finalized in June 2004, sought to reduce, but not entirely eliminate, the "special" treatment these 364-day facilities received.

The Basel Accords appear to have significantly influenced the marketplace. Up until the early 1990s, there was little evidence of 364-day facilities in the market. However, soon after Basel I, these instruments became prevalent. Their popularity then waned with the passage of Basel II.

Plosser and Santos compare banks' pricing of commitments with maturities below one year with their pricing of commitments with maturities above one year around Basel I, controlling for loan-, borrower-, and bank-specific factors as well as market conditions known to explain commitment pricing; a similar exercise is performed around Basel II. They investigate both the undrawn fee and the all-in-drawn spread of commitments. Since the Basel Accords' "special" treatment of short-term commitments applies only to the portion of

the commitment that is undrawn, one would expect the effects to be more pronounced on undrawn fees.

The authors find that commitments with maturities of up to one year, including 364-day facilities, became relatively less expensive following the passage of Basel I. Both the undrawn fees and all-in-drawn spreads on these commitments decline relative to those of commitments with maturities longer than one year. The decline in undrawn fees is 5-6 basis points, or roughly 15 percent of average undrawn fees, whereas the decline in all-in-drawn spreads is 15-25 basis points, or 5-7 percent of the typical spread. Their investigation of the pricing of commitments around Basel II yields exactly the opposite results on both undrawn fees and all-in-drawn credit spreads. These findings are robust and appear to be driven by the Basel Accords because a placebo test based on the pricing of commitments with maturities above one year but below two years does not yield similar evidence. These results also highlight that bank capital regulation is effective at changing the lending policies of banks.

Plosser and Santos estimate that banks are willing to pay at least 4 cents to reduce regulatory capital by one dollar. While this result suggests that the cost of regulatory capital is lower than banks have indicated, it is only a lower bound on what they might be willing to pay.

This study is most closely related to Kisin and Manela (2017), which also attempts to infer the cost of regulatory capital by exploiting a loophole in regulation that exempted banks from holding capital against assets in an asset-backed commercial paper conduit. Two other related papers are Kashyap, Stein, and Hanson (2010) and Van den Heuvel (2008).

In sum, Kovner and Van Tassel (2018) show that the DFA lowered the cost of equity capital for banks (in particular larger banks) relative to nonfinancial corporations, although the cost still remains higher than in the period before the Gramm-Leach-Bliley Act. Cetorelli and Traina (2018) in turn show that living wills increased the cost of equity capital for large banks relative to smaller banks. These findings appear to be inconsistent, but they may derive from differences in the control periods; the former study compares the cost of equity capital post-DFA with that of the pre-DFA period, while the latter focuses on the narrower period around the time that living wills were implemented. Finally, Plosser and Santos (2018) show that regulatory capital is costly, although not as costly as banks claim it to be, and that banks do pass a portion of this cost onto corporate borrowers.

## 2. EFFECTS ON THE PROFITABILITY AND RISK OF BANKS

Historically, the impact of regulation on the risk and profitability of banks has been the subject of much debate. The studies we review in this section examine this relationship through the lens of the post-crisis regulatory reforms. Crump, Giannone, and Hundtofte (2018) tackle the first issue by investigating the impact of the Dodd-Frank Act on bank risk. Choi, Holcomb, and Morgan (2018) investigate whether the supplemental leverage ratio triggered risk shifting, possibly leading to an increase in bank risk. Fuster and Vickery (2018) in turn investigate whether the regulatory change tying regulatory capital to the market value of securities affected the allocation and risk of banks' securities portfolios. Fuster, Plosser, and Vickery (2018) investigate whether the Consumer Financial Protection Bureau's regulatory oversight has significantly affected the supply of credit or bank risk taking and profitability. Last, Pennacchi and Santos (2018) attempt

to explain the preference of banks for using return on equity as a performance benchmark, in contrast to nonfinancial corporations that rely on the growth in earnings per share, and then discuss how the recent regulatory changes might impact banks' preferences.

Crump, Giannone, and Hundtofte (2018) begin by revisiting the academic debate about stock return predictability. However, in contrast to the majority of the literature, which focuses on estimating the conditional mean, their study instead assesses whether economic and financial variables can provide predictive content about the future *distribution* of stock returns. The authors utilize the methodology introduced in Adrian, Boyarchenko, and Giannone (2017) to construct conditional density forecasts based on a wide variety of predictor variables considered in the literature. Across a number of empirical exercises, they find that realized volatility, particularly the realized volatility of financial sector stock returns, has strong predictive content for the future distribution of market returns. They argue that this is a robust feature of the data since all of their results are obtained with real-time analyses using stock return data since the 1920s.

Building on these results, Crump, Giannone, and Hundtofte then focus on the volatility of bank equity as the financial condition most relevant to broad market risk. They pursue a difference-in-differences-in-differences empirical design, comparing the changes in equity volatility of the largest banks (those over the DFA \$50 billion threshold for designation as a systemically important financial institution) with that of banks under the threshold and with other large nonbank firms. They find a material relative reduction in market volatility, with the largest banks experiencing about 9 percent differentially lower volatility in the post-DFA period. On the basis of this result, they conclude that recent regulatory reforms of the financial system are associated with an improvement in the relative risk of large banks.

Crump, Giannone, and Hundtofte's study is related to the recent literature assessing the health of banks before and after the crisis. Sarin and Summers (2016) look across a variety of measures and argue that the evidence is, at best, mixed. Chousakos and Gorton (2017) examine market-to-book ratios across advanced economies and find that the low post-crisis valuations of bank equities have been surprisingly persistent compared with previous financial crises.

Choi, Holcomb, and Morgan (2018) investigate a long-standing conjecture that banks will sidestep (risk-invariant) leverage limits by simply shifting to riskier, higher-yielding assets. Concerns about such risk shifting first emerged after U.S. bank regulators imposed leverage limits in the mid-1980s, and have resurfaced with the recent imposition of the supplementary leverage ratio rule on the largest U.S. banks.

The SLR evolved from concerns that "advanced approach" firms—firms that use internal risk estimates for risk-based capital purposes—might underestimate their risk. The Basel Committee recommended a leverage rule as a backstop in 2010, and U.S. regulators proposed their version (the SLR) in 2012 and finalized it in 2014. The rule requires advanced approach firms to maintain a minimum of 3 percent Tier 1 capital per total leverage exposures (including off-balance-sheet assets), while those advanced approach banks designated as global systemically important banks (G-SIBs) are required to hold a minimum of 5 percent.

Banks bound by the SLR limit have two options: increase Tier 1 capital or decrease the total leverage exposures. If a bank chooses to raise more (costly) capital, one way to offset the increased costs is by shifting from safer, lower-yielding assets to riskier, higher-yielding ones. If instead the bank chooses to reduce its assets, the least costly way to do so would be by shedding assets with low yields, such as reserves. In both cases, the bank's share of risky assets relative to safe assets should rise, as should its average yield across assets.

Choi, Holcomb, and Morgan look for evidence of risk shifting around the new leverage rule using difference-in-differences analysis. The treated group comprises the fifteen advanced approach bank holding companies (“banks”) subject to the new rule. These firms, by definition, are very large, with at least \$250 billion in total assets or \$10 billion in foreign exposures. The control group comprises the eighteen banks with assets between \$50 billion and \$250 billion not covered by the new rule. Though smaller, these banks are officially large per the DFA and thus face similar regulatory environments apart from the application of the SLR rule. Using standard difference-in-differences regressions with time and institution fixed effects and a parsimonious set of controls (including lagged risk-based capital ratios and assets), they compare portfolio and overall risk measures before and after the SLR was finalized in September 2014.

They find strong evidence of risk shifting. After finalization of the SLR, covered banks shift their portfolios toward riskier assets (as measured by the ratio of risk-weighted securities to total securities or the ratio of risk-weighted trading assets to trading assets) compared with other large banks not subject to the rule. The average yields of securities held by banks subject to the SLR also increase by more, consistent with the reach-for-yield hypothesis. The shifts are sizable and tend to be larger at banks more constrained *ex ante* by the leverage limit.

Despite the finding that SLR banks shift toward riskier, higher-yielding assets, the authors find no evidence of higher overall risk at these banks. They resolve this apparent conflict by showing that leverage at the SLR banks *also* fell, particularly at the most constrained SLR banks, suggesting that the higher capital required under the new rule offset the risk shifting.

The Choi, Holcomb, and Morgan study contributes to an emerging literature investigating the response of banks to the leverage rule. Allahrakha, Cetina, and Munyan (2016) find that U.S. banks decreased repo borrowing following the SLR rule and, consistent with Choi, Holcomb, and Morgan’s findings, shifted toward riskier (more volatile) collateral. Bicu, Chen, and Elliott (2017) and Kotidis and van Horen (2018) find illiquidity effects in the U.K. repo market after the imposition of a leverage limit, while Bucalossi and Scalia (2016), studying European banks, find no such effects. The present paper is closest to Acosta Smith, Grill, and Lang (2017), who find a shift toward riskier assets by European banks in response to the Basel leverage rule proposal, but no increase in overall risk.

The use of fair value accounting for bank capital regulation has trended upward over time, motivated by concerns that accrual accounting data may not reflect the current economic value of bank assets and liabilities. Fuster and Vickery (2018) investigate how banks respond to the use of fair values for capital regulation by studying the effects of a recent policy change tying regulatory capital directly to the market value of bank securities portfolios.

Historically, unrealized gains and losses on investment securities classified as “available for sale” did not count toward bank regulatory capital because of the accumulated other comprehensive income (AOCI) filter.<sup>2</sup> However, as part of the implementation of the Basel III capital accord, the AOCI filter was removed for a set of the largest U.S. banking organizations. For these banks, fluctuations in securities market values now flow through directly to regulatory capital, leading to volatility in capital ratios when asset prices change. The AOCI filter has been removed according to a step function, with the percentage of AOCI counted toward regulatory capital set at 20 percent in calendar year 2014 and rising by 20 percent per year until full phase-out of the filter for affected banks in 2018.

Fuster and Vickery investigate two questions: first, does the removal of the AOCI filter lead to lower risk taking in bank investment securities portfolios; and second, do banks take steps

to reclassify securities or otherwise shift the composition of assets in ways that minimize the effect of the removal of the AOCI filter but do not substantively reduce fundamental bank risk?

To disentangle the effects of the AOCI rule from other recent regulatory changes, the authors take advantage of the staggered removal of the AOCI filter and investigate changes in risk within a class of securities that have the same regulatory capital risk weights and LCR weights (since other rule changes, including the LCR and the leverage ratio, should induce substitution across asset types but not within types). Even more finely, the use of security-level data from the Federal Reserve's FR Y-14Q capital assessments and stress-testing information collection allows them to examine changes in holdings and accounting classification for affected and non-affected banks *for a given security* as the rule change is implemented.

Fuster and Vickery find little to no reduction in the riskiness of securities held by banks subject to the AOCI rule. For example, the removal of the AOCI filter did not lead to lower duration of the agency mortgage-backed securities (MBS) or Treasury securities portfolios, or a decline in the average yield of either type of securities holdings. They do find, however, that banks engage in more risk management of their securities portfolio (for example, they are more likely to use derivatives to hedge their risk exposures) following removal of the filter. In addition, they find that banks actively classify a larger share of securities as held-to-maturity to "shield" them from the AOCI rule (by 20 percent to 38 percent, depending on the specification). Although reclassifying securities in this way reduces the volatility of regulatory capital, it does not mitigate the fundamental risks of the assets being held. Given that there are obstacles to selling securities classified as held-to-maturity, such reclassification may in some circumstances even increase risk, if it reduces the liquidity of the bank's assets during periods of stress.

The Fuster and Vickery paper is closely related to an emerging literature studying the effects of the removal of the AOCI regulatory capital filter, in particular Chircop and Novotny-Farkas (2016), Kim, Kim, and Ryan (2017), and Hamilton (2018). Chircop and Novotny-Farkas (2016) employ an event study approach around announcement dates related to the AOCI rule and find that bank stock returns reacted negatively to news that the rule was more likely to go into effect. Kim, Kim, and Ryan (2017) find evidence of a reduction in securities portfolio risk owing to the AOCI rule (in contrast to the findings in Fuster and Vickery), but they and Hamilton (2018) also find evidence of a shift from available-for-sale to held-to-maturity within securities portfolios. Compared with these two papers, Fuster and Vickery's analysis is able to more directly measure the types of risk embedded in bank securities portfolios based on the characteristics of individual securities, and to identify the effects of the regulatory change more cleanly when examining shifts in securities classification.

Since its establishment, the Consumer Financial Protection Bureau has been the subject of intense debate. Some have praised the agency, citing the benefits of consumer safeguards; however, others have argued that the CFPB raises compliance costs, increases uncertainty and legal risk, and ultimately raises costs and reduces the availability of financial services to consumers. Fuster, Plosser, and Vickery (2018) contribute to this debate by investigating whether the CFPB's supervisory and enforcement activities have significantly affected the supply of credit or bank risk taking and profitability.

The CFPB was established in 2011 with a consumer financial protection mandate and with broad authority over both banks and nonbanks. In addition to its rule-making authority, the CFPB has the power to supervise and conduct examinations of financial firms and to pursue enforcement actions for breaches of federal consumer financial protection law.

The identification strategy employed by Fuster, Plosser, and Vickery makes use of the fact that small depository institutions with less than \$10 billion in total assets are generally exempt from CFPB supervision. Consumer protection oversight of these small banks instead falls to the firm's prudential supervisor (for example, the Office of the Comptroller of the Currency in the case of national banks and national savings associations), the primary mission of which is safety and soundness, rather than consumer financial protection.

The authors use a difference-in-differences approach, examining outcomes before and after July 2011, when the CFPB began operations, and comparing commercial and savings banks subject to CFPB oversight with those below the \$10 billion size threshold.<sup>3</sup> They analyze loan-level mortgage lending outcomes, growth and composition of bank balance sheets, and bank noninterest expenses.

Fuster, Plosser, and Vickery find little evidence that CFPB oversight significantly reduces the overall volume of mortgage originations, or that banks subject to CFPB oversight reject a higher fraction of mortgage applications. They do, however, find some evidence that CFPB oversight is associated with a shift in the composition of mortgage lending. In particular, CFPB-supervised banks have experienced a moderate drop in market share among mortgages insured by the Federal Housing Administration. These loans tend to be riskier because they are made to lower-income borrowers and generally involve small down payments. There is also some evidence of a drop in lending to other groups of borrowers that were found to have exhibited higher credit risk historically. Offsetting these declines, CFPB-supervised banks substitute toward large loans in the “jumbo” segment of the mortgage market, where borrowers tend to have higher incomes.

Taken together, this evidence provides some support for the view that heightened supervisory scrutiny related to consumer financial protection has led to some “de-risking” of bank activities, and in particular, affected bank lending to riskier borrowers. Fuster, Plosser, and Vickery find no evidence that CFPB supervision reduces asset growth or increases noninterest expense components, although the confidence bounds on many of these estimates are relatively wide.

The Fuster, Plosser, and Vickery paper is closely related to a recent literature that attempts to investigate the causal effects of financial supervision. Agarwal et al. (2014) show that supervisors may implement regulation inconsistently depending on their institutional design and incentives. Hirtle, Kovner, and Plosser (2016) study the effects of greater prudential supervision of bank holding companies (BHCs) based on whether a BHC is large relative to other banks in its Federal Reserve District and find that supervision reduces riskiness with little trade-off in growth. These papers, however, all focus on prudential supervision, whereas Fuster, Plosser, and Vickery study supervision and enforcement of consumer financial protection laws, a key focus of policy in the decade since the global financial crisis.

Finally, Pennacchi and Santos (2018) attempt to explain banks' preference for using return on equity to track their performance. They start by noting that, traditionally, both nonfinancial corporations and banks emphasized performance targets linked to their earnings per share, but starting in the 1970s banks shifted toward ROE. Stock market investors account for the difference because market-to-book values of bank stocks react more to ROE announcements than to EPS announcements, while the reverse occurs for nonfinancial firms. In addition, the authors find that banks' market-to-book equity became relatively insensitive to EPS only after the 1980s.

Pennacchi and Santos attempt to explain banks' preference for ROE using a structural model of a bank that rationally maximizes its shareholders' value in excess of the shareholders'

contributed capital. The model has several key components. First, the bank's deposits are insured by the government. Second, the bank has "charter" or "franchise" value that derives from its ability to pay interest on insured deposits at a rate that is below a competitive risk-free rate. Third, the bank must pay corporate income taxes.

According to their model, banks that maximize shareholder value reduce their initial choice of amount of capital when they face increasing competition that erodes their charter value, and this reduction is greater in magnitude when the bank is subject to fixed-rate deposit insurance than when it is subject to fairly priced deposit insurance. In that setting, if a bank did not adjust its capital, EPS growth would be negative but small in magnitude owing to the mechanical effect from greater competition that decreases the bank's deposit spread and reduces its net interest margin. However, when the bank rationally reduces its capital, EPS growth worsens further. Moreover, the magnitude of the decline in EPS growth is greater when the bank is subject to fixed-rate deposit insurance than when it is subject to fairly priced deposit insurance.

With regard to ROE, if a bank did not adjust its capital, ROE growth would be negative, though slightly smaller in magnitude compared with EPS growth. Interestingly, however, when a bank rationally reduces its initial capital in response to greater competition, the consequence for ROE growth is exactly opposite that for EPS growth. Specifically, the bank's rational reduction in capital causes a rise in ROE growth that can easily offset the mechanical decline from a lower net interest margin. Moreover, the resulting rise in ROE growth is greater when the bank has fixed-rate deposit insurance than when it has fairly priced deposit insurance.

Banks' preference for ROE arises because ROE makes banks look better when they rationally respond to greater competition in the presence of fixed-rate deposit insurance. Pennacchi and Santos argue that this matches the conditions banks experienced in the United States. Historically, the effective deposit insurance premiums that the Federal Deposit Insurance Corporation (FDIC) has charged banks have been only mildly linked to risk. Further, starting in the late 1970s money market funds, a direct competitor for bank deposits, experienced rapid growth. Competition in the banking sector further intensified in the 1980s following states' decisions to lift restrictions on branching within their borders and to permit out-of-state institutions to acquire their banks.

Pennacchi and Santos note that one implication of their analysis is that the typical bank's performance based on ROE after Basel III is worse than if it were based on EPS, and that if minimum capital standards continue to rise, we might expect banks to de-emphasize ROE in favor of EPS. The Pennacchi and Santos paper is related to Haldane and Alessandri (2009) and Begenau and Stafford (2016), which also attempt to explain banks' preference for an ROE performance metric. However, Haldane and Alessandri (2009) attribute that preference to lower capital and greater bank asset risk, while Begenau and Stafford (2016) suggest that banks manipulate ROE upward through leverage because stock market investors (inefficiently) focus on ROE.

Summing up, Choi, Holcomb, and Morgan (2018) find strong evidence of risk shifting in response to the supplemental leverage ratio, but this change did not lead to higher overall risk at SLR banks because these banks lowered their leverage at the same time. Crump, Giannone, and Hundtofte (2018) find a more favorable effect of regulation on banks. They find that the equity volatility of these large banks is differentially lower than it was pre-crisis when compared with changes over the same period for smaller banks or large nonbank firms. Fuster and Vickery (2018) reveal a potential adverse effect of using market information to value

banks' equity capital. They find that banks increase hedging and classify more securities as held-to-maturity following the removal of the AOCI filter, which limits their ability to sell these securities. However, Fuster, Plosser, and Vickery (2018) do not find evidence that would support the claims of some analysts that CFPB oversight has had a large impact on banks' businesses, including their supply of mortgages. Last, Pennacchi and Santos (2018) argue that banks have started to emphasize ROE to the detriment of EPS growth in response to the erosion in their charter value brought about by the growing competition from nonbanks in the 1970s and the branch deregulation of the 1980s.

### 3. EFFECTS ON LIQUIDITY

An important function of the financial system is to provide liquidity to consumers, corporations, and other economic agents. Banks play a pivotal role in this function both through their own liquidity creation and by providing the necessary support for other financial intermediaries to contribute to liquidity in the financial system. In this section, we review four studies that investigate whether post-crisis regulatory reforms interfere with these roles of banks. Roberts, Sarkar, and Shachar (2018) investigate whether the liquidity coverage ratio reduces the ability of banks to create liquidity. In turn, three studies—Boyarchenko, Eisenbach, Gupta, Shachar, and Van Tassel (2018), Adrian, Boyarchenko, and Shachar (2018), and Boyarchenko, Costello, and Shachar (2018)—investigate whether post-crisis reforms interfere with the role banks play supporting liquidity in the debt markets.

One response to the financial crisis was the introduction of liquidity regulation for banks. A component of this regulation, the LCR, aims to promote the short-term resilience of the liquidity risk profile of banks by ensuring that they maintain sufficient unencumbered high-quality liquid assets (HQLA) that can be converted into cash easily and immediately in private markets to meet their liquidity needs for a thirty-calendar-day liquidity stress scenario. Roberts, Sarkar, and Shachar (2018) investigate a potential downside of the LCR—harm to banks' ability to create liquidity.

The effect of the LCR on liquidity creation depends on how banks respond to the regulation. Prior to implementation of the LCR, most banks did not meet its requirements and so the direct effect may be to reduce the liquidity mismatch (as was intended) and liquidity creation by banks subject to the LCR. However, because the liquidity preferences of banks and the contours of the LCR differ, banks may have an incentive to undo the direct effects. For example, banks may increase the portfolio weights of their non-HQLA assets by substituting high-yield corporate bonds (that are unconstrained by HQLA) for investment-grade bonds (that are constrained). Even within the HQLA portfolio, banks can choose between assets with similar risk-adjusted returns but different HQLA weights. Thus, the question of whether liquidity creation decreases for banks subject to the LCR must be answered through empirical analyses.

Roberts, Sarkar, and Shachar examine liquidity creation by LCR and non-LCR banks using variations of the liquidity measures designated as the liquidity mismatch index (LMI) in Bai, Krishnamurthy, and Weymuller (2018) and as "BB" in Berger and Bouwman (2009). Both measures are defined as liquidity-weighted liabilities minus liquidity-weighted assets, with the liquidity weights either derived from market prices (as with LMI) or pre-specified

(as with BB). The authors exploit the differential implementation of the LCR for so-called full LCR banks with assets greater than \$250 billion (which had to start implementation by January 2015) and modified-LCR banks with assets between \$50 billion and \$250 billion (which had to start implementation by January 2016).

They find that LCR banks had lower liquidity creation than non-LCR banks post-2013, primarily because of greater holdings of liquid assets and reduced holdings of illiquid assets. Holdings of commercial and residential real estate loans as well as the “high run-off” category of liabilities decline for LCR banks in comparison with non-LCR banks relative to the pre-2013 period. Interestingly, the authors detect a post-LCR shift in LCR bank portfolios toward GNMA (Government National Mortgage Association) MBS rather than GSE (government-sponsored enterprise) MBS, which are economically similar assets with different LCR weights. Since this shift is not attributable to relatively greater issuance of GNMA or relative price effects, it likely indicates an LCR effect on bank portfolio choice.

The Roberts, Sarkar, and Shachar paper is most closely related to Bai, Krishnamurthy, and Weymuller (2018) and Berger and Bouwman (2009) in that it relies on the liquidity measures that those papers have developed. In contrast to those papers, whose focus is on understanding the factors that drive banks’ creation of liquidity, Roberts, Sarkar, and Shachar focuses on understanding the impact of the LCR on this important function of banks.

Adrian, Boyarchenko, and Shachar (2017) study whether the ability of regulated institutions to intermediate in the corporate bond market changed in the wake of post-crisis regulatory reforms. The authors utilize the supervisory version of the Trade Reporting and Compliance Engine (TRACE), which allows them to focus on the relationship between bond-level liquidity and financial institutions’ balance sheet constraints.

They find that post-crisis regulation has had an adverse impact on bond-level liquidity. Prior to the financial crisis, bonds traded by more levered institutions and by institutions with investment-bank-like characteristics were more liquid, but this relationship reversed after the financial crisis. In addition, institutions that faced more regulations after the crisis reduced their overall volume of trade and have less ability to intermediate customer trades. This reversal is consistent with the view that more stringent leverage regulation and more regulation of investment banks reduce the ability of financial institutions to provide liquidity to the market overall. However, these effects have not translated into a decrease in the liquidity of corporate bonds, on average, because the share of corporate bond liquidity provision by more regulated dealers has fallen at the same time.

The Adrian, Boyarchenko, and Shachar study is related to a number of recent empirical papers that have examined post-crisis changes in corporate bond market liquidity. These papers have come to mixed conclusions on the impact of regulatory reforms. Bessembinder et al. (2016) and Bao, O’Hara, and Zhou (2016) find decreased liquidity during idiosyncratic stress events; Anderson and Stulz (2017) find evidence of decreased liquidity during systemic events as measured by extreme values of the VIX. In contrast, Trebbi and Xiao (2015) and Adrian et al. (2016) conclude that aggregate bond market liquidity remains largely unaffected by post-crisis regulation. A drawback to these studies is that they rely on indirect measures of the effect of regulation on corporate bond market participants, whereas Adrian, Boyarchenko, and Shachar (2017) directly link the trading behavior of market participants to their balance sheet constraints.

Boyarchenko, Costello, and Shachar (2018) study the decision of financial institutions to participate in either the cash or the derivatives markets to allocate credit risk to individual

corporate entities, and how regulatory changes have affected that decision. The paper's key innovation is the construction of a weekly data set of changes in financial institutions' holdings of both corporate bonds *and* credit default swaps (CDS). These data are observed at a higher frequency and at a more granular level than in prior work in the academic literature.

The authors find that institutions change their participation decisions in these markets in response to changes in the regulatory environment. Global systemically important banks—the banks most affected by changes in regulation—are less likely to use CDS contracts but they hedge a greater fraction of their corporate bond transaction flow in the CDS market since January 2014. Similarly, G-SIBs increase the volume and frequency of their transactions in single-name CDS after the single-name contract becomes eligible for clearing (which lowers its capital requirement). The results suggest that regulatory constraints play an important role in determining which markets an institution uses to change its exposure to corporate credit risk.

The paper by Boyarchenko, Costello, and Shachar is most closely related to the literature that has investigated the relationship between the use of credit derivatives and fundamental credit exposures. This literature has found mixed results as to whether financial institutions use CDS or other credit derivatives extensively for hedging purposes. In fact, Boyarchenko, Costello, and Shachar find that institutions rarely use both the CDS market and the corporate bond market in the same week.

Boyarchenko, Eisenbach, Gupta, Shachar, and Van Tassel (2018) study a wide variety of basis trades that, since the crisis, have experienced sizable and persistent deviations from parity. The authors first investigate the role of post-crisis regulations by calculating the implied ROE on each trade under the pre-crisis regulatory regime and its post-crisis counterpart. They show that the implied ROE of these basis trades is significantly lower in the post-crisis period and infer that post-crisis changes to regulation and market structure have increased the cost of participation in spread-narrowing trades for regulated institutions, creating limits to arbitrage.

The authors further argue that regulated broker-dealers are not only more constrained to participate in arbitrage trades themselves but also less able to provide funding to their clients participating in these trades. They show that among hedge funds with a G-SIB prime broker, those that use leverage show a significant decline in assets under management and lower returns compared with funds that do not use leverage. Moreover, the number of funds obtaining leverage from G-SIB-affiliated prime brokers has declined relative to the number of funds obtaining leverage from other types of prime brokers. Taken together, these results suggest a pass-through of regulation from the directly affected sector to other parts of the financial sector that rely on the regulated sector for funding, execution, and clearing services.

The Boyarchenko, Eisenbach, Gupta, Shachar, and Van Tassel study joins a number of recent studies that have focused on the role that regulatory constraints on intermediaries play in perpetuating deviations from arbitrage. Avdjiev et al. (2016) shows that deviations from covered interest rate parity (CIP) are strongly correlated to the dollar financing costs of global banks. A related paper, Du, Tepper, and Verdelhan (2018), argues that the expected profitability of CIP trades is much lower after controlling for banks' balance sheet costs. Similarly, Boyarchenko et al. (2018a) and Boyarchenko et al. (2018b) show that, after the introduction of SLR in the United States, the break-even levels of Treasury-swaps spreads and credit bases are much lower (more negative) than prior to the crisis. In the equity market, Jylhä (2018) shows that

tighter leverage constraints, induced by changing initial margin requirements, correspond to a flatter relationship between market betas and expected returns.

In sum, all four of the studies investigating the effect of post-crisis regulatory reforms on liquidity show that the constraints that financial institutions face shape their decisions regarding market participation. This effect, in turn, appears to have had a negative impact on market and funding liquidity and liquidity creation.

## 4. FINAL REMARKS

The financial crisis of 2007-08 triggered an unprecedented number of regulatory reforms, particularly affecting the banking sector. Sufficient time has elapsed since the implementation of many of these reforms to offer an opportunity to investigate their effects. This investigation is important not only to ascertain whether the reforms achieved their intended goals but also to determine whether they have had unanticipated consequences, positive or negative. Assessing the effects of reforms is important for another reason: It provides us with valuable information about how financial institutions, and markets more generally, respond to regulation—an important consideration when evaluating adjustments to post-crisis regulatory reforms and future changes to financial regulation.

The twelve studies reviewed in this article represent an effort by a set of New York Fed economists to contribute to the ongoing debate on the effects of the post-crisis reforms. By design, these studies focus on effects related to banks' risk taking, funding costs, and profitability, as well as liquidity in debt markets—representing only a small subset of the potential outcomes triggered by these regulatory reforms. The evidence unveiled by these papers suggests that deepening our understanding of the effects of post-crisis reforms on these issues as well as expanding our investigation into other areas, including banks' provision of credit, the securitization of credit, and the role of shadow banking, just to name a few, are likely fruitful areas for future research.

## NOTES

<sup>1</sup> See “U.S. Won’t Let 11 Biggest Banks in Nation Fail,” *Wall Street Journal*, September 20, 1984, and O’Hara and Shaw (1990) for further details on the Comptroller of the Currency’s announcement.

<sup>2</sup> Under U.S. accounting rules, securities are classified as “trading assets,” “held to maturity,” or “available for sale.” Unrealized changes in the fair value of available-for-sale securities do not affect net income; however, they contribute to AOCI, which is a component of equity on the balance sheet of the bank. Until recently, however, bank capital rules included an AOCI filter, which meant that AOCI was not counted toward bank regulatory capital.

<sup>3</sup> Note that this approach only measures the effect of CFPB supervision and enforcement; it does not identify the impact of new regulations issued by the CFPB, which would generally apply to both groups of lenders.

## REFERENCES

- Abadie, A., and J. Gardeazabal.* 2003. “The Economic Costs of Conflict: A Case Study of the Basque Country.” *AMERICAN ECONOMIC REVIEW* 93, no. 1 (March): 113-32.
- Adrian, T., N. Boyarchenko, and D. Giannone.* 2017. “Vulnerable Growth.” *AMERICAN ECONOMIC REVIEW*, forthcoming.
- Adrian, T., M. Fleming, O. Shachar, and E. Vogt.* 2016. “Market Liquidity after the Financial Crisis.” Federal Reserve Bank of New York *STAFF REPORTS*, no. 796.
- Adrian, T., N. Boyarchenko, and O. Shachar.* 2017. “Dealer Balance Sheets and Bond Liquidity Provision.” *JOURNAL OF MONETARY ECONOMICS* 89 (August): 92-109.
- Acharya, V. V., D. Anginer, and A. J. Warburton.* 2016. “The End of Market Discipline? Investor Expectations of Implicit Government Guarantees.” Working paper.
- Acosta Smith, J., M. Grill, and J. H. Lang.* 2017. “The Leverage Ratio, Risk-Taking, and Bank Stability.” European Central Bank Working Paper Series, no. 2079.
- Afonso, G., M. Blank, and J. A. C. Santos.* 2018. “Did the Dodd-Frank Act End ‘Too Big to Fail’?” Federal Reserve Bank of New York *LIBERTY STREET ECONOMICS* (blog), March 5.
- Agarwal, S., D. Lucca, A. Seru, and F. Trebbi.* 2014. “Inconsistent Regulators: Evidence from Banking.” *QUARTERLY JOURNAL OF ECONOMICS* 129, no. 2 (May): 889-938.
- Allahrakha, M., J. Cetina, and B. Munyan.* 2018. “Do Higher Capital Standards Always Reduce Bank Risk? The Impact of the Basel Leverage Ratio on the U.S. Triparty Repo Market.” *JOURNAL OF FINANCIAL INTERMEDIATION* 34 (April): 3-16.
- Anderson, M., and R. M. Stulz.* 2018. “Is Post-Crisis Bond Liquidity Lower?” NBER Working Paper no. 23317.
- Avdjiev, S., W. Du, C. Koch, and H. S. Shin.* 2016. “The Dollar, Bank Leverage, and the Deviation from Covered Interest Parity.” BIS Working Papers, no. 592.
- Bai, J., A. Krishnamurthy, and C. H. Weymuller.* 2018. “Measuring Liquidity Mismatch in the Banking Sector.” *JOURNAL OF FINANCE* 73, no. 1 (February): 51-93.
- Bao, J., M. O’Hara, and X. A. Zhou.* 2016. “The Volcker Rule and Market-Making in Times of Stress.” Federal Reserve Board *FINANCE AND ECONOMICS DISCUSSION SERIES* 2016-102.
- Begenau, J., and E. Stafford.* 2016. “Inefficient Banking.” Working paper.

## REFERENCES (CONTINUED)

- Berger, A. N., and C. H. S. Bouwman.* 2009. "Bank Liquidity Creation." *REVIEW OF FINANCIAL STUDIES* 22, no. 9 (September): 3779-837.
- Bessembinder, H., S. E. Jacobsen, W. F. Maxwell, and K. Venkataraman.* 2016. "Capital Commitment and Illiquidity in Corporate Bonds." *JOURNAL OF FINANCE* 73, no. 4 (August): 1615-61.
- Bicu, A., L. Chen, and D. Elliott.* 2017. "The Leverage Ratio and Liquidity in the Gilt and Repo Markets." Bank of England Working Paper no. 690.
- Boyarchenko, N., A. M. Costello, and O. Shachar.* 2018. "Credit Market Choice." Federal Reserve Bank of New York *STAFF REPORTS*, no. 863.
- Boyarchenko, N., T. Eisenbach, P. Gupta, O. Shachar, and P. Van Tassel.* 2018. "Bank-Intermediated Arbitrage." Federal Reserve Bank of New York *STAFF REPORTS*, no. 858.
- Boyarchenko, N., P. Gupta, N. Steele, and J. Yen.* 2018a. "Negative Swap Spreads." Federal Reserve Bank of New York *ECONOMIC POLICY REVIEW* 24, no. 2 (October): 1-14.
- . 2018b. "Trends in Credit Basis Spreads." Federal Reserve Bank of New York *ECONOMIC POLICY REVIEW* 24, no. 2 (October): 15-37.
- Bucalossi, A., and A. Scalia.* 2016. "Leverage Ratio, Central Bank Operations, and Repo Market." Bank of Italy Occasional Paper no. 347.
- Calomiris, C. W., and D. Nissim.* 2014. "Crisis-Related Shifts in the Market Valuation of Banking Activities." *JOURNAL OF FINANCIAL INTERMEDIATION* 23, no. 3 (July): 400-35.
- Cavallo, E., S. Galiani, I. Noy, and J. Pantano.* 2013. "Catastrophic Natural Disasters and Economic Growth." *REVIEW OF ECONOMICS AND STATISTICS* 95, no. 5 (December): 1549-61.
- Cetorelli, N., and J. Traina.* 2018. "Resolving 'Too Big to Fail.'" Federal Reserve Bank of New York *STAFF REPORTS*, no. 859.
- Chircop, J., and Z. Novotny-Farkas.* 2016. "The Economic Consequences of Extending the Use of Fair Value Accounting in Regulatory Capital Calculations." *JOURNAL OF ACCOUNTING AND ECONOMICS* 62, no. 2-3 (November-December): 183-203.
- Choi, D. B., M. R. Holcomb, and D. Morgan.* 2018. "Leverage Limits and Bank Risk: New Evidence on an Old Question." Federal Reserve Bank of New York *STAFF REPORTS*, no. 856.
- Chousakos, K. T., and G. B. Gorton.* 2017. "Bank Health Post-Crisis." NBER Working Paper no. 23167.

## REFERENCES (CONTINUED)

- Claus, J., and J. Thomas.* 2001. "Equity Premia as Low as Three Percent? Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets." *JOURNAL OF FINANCE* 56, no. 5 (October): 1629-66.
- Crump, R. K., D. Giannone, and S. Hundtofte.* 2018. "Changing Risk-Return Profiles." Federal Reserve Bank of New York *STAFF REPORTS*, no. 850.
- Du, W., A. Tepper, and A. Verdelhan.* 2018. "Deviations from Covered Interest Rate Parity." *JOURNAL OF FINANCE* 73, no. 3 (June): 915-57.
- Fama, E. F., and K. R. French.* 1993. "Common Risk Factors in the Returns on Stocks and Bonds." *JOURNAL OF FINANCIAL ECONOMICS* 33, no. 1 (February): 3-56.
- Fuster, A., M. C. Plosser, and J. Vickery.* 2018. "Does CFPB Oversight Crimp Credit?" Federal Reserve Bank of New York *STAFF REPORTS*, no. 857.
- Fuster, A., and J. Vickery.* 2018. "Regulation and Risk Shuffling in Bank Securities Portfolios." Federal Reserve Bank of New York *STAFF REPORTS*, no. 851.
- Gebhardt, W. R., C. Lee, and B. Swaminathan.* 2001. "Toward an Implied Cost of Capital." *JOURNAL OF ACCOUNTING RESEARCH* 39, no. 1 (June): 135-76.
- Hamilton, D.* 2018. "Fear of (Capital) Commitment: Strategic Accounting Classifications and the Consequences for Fixed Income Dealer Inventories." Working paper.
- Haldane, A., and P. Alessandri.* 2009. "Banking on the State." Working paper, Bank of England.
- Hirtle, B., A. Kovner, and M. C. Plosser.* 2016. "The Impact of Supervision on Bank Performance." Federal Reserve Bank of New York *STAFF REPORTS*, no. 768.
- Huizinga, H., and L. Laeven.* 2012. "Bank Valuation and Accounting Discretion during a Financial Crisis." *JOURNAL OF FINANCIAL ECONOMICS* 106, no. 3 (December): 614-34.
- Jylhä, P.* 2018. "Margin Requirements and the Security Market Line." *JOURNAL OF FINANCE* 73, no. 3 (June): 1281-321.
- Kashyap, A., J. Stein, and S. Hanson.* 2010. "An Analysis of the Impact of 'Substantially Heightened' Capital Requirements on Large Financial Institutions." Working paper.
- Kim, S., S. Kim, and S. G. Ryan.* 2017. "Economic Consequences of the AOCI Filter Removal for Advanced Approaches Banks." Working paper.

## REFERENCES (CONTINUED)

- Kisin, R., and A. Manela.* 2016. “The Shadow Cost of Bank Capital Requirements.” *REVIEW OF FINANCIAL STUDIES* 29, no. 7 (July): 1780-820.
- Kotidis, A., and N. van Horen.* 2018. “Repo Market Functioning: The Role of Capital Regulation.” Bank of England Working Paper no. 746.
- Kovner, A., and P. Van Tassel.* 2018. “Regulatory Changes and the Cost of Capital for Banks.” Federal Reserve Bank of New York *STAFF REPORTS*, no. 854.
- Minton, B. A., R. M. Stulz, and A. G. Taboada.* 2017. “Are Larger Banks Valued More Highly?” NBER Working Paper no. 23212.
- O’Hara, M., and W. Shaw.* 1990. “Deposit Insurance and Wealth Effects: The Value of Being ‘Too Big to Fail.’” *JOURNAL OF FINANCE* 45, no. 5 (December): 1587-600.
- Pennacchi, G., and J. A. C. Santos.* 2018. “Why Do Banks Target ROE?” Federal Reserve Bank of New York *STAFF REPORTS*, no. 850.
- Plosser, M. C., and J. A. C. Santos.* 2018. “The Cost of Bank Regulatory Capital.” Federal Reserve Bank of New York *STAFF REPORTS*, no. 853.
- Roberts, D., A. Sarkar, and O. Shachar.* 2018. “Bank Liquidity Provision and Basel Liquidity Regulations.” Federal Reserve Bank of New York *STAFF REPORTS*, no. 852.
- Sarin, N., and L. H. Summers.* 2016. “Have Big Banks Gotten Safer?” *BROOKINGS PAPERS ON ECONOMIC ACTIVITY*, Fall.
- Trebbi, F., and K. Xiao.* 2015. “Regulation and Market Liquidity.” NBER Working Paper no. 21739.
- Van den Heuvel, S. J.* 2008. “The Welfare Cost of Bank Capital Requirements.” *JOURNAL OF MONETARY ECONOMICS* 55, no. 2 (March): 298-320.

*The views expressed are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. The Federal Reserve Bank of New York provides no warranty, express or implied, as to the accuracy, timeliness, completeness, merchantability, or fitness for any particular purpose of any information contained in documents produced and provided by the Federal Reserve Bank of New York in any form or manner whatsoever.*