A Primer on Regulatory Bank Capital Adjustments

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ABSTRACT

To calculate regulatory capital ratios, banks have to apply adjustments to book equity. These regulatory adjustments vary with a bank's solvency position. Low-solvency banks report values of Tier 1 capital that exceed book equity. They use regulatory adjustments to inflate regulatory solvency ratios such as the Tier 1 leverage ratio and the Tier 1 risk-based capital ratio. In contrast, highly solvent banks report Tier 1 capital that is lower than book equity. These banks adjust their solvency ratios downward for prudential reasons, despite their resilient solvency levels. These results weaken the case for regulatory adjustments. The decreasing relationship between regulatory adjustments and bank solvency reflects the cost of deleveraging, a cost that demonstrates the resistance of banks to substituting equity for debt.

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THE GLOBAL FINANCIAL CRISIS prompted renewed attention to bank capital. In the wake of the crisis, rules on regulatory capital are changing. New capital rules (Basel III) have entered into force (BCBS 2010, EC 2013, OCC 2013). In anticipation of these rules, banks have been increasing the level of regulatory capital (BCBS 2013a).

The attention to bank capital is focused predominantly on the levels of capital, although opinions on the benefits and costs of bank capital vary. Whereas Mehran and Thakor (2011), Admati et al. (2013a), and Berger and Bouwman (2013) highlight the benefits of increased levels of bank capital, others highlight the drawbacks (e.g., Diamond and Rajan 2001, Kashyap et al. 2008, DeAngelo and Stulz 2013). Others also highlight the benefits of convertible capital: debt that can be converted when a bank's capital level drops below a certain threshold (Flannery 2005, French et al. 2010, Herring and Calomiris 2011, Pennacchi et al. 2011).

Surprisingly little has been written about the structure, or the quality, of regulatory capital. This lack of attention to the structure of regulatory capital is surprising for two reasons.

First, regulation alters the structure of regulatory bank capital. Bank capital rules require banks to apply adjustments to book equity to calculate regulatory capital—where book equity is the starting point of the calculation of regulatory capital and solvency ratios (Federal Reserve 2005, FDIC 2012, OCC 2012, EC 2013).

The adjustments are intended to exclude from capital items that do not contribute to the safety and soundness of the banking system, but include items that augment the quantity of regulatory capital.

Examples of items that are deducted from book equity are goodwill, deferred tax assets, minority interests, and unrealized gains on securities held for sale.

Examples of items included in regulatory capital are specific subordinated debt securities and unrealized losses on available-for-sale debt securities (Federal Reserve 2005, 12 CFR 225 2012).

Because of the regulatory adjustments, regulatory capital differs from "accounting capital" or book equity. This paper shows that the regulatory adjustments, relative to equity, increase (decrease) Tier 1 capital up to 311 basis points (bp) (443 bp) of total assets. These differences are amplified by leverage and warrant attention from banks and regulators.

Second, bank solvency regulation does pay attention to the structure of regulatory capital. For example, Basel III aims to raise both the *quantity* and the *quality* of regulatory capital (BCBS 2010, sections 8 and 9). Moreover, the discussions on the structure of capital, i.e., on which items can or cannot count as regulatory capital, are often heated. They also tend to drag on. A case in point is the controversy around the Basel Committee's preliminary "Regulatory Consistency Assessment" of 2012. The adverse assessment outcome prompted the European Commission to make an exceptional announcement that publicly defended the proposed new European bank capital rules (BCBS 2012, EC 2012, Goldstein 2012). Another example, which will be discussed in this paper, is the ongoing discussion of the inclusion of unrealized gains and losses in regulatory capital.

The reasons above prompt the question: What do we know about the empirical effects of regulatory adjustments on the structure of regulatory capital?

To answer that question, this paper examines Tier 1 regulatory adjustments: items that banks can and cannot include in Tier 1 capital and thus affect the structure of regulatory capital. This paper examines how banks apply these regulatory adjustments and assesses whether the adjustments satisfy regulators' concerns about the safety and soundness of the banking system.

For a large sample of US bank holding companies over the years 2001–2013, this paper presents empirical evidence of regulatory adjustments, which are adjustments that banks are required to apply to book equity to calculate Tier 1 regulatory capital, which is the numerator of two important bank solvency ratios: the Tier 1 leverage ratio and the Tier 1 risk-based capital ratio.

The main finding of this paper is that the relationship between regulatory adjustments and bank solvency declines with solvency. Weaker banks in particular benefit from regulatory adjustments. These banks report Tier 1 capital that exceeds book equity. They rely on regulatory adjustments to inflate the solvency ratios reported to their supervisors. In contrast, highly solvent banks report low regulatory solvency ratios relative to ratios based on book equity.

Moreover, the relationship between solvency and regulatory adjustments is convex: The effects of regulatory adjustments monotonically decline with bank solvency.

This paper contributes to the literature by showing that banks use regulatory adjustments to manage Tier 1 capital. Specifically: Low-solvency banks use adjustments to increase Tier 1 capital, and high-solvency banks display a higher incidence of regulatory adjustments that decrease Tier 1 capital. In addition, the paper shows that the use of regulatory adjustments mirrors the option value of equity, which peaks in low-solvency banks. The results presented in this paper are the first concerning Tier 1 regulatory capital choice and present empirical evidence consistent with the leverage ratchet effect of Admati et al. (2013b).

The results in the present paper indicate a limited effectiveness of bank solvency rules regarding regulatory adjustments to preserve capital. In fact, the rules work to the advantage of weaker banks. These banks are "helped" (or choose to be helped) by rules that allow them to augment regulatory capital by using items that have not consistently proven their contribution to the safety and soundness of the banking system (French et al. 2010, ASIC 2013). Conversely, highly solvent banks are required to adjust their solvency ratios downward for prudential reasons. Given their resilient capital ratios, we may question the relevance of regulatory adjustments for these banks.

In addition, the results show that banks respond to the rules governing regulatory adjustments. Provided that the rules governing regulatory adjustments are carefully developed, the rules have prudential merits. However, some of the deductions may be the result of a willingness among standard setters to conform to an international level playing field. This may also limit the effectiveness of the regulatory adjustments.

With the Basel Committee on Banking Supervision gathering views on the risk-based solvency approach, this paper may contribute to the debate on the choice of a measure of solvency (BCBS 2013b).

1. BACKGROUND: LITERATURE AND REGULATION

1.1 Literature

The existing literature on regulatory adjustments originates mainly from accounting studies that focus on the allowance for loan and lease losses includible in Tier 2 capital. See, for example, Kim and Kross (1998) and Ramesh and Revsine (2000). Ng and Roychowdhury (2011) document a positive association between the allowance for loan and lease losses includible in Tier 2 capital, an "add-back" to capital, and the risk of bank failure. Their study confirms the results of Laeven and Majnoni (2003), who show that banks tend to postpone provisioning. Gebhardt and Novotny-Farkas (2011) show that accounting rules that rely on the recognition of incurred losses (instead of expected losses) are an incentive to postpone provisioning. In doing so, accounting rules may frustrate the prudential objectives of Tier 2 capital.

Results of studies examining Tier 2 capital may not be generalizable for all banks, in particular for going-concern banks. Tier 2 capital is increasingly seen as "gone concern" capital. Its role in going concern is limited and diminishing. As opposed to Tier 1 capital, which absorbs losses in going concern by the deduction of losses from book equity, Tier 2 capital acts as a buffer that can be drawn down to limit "losses given default." Tier 1 should reduce the probability of a bank defaulting. New bank solvency rules, e.g., Basel III, formalize these two separate roles of Tier 1 and Tier 2. The former has a going-concern role, and the latter has a gone-concern role (BCBS 2010, 2011).

In the literature on regulatory capital, there is broad agreement that bank capital is expensive. Two important factors that drive the high cost of bank capital are subsidized debt and the benefits forgone by less-intense creditor monitoring.

Tax deductibility of debt increases firm value with leverage (Modigliani and Miller 1963). As the probability of default increases with leverage, banks may limit their indebtedness to the levels observed in corporate firms. However, in the presence of a regulatory safety net that mitigates the effects of bank failure on the financial system, banks may increase leverage further. Berger et al. (1995) document that the leverage of banks has increased since the nineteenth century. Equity to asset ratios were about 1:1 in 1840. Leverage then increased to about 14:1 at the end of the twentieth century. Moreover, the increases in leverage documented by Berger et al. (1995) coincide with regulatory initiatives that "widened" the safety net for banks. Poole (2009) and Admati et al. (2013b) show that subsidized debt is distortive.

The literature on creditor monitoring highlights the special role of banks in society as financial intermediaries. This literature favors higher capital levels than observed currently or in the recent past. However, it also acknowledges the limits of high solvency levels. More capital may "crowd out" creditors and depositors, which diminishes their role of monitoring bank managers. Increased capital levels may therefore lower the threat and prospect of a bank run. This may lower managerial effort levels, or it may lower managers' commitment to collect cash flows from debtors (Diamond and Rajan 2001). The intuition of Diamond and Rajan is akin to that of Jensen (1986) on the agency cost of free cash flows. Both studies present a case for low to moderate levels of capital.

Another paper that relies on monitoring by creditors is that by Kashyap et al. (2008), who advance the idea of capital buffers that vary with the business cycle. In good times, the capital requirement should be set at a relatively high level such as 10%. In a crisis, this requirement should be lowered to 8%. This idea is now part of the Basel III capital rules, which introduce a conservation buffer and the countercyclical buffer. The former can be drawn down when a bank's common equity Tier 1 ratio drops below 7%. The latter will be deployed in times of excess aggregate credit growth (BCBS 2010, sections 3 and 4). Whether these buffers will work remains to be seen. The capital requirements in good times may be set too high for monitoring purposes, and the low capital requirements in a crisis may be set too low to

deter managerial risk taking (Acharya et al. 2010). DeAngelo and Stulz (2013) show that high leverage levels support the production of liquidity.

Convertible capital also offers a solution to the high cost of equity capital. Convertible securities (contingent convertibles, or CoCos) boost the capital levels only when needed. Flannery (2005), French et al. (2010), Herring and Calomiris (2011), and Pennacchi et al. (2011) present various CoCo alternatives. These instruments are likely to become more popular as Basel III rules for debt capital securities require them to be converted into equity when a bank's solvency becomes too low, i.e., at the point of nonviability (BCBS 2010, 2011).

However attractive convertible securities may appear, the ones that were issued prior to the global financial crisis failed to absorb losses (ASIC 2013). Moreover, in practice, CoCos have many known practical problems that affect their effectiveness (Kimball 2013).

Admati et al. (2013a) argue that the global financial crisis has demonstrated the limits of creditor monitoring. Creditors might not monitor because they feel protected by, for example, depositor insurance. Moreover, banks might choose to not impose losses on subordinated debt holders, to protect future access to the market of subordinated debt.

Admati et al. (2013a) therefore highlight the benefits of high levels of capital, even if they may require the regulator to devise policies that force banks to issue shares as banks resist voluntary issuances of shares. Empirical papers supporting Admati et al. (2013a) include that by Mehran and Thakor (2011), who show that bank value increases with capital and thus respond to Modigliani and Miller (1958) and Miller (1995), who cling to capital structure irrelevance. Berger and Bouwman (2013) show that banks' odds of surviving a crisis increase with capital.

In a follow-up paper relevant to the present study, Admati et al. (2013b) model the resistance to deleveraging once debt is in place. Although low leverage levels may be optimal for society, firms with debt will privately resist deleveraging. This is because the benefits of

deleveraging accrue predominantly to the debt holders. This is particularly the case for banks, given their high leverage.

The intuition behind Admati et al. (2013b) follows that of the Myers (1977) debt overhang problem: A highly leveraged firm may forgo a profitable project because its cash flows will accrue to the debt holders. Admati et al. (2013b) show that highly leveraged firms—banks—will resist repaying debt for the same reason. The difference is that the Myers debt overhang problem may prompt a manager to gamble his way out of a debt, with some probability of success. However, Admati et al. (2013b) show that the resistance to paying off debt persists however high the benefits of deleveraging are.

To the best of my knowledge, no empirical studies thus far have examined adjustments applied to Tier 1 (going concern) capital only. Although pre-Basel Accord studies have investigated items that now belong to Tier 1 capital, these papers report inconsistent results and do not model the decreasing relationship between regulatory adjustments and solvency that I document. Nor do these papers examine regulatory adjustments collectively–the papers predominantly examine levels of capital and the management thereof. For example, in a study of commercial banks, Beatty et al. (1995) used a simultaneous equation approach applied to factors that banks may use to manage tax, regulatory capital, and earnings. They found inconsistent results regarding capital management. Collins et al. (1995), using data around the implementation of the first Basel Accord, found similar inconsistent evidence regarding capital management. Moyer (1990), in a study on loan losses, charge-offs, and gains and losses on securities over the years 1981–1983, found inconsistent, and in some cases insignificant, results regarding the use of adjustments applied to regulatory capital.

1.2 Regulation

Regulatory capital requirements

Regulation Y of the Federal Reserve System (12 CFR 225 2012) describes the relevant elements of the definition of capital for US banks. The Federal Reserve System defines capital to determine three ratios of bank solvency: the Tier 1 risk-based capital ratio, the Tier 1

leverage ratio, and the total risk-based capital ratio. The risk-based ratios use risk-weighted assets as the denominator. This is to exempt banks from holding capital against low-risk or risk-free holdings of assets.[1]

The Tier 1 risk-based capital ratio is the ratio of Tier 1 capital over total risk-weighted assets. As an indication of the impact of risk weights, the value of risk-weighted assets is on average about 70% of the value of total assets.

The Tier 1 leverage ratio is the ratio of Tier 1 capital over average total assets for leverage capital purposes.

The total risk-based capital ratio is the sum of Tier 1 capital (or core capital) and Tier 2 capital (or supplementary capital), both divided by risk-weighted assets.

For a bank to be called adequately capitalized, the total risk-based capital ratio must equal or exceed 8% of risk-weighted assets, and the leverage ratio should be higher than 4%. Given that average total assets are larger than risk-weighted assets, the Tier 1 leverage ratio will reach 4% before the Tier 1 risk-based capital ratio does. Therefore, as an exception to the 4% leverage ratio requirement, strong banks may hold 3% of Tier 1 capital against assets (12 CFR 6.4 2011, 12 CFR 225 2012).

Regulatory adjustments

The starting point for the calculation of Tier 1 capital is book equity, that is, *common stockholders' equity* or *total bank holding-company equity capital*. For prudential reasons, bank supervisors then adjust book equity to determine regulatory capital. The predominant prudential criterion for including items in regulatory capital is the ability of an item to absorb losses before debt holders' claims (Lautenschläger 2013). Figure 1 shows how these adjustments were made, line by line, for Bank of America Corporation on June 30, 2013.

[1] With Basel III being phased in from 2014–2015 onward, this discussion on regulation does not necessarily reflect the full Basel III implementation. It does cover the measurement period (2001–2013) because the sample cutoff date is June 30, 2013. This is two days before the Federal Reserve announced the Final Rule on Basel III implementation (www.federalreserve.gov/newsevents/press/bcreg/20130702a.htm).

[Figure 1 about here]

The result of these adjustments is a Tier 1 capital figure that differs from book equity, or equity as defined by Generally Accepted Accounting Principles (GAAP). In the case of Bank of America Corporation on June 30, 2013, the adjustments created a $74 billion difference between regulatory Tier 1 capital ($157 billion) and book equity ($231 billion). Without the adjustments, the Tier 1 leverage ratio would be 11.04%, which is 355 bp higher than the reported 7.49%.

The Board of Governors of the Federal Reserve (2005) explains why it diverges from GAAP. In doing so, the Board justifies the use of regulatory adjustments by indicating that the adjustments ensure the safety and soundness of the banking system:

> Although GAAP informs the definition of regulatory capital, the Board is not bound to use GAAP accounting concepts in its definition of Tier 1 or Tier 2 capital because regulatory capital requirements are regulatory constructs designed to ensure the safety and soundness of banking organizations, not accounting designations established to ensure the transparency of financial statements. In this regard, the definition of Tier 1 capital since the Board adopted its risk-based capital rule in 1989 has differed from GAAP equity in a number of ways. The Board has determined that these differences are consistent with its responsibility for ensuring the soundness of the capital bases of banking organizations under its supervision. These differences are not differences between regulatory reporting and GAAP accounting requirements, but rather are differences only between the definition of equity for purposes of GAAP and the definition of Tier 1 capital for purposes of the Board's regulatory capital requirements for banking organizations.

The Board expressed this rationale in a decision to allow the continued inclusion of outstanding and prospective issuances of trust-preferred securities in the Tier 1 capital of bank holding companies.[2]

Although regulations often refer to the regulatory adjustments as "deductions" or "deductions from capital" (see, for example, the Basel II framework, BCBS 2006), the rationale of the Federal Reserve Board shows that it does not discriminate between regulatory adjustments with different signs. Positive adjustments are deemed to contribute to the safety and soundness of the banking system because they are intended to absorb losses. Deducted are items that do not absorb losses, and banks should replenish them with loss-absorbing capital.

Loss absorption is an important prudential criterion governing decisions on regulatory adjustments. However, it is not the only criterion. The following section shows that political considerations also play a role in decisions on regulatory adjustments.

1.3 Description of Regulatory Adjustments

Table 1 shows the regulatory adjustments separately, including their average effect on the Tier 1 capital, expressed in basis points of average total assets. The first column shows the names of the deductions as reported by banks to the Federal Reserve System on the quarterly Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). The second column shows the period during which the regulatory adjustments were in force. The third column, using *total bank holding-company equity capital* as a reference, reports the direction of the effect of the adjustments on regulatory capital: "Additions" increase and "Deductions" decrease Tier 1 capital relative to book equity. A "symmetric" adjustment either adds to or deducts from Tier 1 capital. "Neutralized" means that the adjustment renders a fair-valued item to its amortized (accounting) cost value.

[2]Apparently, at that time, there was insufficient evidence to diverge further from GAAP and exclude these securities from regulatory capital. However, on July 2, 2013, following the Collins Amendment to the Dodd–Frank bill, the Federal Reserve Board approved the final rule to help banks to maintain strong capital positions. This rule now excludes these securities from Tier 1 capital (Collins 2010, Congress of the United States of America 2010, OCC 2013).

[Table 1 about here]

The table reports two value columns: one for observations including those where a bank reports a zero for an item, and the second for nonzero observations only. The values are expressed in bp of average total assets.

The next section discusses the most significant regulatory adjustments, roughly in order of their effect on Tier 1 capital.

Note that the text that follows may, in some instances, refer to Basel III. A consultation version of the new rules on capital was published in 2009 setting expectations on new capital requirements and allowing banks to pre-emptively adjust their regulatory capital levels (BCBS 2009, 2013a).

Tier 1 hybrid securities

Four items in report FR Y-9C refer to hybrid securities, that is, debt-like securities that may or may not count toward regulatory bank capital. These are *nonqualifying perpetual preferred stock*, which is deducted; *qualifying trust-preferred securities*, which is an addition; *qualifying restricted core capital elements (other than cumulative perpetual preferred stock)*, which is also an addition; and some designated convertible securities, that is, *qualifying mandatory convertible preferred securities of internationally active bank holding companies*.

These adjustments refer to hybrid securities, sometimes called "innovative instruments," which should be able to absorb losses in going concern (BCBS 1998). Although loss absorption is an important feature of Tier 1 capital securities, few Tier 1 hybrid securities actually absorbed losses during the recent global financial crisis (BCBS 2009, ASIC 2013). For that reason, Basel III has become more restrictive on hybrid securities. For inclusion in Tier 1, these should now be more equity-like and absorb losses before the bank approaches nonviability (BCBS 2011). The Federal Reserve System follows Basel III and will ban most, but not all, hybrid securities from Tier 1 (see footnote 2).

The effect of the hybrid securities on Tier 1 capital varies. For example, *nonqualifying perpetual preferred stock* on average does not affect Tier 1 capital; however, for banks that have issued such stocks, they lower Tier 1 capital by 71 bp of average total assets.

The securities that are eligible for inclusion in Tier 1 capital augment it by on average 96 bp (*qualifying trust-preferred securities*) and 92 bp (*qualifying restricted core capital elements (other than cumulative perpetual preferred stock)*). Note that the contributions to Tier 1 capital are stronger if we restrict the sample to only those banks that issue them: 176 bp and 150 bp, respectively.

The average effect of *qualifying mandatory convertible preferred securities of internationally active bank holding companies* is nil. However, again, for the issuing banks, these contribute 118 bp to Tier 1 capital.

Goodwill, intangibles, and servicing rights

The item *disallowed goodwill and other disallowed intangible assets* is the most significant deduction in terms of its effect on solvency. On average, this deduction decreases Tier 1 capital by 72 bp, and by 104 bp if we restrict the observations to only nonzero values. This deduction is commonly required by many countries. It reflects the notion that the amount the bank paid for goodwill at an acquisition may not be recoverable. This is particularly the case when a bank is barely viable.

The adjustment for *disallowed servicing assets and purchased credit card relationships* is akin to the deduction of goodwill and intangible assets.

Minority interests

Minority interests increase Tier 1 capital. Since Financial Accounting Standards Board (FASB) Statement No. 160, minority interests should be classified as equity (Leone 2007, FASB 2008). For the relevant quarters, the adjustment contributes on average 22 bp to Tier 1 capital, and 114 bp if we include only nonzero observations from the sample.

There are disagreements about whether a minority is a liability or equity, and this split in views may explain why Basel III rules allow the inclusion of minority interests in common equity Tier 1 capital, albeit under strict conditions (BCBS 2010, annex 3).

Unrealized gains and losses on available-for-sale securities

The next two items—*net unrealized losses on available-for-sale equity securities* and *net unrealized gains (losses) on available-for-sale securities*—undo the fair valuing of securities held for sale, with the exception of unrealized losses on *equity* securities held for sale. The adjustments exclude unrealized fair value gains and losses on debt securities such as bonds and loans. However, for equity securities, e.g., shares held in other firms, only the unrealized gains will be excluded.

Although small in comparison to the adjustments for goodwill or hybrid securities, the exclusion of unrealized gains and losses from regulatory capital is nevertheless controversial. Banks dislike the inclusion of unrealized gains and losses in regulatory capital, because it introduces a downside risk element into capital. Furthermore, fair values of assets are believed to increase the volatility of important ratios (Adrian and Shin 2010, Becker 2013).

Bank regulators disagree about the treatment of unrealized gains and losses in regulatory capital, and the rules governing this adjustment may change. The Appendix details the controversy regarding the inclusion of unrealized gains and losses in regulatory capital.

Deferred tax assets

Deferred tax assets are a negative adjustment that constitutes about 5 bp of the Tier 1 leverage ratio. From a prudential point of view, it makes sense to exclude deferred tax assets from regulatory capital. Loss-making banks report this deferred asset, which can be used to generate tax relief only if at some time in the *future* the bank holding company returns to profitability.

Cumulative results of own creditworthiness

The exclusion of cumulative results of own creditworthiness undoes the fair valuing of liabilities accounted for under the fair value option. The United States introduced this adjustment in 2007 (FFIEC 2007). It effectively levels the playing field with Europe, where treatment of own credit results of creditworthiness sparked controversy at the introduction of International Financial Reporting Standards (IFRS) (Barth et al. 2008). Initially, this led to a "carve-out" of the fair value option from European IFRS. However, shortly after IFRS came into force in Europe, and after close coordination between the European Commission, the International Accounting Standards Board (IASB), and the Basel Committee, the carve-out was eliminated from IFRS (EC 2005). Despite this elimination, regulators including the Federal Reserve continued it for banks.

The adjustment is symmetrical. In the case of gains, the adjustment acknowledges the compensation that banks will need to offer subordinated debt holders to redeem their debt. This strengthens the case for this adjustment.

To illustrate this point, at the time of the European Banking Authority stress test of 2011, BNP Paribas bought back part of a £350 million security at a price significantly below par, at 72.50% (£253.75 million), but £23.75 million over the market price just before purchase (£230.00 million, or 65.75%). In doing so, BNP paid a premium of £23.75 million to crystallize a gain on own creditworthiness, which was intended to strengthen equity by £96.25 million (BNP Paribas 2011a,b). The premiums paid compensate subordinated debt holders for their contribution to making other debt less risky; i.e., these premiums are unavoidable and demonstrate that the fair value gains on own creditworthiness are fickle. This justifies their exclusion from capital.

Other deductions

The symmetrical adjustment for *accumulated net gains (losses) on cash flow hedges* is an accrual that leads to cash outflows later and, therefore, should not be included in regulatory capital. The adjustment for *amounts recorded in accumulated other comprehensive income*

resulting from the initial and subsequent application of FASB ASC 715-20 (former FASB Statement No. 158) to defined benefit postretirement plans follows the logic of the adjustment for *net unrealized gains (losses) on available-for-sale securities*. However, the amounts involved are generally small.

2. BASIS FOR PREDICTION, SAMPLE, AND RESEARCH DESIGN

2.1 Basis for Prediction

The cost of regulatory capital for banks may be high because of subsidized debt and increased agency costs (Diamond and Rajan 2001, Poole 2009). These factors motivate banks to increase leverage to maximize firm value (Modigliani and Miller 1958, 1963, Miller 1995).

Furthermore, regulatory capital in the form of common equity is relatively expensive. It counts toward regulatory capital jointly with hybrid capital securities. These securities are low-cost substitutes for common equity because of tax deductible coupons or coupons that are capped.[3]

The ability to substitute hybrid capital securities for equity has value, particularly when equity is expensive. The value of regulatory adjustments should thus reflect the cost of equity capital.

To model the value of regulatory adjustments, I rely on Merton (1974), who shows that the value of equity can be expressed as

$$E = A \cdot N(d_1) - Ke^{-rt}N(d_2), \quad (1)$$

[3]Capped are variable coupon payments that will not exceed a prespecified percentage.

where A represents the asset value of the bank, K is the book value of debt, r is the risk-free rate, and t is the duration of debt. $N(d)$ is the probability that a standard normal random variable will be less than or equal to d:

$$\begin{aligned} d_1 &= \frac{ln(\frac{A}{K}) + (r + \sigma^2/2)^t}{\sigma\sqrt{t}} \\ d_2 &= d_1 - \sigma\sqrt{t}. \end{aligned} \tag{2}$$

Equation (1) shows that a dollar reduction in debt (K) increases the value of equity (E) by less than one dollar. The increase in the value of equity is between zero and, at best, the value of the bond price:

$$0 < -\frac{\partial E}{\partial K} < e^{-rt}. \tag{3}$$

The equity holder will always lose the time value of money, because he redeems debt now instead of later. This explains the upper bound in equation (3) (Smith 1976). However, the equity holder also forfeits the option value of equity, which is most valuable at low solvency levels. According to Admati et al. (2013b), the equity holder loses most of the benefits of deleveraging to the debt holders. Thus, deleveraging is undesirable from the perspective of the equity holder.

Based on equation (1), the cost of deleveraging decreases with solvency. The cost of deleveraging (C), here defined as the amount paid to debt holders (∂K) but not reflected in an increase of equity (∂E), is

$$\begin{aligned} C &= 1 + \frac{\partial E}{\partial K} \\ C &= 1 - e^{-rt} N(d_2), \end{aligned} \tag{4}$$

where $\frac{\partial E}{\partial K}$ is the partial derivative of the value of equity with respect to debt. Equation (4) shows that the cost of deleveraging increases with leverage ($\frac{K}{A}$).

The cost of deleveraging approaches a floor at $1 - e^{-rt}$ if the bank has close to zero debt. At that point, the relevant costs reflect the opportunity costs of expediting the debt redemption.

Based on equation (4), the relationship between the cost of deleveraging and solvency is convex: high at low levels of solvency, declining with solvency, and approaching a lower bound when solvency is at its maximum, as shown in Figure 2.

[Figure 2 about here]

The vertical axis in the figure shows the cost of deleveraging per dollar redeemed. The horizontal axis represents solvency. At the far right, there is no debt; at the far left, there is no equity.[4] The figure shows that the cost of deleveraging approaches a hyperbola for solvency levels that are moderate to very low.

I expect that banks respond to the cost of deleveraging by managing regulatory adjustments. For example, in a setting without regulatory adjustments, the introduction of a rule that requires a bank to deduct one dollar of capital from equity forces that bank to replenish the deducted dollar. It can do so by issuing shares or by deleveraging, which the bank will attempt to avoid (Admati et al. 2013b).

If the regulator notices that banks collectively avoid replenishing deducted capital, it may respond with policy initiatives that allow banks to issue less costly capital substitutes.

In the presence of a menu of regulatory choices, banks will manage the structure of regulatory capital. They will replenish deducted capital with nonequity substitutes, avoid activities that give rise to deductions, or simply issue nonequity capital securities to augment regulatory capital. The cost of deleveraging thus determines the value of regulatory adjustments:

$$D = f(C), \tag{5}$$

where D represents the dollar value of regulatory adjustments.

[4]The figure assumes the following parameter values: $t = 2.5$ years—assuming average maturity of a 5-year Tier 2 hybrid capital security; risk-free rate $r = 4.0\%$; annual standard deviation $\sigma = 20.0\%$.

Bearing in mind Figure 2 and equation (4), I predict that low-solvency banks will manage capital relatively aggressively: They will issue significant amounts of equity substitutes while avoiding deductions. Likewise, I predict that banks with high solvency will manage regulatory adjustments less aggressively.

2.2 Research Design

I use the reciprocal of the equity solvency ratio to estimate the relationship between regulatory adjustments and solvency:

$$\Delta = g(\tfrac{1}{S}), \tag{6}$$

where Δ is the dollar value of regulatory adjustments (D) standardized for total assets. More specifically: Δ is the difference between regulatory Tier 1 capital (T) and book equity (E), both divided by total assets:

$$\Delta = \frac{T-E}{A}. \tag{7}$$

Equation (6) shows that Δ is a function of $\frac{1}{S}$, where $\frac{1}{S}$ is the reciprocal of the solvency of a bank, here defined as total assets over equity: $\frac{1}{S} = \frac{A}{E}$. Additionally, equation (6) expresses the value of regulatory adjustments as a function of solvency in such a way that the positive effect of regulatory adjustments on regulatory capital diminishes as solvency increases. The relationship is assumed to be convex and hyperbolic.

It is not likely that extremely low denominators in $\frac{1}{S}$ will comprise my analysis; my analysis pertains to banks that are not critically undercapitalized. These banks have a ratio of equity to total assets of more than 2% ($\frac{E}{A} > 0.02$) (12 CFR 6.4 2011).

Univariate regressions

The univariate regression analyses rely on the following model, with $\Delta_{i,t}$ as a measure of regulatory adjustments:

$$\Delta_{i,t} = \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \varepsilon_{i,t}, \tag{8}$$

where the reciprocal of solvency ($S_{i,t}$) is $\frac{1}{S_{i,t}} = \frac{A_{i,t}}{E_{i,t}}$: the *average total assets [3368]* standardized by *total bank holding-company equity capital [3210]*.[5]

The regression model relies on p-values that account for the two dimensions (banks (i) and quarters (t)) of within-cluster correlation (Petersen 2009).

Note that the functional form of the model follows from Section 2.1. It should be preferred over a quadratic function or a form that relies on the negative of the log of S. The former is inconsistent with my prediction. It violates the requirement that the option value of equity approaches a lower bound of $1 - e^{-rt}$ with increasing solvency. The latter also violates this requirement, because the log function has no bounds. Nevertheless, Section 4 (robustness tests) shows that a log function overestimates the effect of deductions, in particular for banks that are highly solvent.

I expect that low-solvency banks will value regulatory adjustments higher than high-solvency banks. This would lead to a positive slope coefficient (β_1), which is generally offset by a negative coefficient for the intercept (β_0).

I apply three measures of regulatory adjustments (Δ) to assess my expectations. The first measure, *Tier 1 minus equity*, is the difference between *Tier 1 capital [8274]* and equity (*total bank holding-company equity capital [3210]*) from report FR Y-9C; both standardized for *average total assets [3368]*. This measure is straightforward to interpret: Positive adjustment values applied to equity increase Tier 1 capital, whereas negative adjustments applied to equity decrease Tier 1 capital.

I choose this aggregate approach instead of a piecemeal approach to each single adjustment for three reasons. (i) The information pertains to the holding company of a bank group. Because of the consolidated nature of the information, the regulatory adjustments are likely to be managed jointly by management of the holding company. (ii) The consolidated nature of

[5]Codes in square brackets are the item codes from the Consolidated Financial Statements for Bank Holding Companies (FR Y-9C); their definitions are from www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm.

the reported information dovetails with US bank supervision, which primarily relies on consolidated information instead of on information from individual subsidiaries (Bhatia 2011). (iii) Regulators often discuss the adjustments jointly; see the sections defining regulatory capital and adjustments in *Regulation Y*, the Federal Deposit Insurance Corporation's (FDIC) and Federal Reserve's Supervision Manuals, and Basel II and Basel III (BCBS 2006, 2010, FDIC 2012, 12 CFR 225 2012, Federal Reserve 2013).

The second measure of adjustment separately records positive adjustments and negative adjustments. This second measure differs from the first in that banks may manage additions differently from deductions.

Note, however, that some items contain positive as well as negative values. For example, item [8434] records both the unrealized gains and the unrealized losses on available-for-sale securities. Unrealized gains are deducted from Tier 1 capital, and unrealized losses are added back to Tier 1 capital; however, a bank holding company can report only the net positive or a negative value for that particular item.

This second measure acknowledges the different signs of these values: It codes adjustments for unrealized gains as deductions from capital. The adjustment for unrealized losses is coded as an addition to capital. I group the deductions and additions into two distinct variables: one that comprises only the deductions, and one that comprises only the additions to the Tier 1 leverage ratio.

My third measure of regulatory adjustments is the item *net unrealized gains (losses) on available-for-sale securities [8434]*. I use this adjustment because it is a symmetrical adjustment to capital; adjustments can be both positive and negative. The symmetrical property allows me to generalize the results for any adjustment, not only to those that are either positive or negative. Furthermore, I use this adjustment because it persistently attracts attention from banks, regulators, and standard setters. Results for this measure may therefore contribute to the ongoing policy debate on the inclusion in regulatory capital of unrealized gains and losses on available-for-sale securities.

Multivariate regressions

The following model expands on the previous model with control variables. Except for credit growth (*Credit*) and *Size*, all variables are standardized by the *average total assets* of a bank:

$$\begin{aligned}\Delta \quad = \quad & \beta_0 + \beta_1 \tfrac{1}{S} + \beta_2 Risk + \beta_3 Size + \beta_4 Tier\ 2\ LLA + \beta_5 Funding\ gap \\ & + \beta_6 ROA + \beta_7 Liquid\ assets + \beta_8 Credit + \beta_9 I_{2006} \cdot Credit \\ & + \beta_{10} I_{2007-2013} \cdot Credit + \sum_{j=2}^{12} \beta_{j+9} District_j + \varepsilon.\end{aligned} \tag{9}$$

I assume that subscripts for firms (i) and quarters (t) are understood.

The regression model relies on p-values that account for the two dimensions (banks and quarters) of within-cluster correlation (Petersen 2009).

Risk is *risk-weighted assets over total assets: ([A223] over [2170])*. *Size* is the natural log of one dollar plus the value of *total assets [2710]* in thousands of dollars. *Tier 2 LLA* is *allowance for loan and lease losses includible in Tier 2 capital [5310]*.

Funding gap is the difference between loans and deposits, where the former is *loans and leases net of unearned income and allowance [B529] and [2125]* and *loans and leases held for sale [5369]*; and the latter is the sum of *interest-bearing* and *noninterest-bearing deposits [6631]* and *[6636]*. *ROA* is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*. *Liquid assets* is *cash and balances due from depository institutions [0010]*.

Credit is a measure for the business cycle. It is the aggregate change in the value of *loans* of all sample banks relative to the value of *total assets* of the sample banks. The change is measured over the period of a year (four quarters). Note that the change in supervisory threshold for submitting the FR Y-9C reports requires the use of an indicator variable for observations of 2006 as well as one for the years after 2006. *District* is an indicator variable for the 12 Federal Reserve Districts, where coefficient values are relative to the first district: Boston.

I use control variables as follows. *Size* may in itself be an inverse measure of risk (Banz 1981, Fama and French 1992). However, for financial intermediaries, size may also be seen as a determinant of failure, which is in line with Bhagat et al. (2012), who show that size is a prime driver of risk. Given the ambiguity regarding the effects of size and risk, I separately control for each of these two factors.

Risky banks may need additional capital to absorb losses. This can be done, for example, by issuing hybrid instruments. In addition, risky banks may want to avoid relying on items that do not absorb losses; they therefore may avoid deductions in order to augment capital. I therefore expect a positive coefficient on risk.

Size may affect the use of regulatory adjustments in different ways. For example, larger banks have relatively unproblematic access to investors. They may want to increase capital by issuing relatively inexpensive hybrid securities. The coefficient on size may thus be affected positively by size through additions to Tier 1 capital. Smaller banks may be less complex, and thus may make less use of adjustments.

Tier 2 LLA is negatively related to the bank's probability of continuing as a going concern via the total risk-based capital ratio and, therefore, is expected to be positively associated with the use of capital-increasing adjustments (Ng and Roychowdhury 2011). Conversely, the allowance for loan and lease losses may coincide with incurred losses, which gives rise to deferred tax assets, which are deducted from Tier 1 capital.

Funding gap is expected to increase the internally determined demand for capital requirements, for example, via the Internal Capital Adequacy Assessment Process. Banks with a relatively high funding gap will need to resort to more expensive forms of funding such as capital in the form of hybrid securities. The reliance on nondepositors gives banks an incentive to lower the cost of bankruptcy protection by increasing regulatory capital—where banks prefer issuing inexpensive subordinated debt over equity (Myers and Majluf 1984, Berger 1995). Therefore, I expect a positive relationship between the funding gap and regulatory adjustments.

ROA is a measure of operating performance, which may be positively associated with intangible assets (including goodwill and servicing rights) and negatively associated with deferred tax assets. Furthermore, with stronger investor appetite to invest in subordinated hybrid securities of more profitable firms, *ROA* may be associated with the use of capital-increasing adjustments. Additionally, Berger (1995) and Berger and Bouwman (2013), the latter against a backdrop of mixed evidence on the relationship between capital and performance, document a positive relationship between these two variables.

The relationship between *liquid assets* and deductions may be mechanical. Banks that crystallize unrealized gains by selling available-for-sale securities may hold more cash and therefore may have less to deduct. This implies a positive relationship between liquidity and the expected coefficient on deductions. The effect of liquidity on additions, however, is less clear cut. It may be that higher liquidity is a manifestation of slack, in which case the relationship would be negative (Jensen 1986). However, liquidity is also a sign of resilience; see the liquidity requirements in Basel III (BCBS 2010). This may positively affect investor appetite to invest in hybrid securities.

Credit growth is a measure of the business cycle. I use this control because of the debate about the effects of capital requirements on economic growth (Admati et al. 2013a, DeAngelo and Stulz 2013) and because of research that documents an association between growth and regulatory capital (Laeven and Majnoni 2003).

To control for differences in supervision approaches regarding regulatory adjustments, I employ indicator variables for Federal Reserve Regulatory Districts 2–12.[6]

2.3 Sample Selection

I use quarterly data from US bank holding companies submitted on report FR Y-9C to the Federal Reserve System. I include only those entities with a Bank Holding Company charter, i.e., where item [9331] has value 28 and item [9048] has value 500.

[6]For the designations of districts, see www.federalreserve.gov/otherfrb.htm.

The starting point of the sample is 2001, because of the availability of data for the variables of interest. Furthermore, from 2001 onward, the reporting schedule for regulatory capital on FR Y-9C retained its current structure with only minor changes to the items included. The sample includes observations of banks up to and including June 30, 2013.

I exclude observations from banks with year-ends other than December 31. To control for outliers, observations in the highest and lowest percentile of variables affected are eliminated from the sample.

The main sample contains 62,756 quarterly observations, with the number of banks varying from 2,096 in 2005 to 773 in 2007. The primary cause of the drop in the number of banks after 2005 is a change in the filing requirements for bank holding companies: In 2006, the threshold for filing a FR Y-9C report changed from $150 million of total assets to $500 million of total assets (Federal Reserve 2006).

3. RESULTS

3.1 Descriptive Statistics

Tables 2 and 3 present the sample descriptives. All figures are from US bank holding companies reported on FR Y-9C. Table 2 presents descriptives over time. Table 3 presents pooled sample descriptives of the main variables used in the regression analyses.

Descriptives over time

Table 2 shows information for the fiscal year-ends of 2001–2012 and the second quarter of 2013. Except for the obvious items and those that are preceded by "Total" (which are expressed in millions of dollars), all items are standardized by *average total assets*.

[Table 2 and Table 3 about here]

The solvency ratios (*equity*, *Tier 1 capital*, and *total risk-based capital*) all increase over time. *Equity* solvency increases by 90 bp from 8.92% to 9.82%, with a fairly steep increase

after 2008. This may indicate an anticipation of regulators' efforts to increase regulatory capital ratios. Likewise, *Tier 1 over average total assets* increases from 8.63% to 9.79%.

The first measure of adjustment (*Tier 1 minus equity*) peaks in 2005. For 2001–2003, 2007, and from 2011 onward, the adjustments are negative, acting as deductions—thus depressing the Tier 1 leverage ratio.

Regulatory capital, or *total risk-based capital*, drops to a low of 12.73% in 2008 because of the global financial crisis. However, from then onward, it increases steadily.

The variables that reflect size (*total equity* and *total assets*) increase over the sample period. The increase in these values after 2005 reflects the change in the filing threshold for report FR Y-9C in 2006. This change in the filing threshold warrants further investigation (see Section 4).

ROA reflects the decreasing performance of bank holding companies in the sample. It drops from 1.36% to a low of -0.37% in 2009 and thus does not return to precrisis levels. The observation (0.54%) for 2013 reflects the inclusion of only the first two quarters in the research sample.

Regarding *disallowed goodwill and other disallowed intangible assets*, this deduction peaks in 2007, at the start of the global financial crisis. From then onward, it reverts steadily.

The *net unrealized gains (losses) on available-for-sale securities* is the amount of net unrealized gains and losses on available-for-sale securities. This net adjustment peaks in 2005, reflecting a dominance of unrealized gains for this year. The entry for 2013 is positive, indicating the return of unrealized gains.

"Core Elemts & Trups" are *qualifying restricted core capital elements (other than cumulative perpetual preferred stock)* and *qualifying trust-preferred securities*, which are nonaccounting-based adjustments: They reflect the issuance of Tier 1 eligible hybrid securities. The issuance

of these securities peaks before the global financial crisis, and then declines, perhaps because banks anticipate the more stringent Basel III rules for these securities.

The funding gap peaks during the onset of the crisis at values immediately below -6%. This variable is driven by a drop in the amount of deposits and an increase in the value of loans—which comprises *loans and leases net of unearned income and allowance* and *loans and leases held for sale*.

Disallowed deferred tax assets show a predictable increase after 2008, and despite an upturn in the business cycle, have continued to increase since then.

Descriptives of pooled data

Table 3 shows descriptives of the main regression variables. The information uses data from all quarters over the period 2001Q1–2013Q2. It shows that regulatory adjustments generally depress book equity. My main variable of interest, *Tier 1 minus equity*, has a mean (median) value of -5 bp (-11 bp) over average total assets. These values are close to zero and relatively small compared with the range, which is -443 bp to 311 bp.

The distributions of the aggregated additions and aggregated deductions are similar: Their means are 79 bp and -85 bp, respectively; the maximum of additions is 569 bp, and the largest deduction is 589 bp.

The next two rows of Table 3 confirm that the distribution of equity solvency is less leptokurtic than the distribution of Tier 1 capital solvency. The medians of both solvency measures are similar (9.03% and 8.98%). However, the values at percentiles 5 and 25 of Tier 1 capital are higher than equity. Likewise, the values of Tier 1 capital at percentiles 75 and 95 are below equity.

Both measures of solvency range from about 2% to about 20%—the range over which equation (6) would reflect the hyperbolic relationship between regulatory adjustments and bank solvency.

According to the solvency benchmarks of 12 CFR 225 (2012), the sample contains no banks that are critically undercapitalized, e.g., values of book equity over total assets are more than 2%. The maximum value of the reciprocal of solvency ($\frac{1}{S}$) is 43.1.

The next row shows the net sum of adjustments. This net sum is the sum of the use of regulatory adjustments mentioned in Table 1: Each positive adjustment increases the net sum by 1, and each negative adjustment decreases the net sum. On average banks rely on one (net) deduction.

The distribution for *net unrealized gains (losses) on available-for-sale securities* spans a range between -470 bp and 389 bp. This is wider than an interquartile range of 28 bp, thus indicating that this item may be important for a limited set of banks.

The size distribution shows a strong increase in size in the top 5 percentile, which indicates that the market structure of banks is biased toward a limited number of very large banks. This justifies the use of variables standardized for average total assets.

Risk, measured as risk-weighted assets over total assets, has an average and median value of 0.72, with 90% of the observations ranging between 0.52 and 0.89.

Although the time series of ROA are relatively stable, the pooled information ranges from -15.7% to 8.43%.

The variables *liquid assets* and *credit growth* are 4.96 and 2.57 (means), respectively, with a maximum of 61.27 for liquid assets, and a minimum of -21.3 for credit growth.

Figures 3 and 4 illustrate the distribution of both solvency measures. Figure 3 plots the distribution of Tier 1 capital and book equity. Both variables are divided by total assets. The distributions therefore illustrate solvency ratios using two different numerators: book equity and Tier 1 capital.

Figure 4 plots the effect of regulatory adjustments for deciles of solvency. The solid circles show the effect of the aggregate regulatory adjustments on Tier 1 capital, expressed in basis

points of total assets. The triangles (diamonds) show the effect of regulatory adjustments that increase (decrease) Tier 1 capital relative to book equity.

[Figures 3 and 4 about here]

If the adjustments were only deductions, then the Tier 1 distribution would be a copy of the distribution of equity, but shifted to the left. Likewise, if adjustments were only additions, then the Tier 1 distribution would be shifted to the right of the distribution of equity. Instead, the distribution of Tier 1 capital is more leptokurtic than the distribution of equity. Figure 4 shows why: Positive (negative) adjustments are to be found at banks with low (high) solvency ratios.

3.2 Results of Tier 1 Minus Equity

Figure 5 summarizes the main results. The graphs use the coefficient estimates of the univariate regressions for four measures of adjustments. The first is the difference between Tier 1 capital and total bank holding-company equity capital—standardized for average total assets (*Tier 1 minus equity*). The second graph only tracks additions to equity, and the third graph only tracks deductions from equity. The fourth graph tracks the effects of the adjustments for unrealized gains and losses.

In the following, I discuss each of these regulatory adjustments.

[Figure 5 about here]

Table 4 presents the regression results, using the first measure of adjustments: the difference between *Tier 1 capital* and *total bank holding-company equity capital*, both standardized for *average total assets*. The coefficients are all expressed in basis points, i.e., multiplied by $10,000$. The p-values account for the two dimensions (banks (i) and quarters (t)) of within-cluster correlation (Petersen 2009).

[Table 4 about here]

The univariate regression in Table 4 shows a positive slope coefficient of 16.6 and an intercept coefficient of -204 bp. As expected, the p-values indicate the significance of both coefficients.

The coefficient of 16.6 on $\frac{1}{S}$ should be read as follows. At a book equity solvency ratio of 4%, the 16.6 bp should be divided by 4% to calculate the amount of basis points the Tier 1 capital increases relative to average total assets: 404 bp $(0.00166/0.04 = 0.0414)$. At a book solvency ratio of 5%, the increase is 331 bp, and at 10%, it is 166 bp. These values are offset by a negative intercept. In the case of the univariate regression of Table 4, the offset is -204 bp. The value of regulatory adjustments can thus be determined at any level of solvency in a straightforward way.

The coefficient of variation of 0.24 and the p-value of zero for the F-statistic confirm the model's significance and its ability to explain variation in regulatory adjustments.

The multivariate regression model results confirm the univariate results, and the value of the slope coefficient (16.0) is close to that of the univariate model. Regarding the control variables, the coefficient on risk is significant and confirms my expectation that riskier banks rely on regulatory adjustments to augment capital.

The coefficient on size shows that larger banks have more regulatory adjustments that decrease Tier 1 capital. The next section of this paper examines the underlying drivers of this coefficient.

The positive sign of the *allowance for loan and lease losses includible in Tier 2 capital* indicates, albeit with a p-value of 0.22, that banks that use this allowance report positive regulatory adjustments.

The coefficient for the funding gap is positive, albeit with a p-value of 0.03. This indicates that banks may augment Tier 1 capital for funding reasons. This supports the result obtained by Berger (1995) that banks use elevated levels of capital to substitute funding alternatives for forgone depositor funding.

The positive coefficient on ROA indicates that banks that perform well appear to use regulatory adjustments to improve Tier 1 capital, although this result is only marginally significant.

Liquid assets are positively associated with regulatory adjustments, thus confirming the notion that liquid assets can be converted into assets that are subject to deduction rules.

The coefficients on credit growth are insignificant and inconsistent. These results therefore do not support an association between regulatory capital and the business cycle.

The evidence for a relationship between regulatory adjustments and the Federal Districts is mixed, and the coefficients are insignificant.

3.3 Results of the Analysis of Additions and Deductions

Table 5 presents the regression results for the second measure of adjustments: adjustments applied to equity, split between additions and deductions. These are the separately summed deductions and additions listed in Table 1. Note that the two measures include the amounts that a symmetric adjustment adds to (deducts from) Tier 1.

[Table 5 about here]

The results of the univariate regressions confirm the results reported in the previous table. The slope coefficient on $\frac{1}{S}$ is positive and significant for the additions (9.11) and for the deductions (5.43). The intercepts are negative: -30.5 and -150, and both are significant. The coefficients generate the top and bottom curves of Figure 5.

Both slope coefficient values are lower than the slope coefficient value of that reported in Table 4. Figure 5 explains why. It shows that the curves for additions and deductions are less steep than the *Tier 1 minus equity* curve. The top of the additions curve touches the top of the *Tier 1 minus equity* curve. Likewise, the minimum of the deductions curve coincides with the minimum of the *Tier 1 minus equity* curve.

The results of the multivariate regression model confirm the univariate results. The slope coefficients on $\frac{1}{S}$ drop slightly to 8.42 and 5.42 (from 9.11 and 5.43), remaining positive and significant, and thus confirming my expectations. The F-statistics confirm the model's significance for both univariate models.

The coefficient on risk is positive and significant throughout. This confirms my expectation that riskier banks augment Tier 1 capital by issuing hybrids and by avoiding deductions.

The positive coefficient on size for additions, with a p-value of 0.00, shows that large banks can more easily access the market for hybrid instruments. The negative coefficient on size, for deductions, shows that larger banks have more to deduct. This may be a manifestation of the fact that larger banks are more complex and consequently engage in more activities that give rise to deductions.

The significantly positive value of 2,664 on the allowance for loan and lease losses indicates that banks that use the allowance rely on items that increase Tier 1 capital. This is likely a manifestation of risk. The negative value of $-1,324$ for deductions appears to indicate that banks that use the allowance are loss-making and may deduct deferred tax assets. However, the p-value of 0.18 weakens the support for conclusive inferences.

The coefficient for the funding gap is positive for both additions and deductions, albeit that the coefficient for the latter is insignificant. To augment Tier 1 capital, banks with a larger funding gap rely on adding items to Tier 1 capital.

ROA is significant only for the deductions, which indicates that well-performing banks deduct less. The significantly positive coefficient (576) is mainly the result of noninterest income: Untabulated results show that net interest income is not significantly associated with regulatory adjustments. One explanation for the positive and significant coefficient on ROA is that it indicates the presence of nonbanking activities, which may give rise to less deductions.

Regarding the relationship between liquid assets and deductions, as predicted, the ability to convert assets subject to deduction requirements into cash drives the positive and significant

coefficient value of liquid assets. The negative sign of additions may be a manifestation of slack, thus confirming Jensen (1986).

The credit growth coefficients on deductions are not always significant and have opposite signs, which indicates that there is no consistent association between the economic cycle and regulatory adjustments. Comparing this result with that of Laeven and Majnoni (2003)—who show an association between the allowance for loan and lease losses includible in Tier 2 capital and the economic cycle—reveals that Tier 1 and Tier 2 capital differ.

The coefficients on the Federal Districts indicate that banks with items that increase Tier 1 capital are concentrated in particular in these districts: Richmond, St. Louis, Minneapolis, Kansas City, and Dallas. Banks in the district of Minneapolis appear to offset the additions by significant deductions. The district of Richmond, which hosts large banks based in North Carolina, appears not to offset additions. This may indicate the influence of large banks on supervision policy, although this inference should be interpreted with great care.

3.4 Results for Net Unrealized Gains (Losses) on Available-for-Sale Securities

Table 6 presents the regression results for the third measure of adjustments: the net unrealized gains (losses) on available-for-sale securities. The results of the univariate regressions confirm the results reported in the previous tables. Note that the dependent variable (net unrealized gains (losses) on available-for-sale securities, a deduction) is multiplied by -1 to maintain consistency between the interpretation of coefficients and the previous tables.

[Table 6 about here]

The slope coefficient on $\frac{1}{S}$ is positive (2.03) and significant, and the intercept is also significant: -35.3. Both coefficients produce the graph closest to the horizontal axis of Figure 5. Here again the relationship between the regulatory adjustments and solvency is apparent, although the magnitude of the effect on the Tier 1 leverage ratio is less profound than that of the two other measures of regulatory adjustments. This result may put into perspective the

relevance of the policy debate on the inclusion of unrealized gains and losses. The F-statistic confirms the model's significance.

The graph in Figure 5 shows that thinly capitalized banks, i.e., those with very low solvency ratios, benefit from the symmetrical filter of net unrealized gains (losses) on available-for-sale securities, thus confirming criticism from academics and regulators on this symmetrical filter.

The multivariate analysis confirms the univariate results. Risk remains consistently positive and significant. The coefficient on the allowance for loan and lease losses includible in Tier 2 capital is negative and significant as well. Banks that use the allowance for loan and lease losses apparently also report high levels of unrealized gains. Combined with the coefficient on risk, these are indications of poor resilience.

4. ROBUSTNESS TESTS

To assess the robustness of the results of this study, I performed additional tests. For example, I used alternative different model specifications for the main regression model. A model that uses the negative log of equity over average total assets leads to the same inferences, with the coefficient equity over average total assets being negative (-236) and significant (p-value of 0.00), and with a negative intercept (-581) that is also significant (p-value of 0.00). However, this pair of coefficients overestimates the deductions at higher solvency levels; for example, at the 20% mark in the graph, the log model would estimate the effect of deductions at -201 bp, whereas Figure 4 shows a maximum deduction effect of about -100 bp. This result justifies the use of $\frac{1}{S}$ as the main regressor in my analyses.

A quadratic function leads to the same inferences, that is, for solvency ratios below 20%. The predicted monotonic decline stops beyond this level of solvency. The upward slope of the adjustments curve beyond this percentage is difficult to explain: There is no *a priori* reason to expect highly solvent banks to deduct less from equity. Although Figure 4 may show a slight upturn for banks in the rightmost decile, the upturn is in fact less dramatic than appears in

the figure, because it is driven by a limited number of highly solvent banks. Moreover, the additions also drop off at high levels of solvency.

Note that the regulatory adjustments are small in comparison with solvency. For example, the maximum effect of absolute regulatory adjustments is 443 bp of average total assets, with 90% of observations between [−235 bp, 211 bp] of average total assets. This precludes a potential mechanical explanation.

To illustrate the mechanical explanation, consider two banks, G and L, which have the same book equity and Tier 1 leverage ratio at $t = 0$. In period $t = 1$, G makes a gain, and L makes a corresponding loss, both of which must be adjusted for to arrive at Tier 1 capital. When the adjustments are made, they will both have the same Tier 1 capital, but G's book equity will be larger than that of bank L. G's adjustment will be negative, and L's will be positive. This will show as a negative relationship between adjustments and book equity capital: those with smaller equity making positive adjustments and those with larger equity making negative ones.

I performed two tests to assess this alternative explanation. First, I split the sample into banks of type G and L, and then into a second split based on above- and below-average solvency. The mechanical explanation should hold for high-solvency type-G banks and low-solvency type-L banks. However, untabulated results show that the decreasing relationship between regulatory adjustments and solvency holds for both types of banks irrespective of solvency.

As a second test, I counted the use of adjustments. This is a relatively robust test, in which I expected that low-solvency banks would use more capital-increasing adjustments and that high-solvency banks would be affected by more capital-decreasing adjustments.

[Table 7 about here]

Table 7 reports the result of this analysis. The table uses as the dependent variable the net sum of regulatory adjustments employed by a bank. The net sum is the sum of the use of regulatory adjustments mentioned in Table 1: Each positive adjustment increases the net sum by 1, and each negative adjustment decreases the net sum. Table 7 reports the results of regressions in which the net sum excludes symmetric adjustments (the left-hand columns). The right-hand columns include these adjustments: Positive (negative) symmetric adjustments increase (decrease) the net sum.

The count data analysis confirms my expectations: The coefficients on $\frac{1}{S}$ are all significant and positive. All intercepts are significant and negative. Low-solvency banks rely on additions, and high-solvency banks are affected relatively strongly by deductions. Note that I repeated the count data analysis with ordered logistic regressions. This led to the same inferences. The results of both tests preclude a mechanical explanation.

Given that the results rely on panel data, I estimated the relationship between regulatory adjustments and solvency with bank fixed effects and robust standard errors. The results of these analyses do not alter the inferences.

I also examined the effect of the 2006 change in the threshold for filing a FR Y-9C report. Banks may have anticipated this change and, consequently, may have changed the use of regulatory adjustments. To test this effect, I marked all banks in 2005 that, because of the change in the threshold, did not file a FR Y-9C report during 2006. The 1,292 banks that were marked as such are largely similar to the 804 banks that would file in 2006. For example, equity solvency medians are 8.47% (8.56%) for the filing (nonfiling) banks. Likewise, Tier 1 capital solvency ratios are 8.57% and 9.01%, respectively. Again, equity solvency is less leptokurtic than the distribution of Tier 1 capital solvency. The 5th (95th) percentile value of the latter is 88 bp (42 bp) higher (lower) than the former. The median adjustment of filing (nonfiling) banks augmented Tier 1 capital by 10 bp (12 bp). ROA performance between both groups is also similar: 1.47% for filing banks, and 1.39% for nonfiling banks. Risk is also similar: 0.76 and 0.73, respectively. The groups differ in the amounts added to and deducted

from Tier 1 capital. The median of the additions is 127 bp (21 bp) for the filing (nonfiling) banks. Likewise, for deductions, these values are -46 bp (-8 bp).

These results indicate that the nonfiling banks share the characteristics of smaller banks: restricted access to the market for hybrid securities; and lower complexity, resulting in lower deductions. Otherwise, the characteristics of the two groups of banks are equivalent.

Regression results confirm this inference. The univariate regressions with *Tier 1 minus equity* as the dependent variable report significant slope coefficients: 23.9 (16.5) for the filing (nonfiling) banks. The intercepts are also negative and significant: -276 and -158, respectively.

The results are also independent of being listed or not listed on a stock exchange. Finally, the results are time invariant—the exponentially declining cost of regulatory adjustments is not tied to a specific time period.

5. CONCLUDING REMARKS

For a large sample of US bank holding companies over the period 2001–2013, this paper documents a decreasing relationship between bank solvency and the adjustments that banks must apply to book equity to calculate regulatory Tier 1 capital.

These regulatory adjustments create a difference between regulatory Tier 1 and "accounting capital" or book equity. The adjustments alter both the structure and the level of regulatory capital. The difference between book equity and Tier 1 capital may be substantial. Relative to book equity, the regulatory adjustments increase (decrease) Tier 1 capital up to 311 bp (443 bp) of total assets.

The regulatory adjustments are intended to contribute to the safety and soundness of the banking system, where the ability to absorb losses in going concern is the predominant prudential criterion for including items in regulatory capital. Items that absorb losses should be

included in regulatory capital. For the same reason, items that do not absorb losses, e.g., goodwill and deferred tax assets, are excluded from regulatory capital.

My results show that the regulatory adjustments are unevenly distributed over the sample population. Low-solvency banks appear to benefit from regulatory adjustments: They report values of Tier 1 regulatory capital that exceed book equity. They rely on regulatory adjustments to inflate important regulatory solvency ratios such as the Tier 1 leverage ratio and the Tier 1 risk-based capital ratio.

The low-solvency banks in particular manage the structure of their regulatory capital. They avoid deductions. More importantly, they issue hybrid capital securities that are substitutes for costly common equity and have yet to prove the ability to absorb losses. These low-solvency banks also tend to rely on accounting rules to increase regulatory Tier 1 capital.

This behavior of low-solvency banks reflects the cost of deleveraging. For these banks, issuing equity is unattractive, as shown by Admati et al. (2013b). As a result, these banks rely on regulatory adjustments to increase Tier 1 regulatory capital.

In contrast, the use of capital-increasing regulatory adjustments is less prevalent in highly solvent banks. These banks show a relatively high incidence of regulatory adjustments that decrease Tier 1 regulatory capital relative to book equity.

The relationship between regulatory adjustments and bank solvency is convex. I use Merton (1974) to estimate the decreasing relationship between regulatory adjustments and solvency. The three measures of regulatory adjustments that I employ (Tier 1 minus equity; additions and deductions; and net unrealized gains (losses) on available-for-sale securities) confirm the expected convex relationship between regulatory adjustments and solvency.

My results indicate that bank solvency rules regarding regulatory adjustments are limited in their effective contribution to the safety and soundness of the banking system. In fact, the regulatory adjustments appear to work *against* the safety and soundness of the banking system. Weaker banks are "helped" (or choose to be helped) by rules that allow them to

augment regulatory capital by issuing low-cost equity substitutes. Stronger banks rely less on additions to Tier 1 capital, but suffer from the impact of deductions.

These results weaken the case for regulatory adjustments, particularly if the regulator offers a set of choices that allows banks to use equity substitutes that more than offset the deductions from capital.

Moreover, low-solvency banks avoid deductible items. Provided that the rules governing regulatory adjustments are carefully developed and deter banks from engaging in risky activities, the application of deductions has prudential merits. However, as the description of adjustments in Section 1.2 and the Appendix show, some of the deductions may be the result of a willingness among regulators to conform to the international level playing field. This may or may not take precedence over issues that concern the safety and soundness of the banking system.

New capital rules under Basel III have increased the number of adjustment choices for banks, which may or may not contribute to financial stability. Perhaps the most effective contribution of Basel III to the safety and soundness of the banking system is the requirement to hold more capital than before. This is expected to lower the incentive to avoid deductions, and it may deter banks from adding items to capital that may not be able to absorb losses effectively.

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APPENDIX: CONTROVERSY ON UNREALIZED GAINS AND LOSSES

During the global financial crisis, banks with unrealized losses reported inflated solvency ratios, attracting criticism from academics (e.g., Ball 2008) as well as from bank regulators. In a response to the global financial crisis, bank regulators decided to change the rules with respect to the exclusion of unrealized gains and losses on available-for-sale securities from regulatory capital, although this decision is not set in stone.

The new Basel III bank solvency rules, endorsed by the G20 in November 2010, currently include unrealized gains and losses in regulatory capital (BCBS 2010). However, this is only temporary, and it also depends on the way that countries implement Basel III, because the position of the Basel Committee, and perhaps its members, on this issue is ambiguous. For example, the consultation version of the Basel III rules issued in December 2009 proposes including unrealized gains and unrealized losses on available-for-sale securities in regulatory capital. The Committee motivated this inclusion because exclusion has undermined confidence in Tier 1 capital. However, the same consultation version mentions, in footnote 17, that the treatment of unrealized gains will be reviewed by the Basel Committee during 2010 (BCBS 2009). With this promise to review the treatment of unrealized gains, the Basel Committee may have relied on the November publication of the first phase of the reform of financial securities accounting, IFRS 9 (IASB 2009). This first presentation of IFRS 9 Phase 1 abandons the available-for-sale securities category and related *other comprehensive income* accounts, thus rendering an adjustment for unrealized gains and losses void.

If IFRS 9 had entered into force simultaneously with Basel III on January 1, 2013, as originally envisioned, then this new accounting standard would have rendered the rules on the inclusion of unrealized gains and unrealized losses in regulatory capital irrelevant—initially for IFRS adopters, but with IFRS and US GAAP expected to converge, the United States would have been likely to follow suit.

In December 2010, the Basel Committee published the final text of the Basel III rules with the new definition of regulatory capital (BCBS 2010). No change was made regarding the intention to include unrealized gains and losses in regulatory capital. Neither was there a firm decision on unrealized gains and losses. The Committee vowed to continue to review their appropriate treatment, taking into account the evolution of the accounting framework (footnote 10 of the Basel III rules, BCBS 2010).

The decision of the Committee reflects its awareness of the lack of progress on IFRS 9 and the FASB's position at that time of favoring the valuation of all financial instruments at fair value on the balance sheet, with value changes recognized in other comprehensive income as well as in profit and loss.[7] The accounting standard setters apparently decided to backtrack on the elimination of the available-for-sale securities category.

From a prudential point of view, a rule that excludes unrealized *gains* from capital is desirable. To see why, it is important to distinguish between liquid and illiquid securities held for sale. When securities are *liquid*, their unrealized gains can be crystallized by selling. The exclusion of unrealized gains of liquid securities should therefore not pose a problem for banks. If they want to increase regulatory capital, they can sell these securities immediately, and this is particularly the case for equity securities, i.e., shares. However, for *illiquid* securities, the unrealized gains are more uncertain. Augmenting capital by selling these securities is not always a quickly implementable option. For this reason, unrealized gains of illiquid instruments may be excluded from capital.

Regarding the evolution of the accounting framework, in November 2012, the IASB proposed limited changes to IFRS 9 classification and measurement requirements (IASB 2012). One of these limited changes is the introduction of a "fair value through other comprehensive income" measurement category for debt securities that would be based on an entity's business model. Although presented as a limited change, this is a serious departure from the intentions of the plans set out by the IFRS in 2008 to reduce the complexity of accounting for financial instruments (IASB 2008). In aligning the level playing field between the US GAAP and IFRS, the limited changes to IFRS 9 thus add credibility to the intention of the Basel Committee to continue to review the appropriate accounting treatment of unrealized gains.

Regarding developments in the United States, the inclusion of unrealized gains and losses applies only to banks with total assets of over $250 billion (Reuters 2013). These are the largest nine banks, which at the time of the decision (July 2013), all reported positive values for net unrealized gains (losses) on available-for-sale securities, with a total of $26.06 billion.[8] The nine affected banks thus benefit from the inclusion of this item in regulatory capital.

[7] See www.iasplus.com/en/news/2009/September/news5421.

[8] See http://capitalissues.co/2013/07/15/aoci-rule-effects-nine-banks-affected/.

Figure 1. Regulatory Capital on FR Y-9C, Bank of America Corporation, 30 June 2013 (Tier 1).

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Schedule HC-R—Regulatory Capital

This schedule is to be submitted on a consolidated basis.

Dollar Amounts in Thousands			
Tier 1 Capital			
1. Total bank holding company equity capital (from Schedule HC, item 27.a)	3210	231032000	1.
2. LESS: Net unrealized gains (losses) on available-for-sale securities[1] (if a gain, report as a positive value; if a loss, report as a negative value)	BHCK 8434	-234000	2.
3. LESS: Net unrealized loss on available-for-sale equity securities[1] (report loss as a positive value)	A221	0	3.
4. LESS: Accumulated net gains (losses) on cash flow hedges[1] and amounts recorded in AOCI resulting from the initial and subsequent application of FASB ASC 715-20 (former FASB statement No. 158) to defined benefit postretirement plans (if a gain, report as a positive value; if a loss, report as a negative value)	4336	-7009000	4.
5. LESS: Nonqualifying perpetual preferred stock	B588	2918000	5.
6. a. Qualifying Class A noncontrolling (minority) interests in consolidated subsidiaries	G214	0	6.a.
b. Qualifying restricted core capital elements (other than cumulative perpetual preferred stock)[2]	G215	5846000	6.b.
c. Qualifying mandatory convertible preferred securities of internationally active bank holding companies	G216	0	6.c.
7. a. LESS: Disallowed goodwill and other disallowed intangible assets	B590	72255000	7.a.
b. LESS: Cumulative change in fair value of all financial liabilities accounted for under a fair value option that is included in retained earnings and is attributable to changes in the bank holding company's own creditworthiness (If a net gain, report as a positive value; If a net loss, report as a negative value.)	F264	-4133000	7.b.
8. Subtotal (sum of items 1, 6.a., 6.b., and 6.c., less items 2, 3, 4, 5, 7.a, and 7.b)	C227	173081000	8.
9. a. LESS: Disallowed servicing assets and purchased credit card relationships	B591	587000	9.a.
b. LESS: Disallowed deferred tax assets	5610	15656000	9.b.
10. Other additions to (deductions from) Tier 1 capital	B592	-149000	10.
11. Tier 1 capital (sum of items 8 and 10, less items 9.a and 9.b)	8274	156689000	11.
	BHCK	Percentage	
Capital Ratios			
31. Tier 1 leverage ratio (item 11 divided by item 27)	7204	7.49	31.
32. Tier 1 risk-based capital ratio (item 11 divided by item 62)	7206	12.16	32.
33. Total risk-based capital ratio (item 21 divided by item 62)	7205	15.27	33.

1. Report amount included in Schedule HC, item 26.b, "Accumulated other comprehensive income (AOCI)."
2. Includes subordinated notes payable to unconsolidated trusts issuing trust preferred securities net of the bank holding company's investment in the trust, trust preferred securities issued by consolidated special purpose entities, and Class B and Class C noncontrolling (minority) interests that qualify as Tier 1 capital.

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Figure 2. The Cost of Deleveraging.

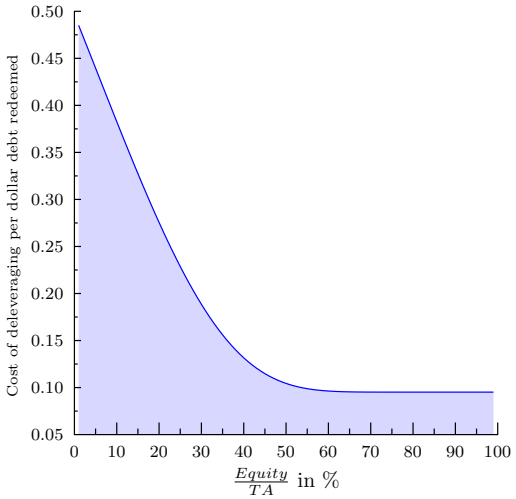

Figure 3. Distribution of two solvency metrics.

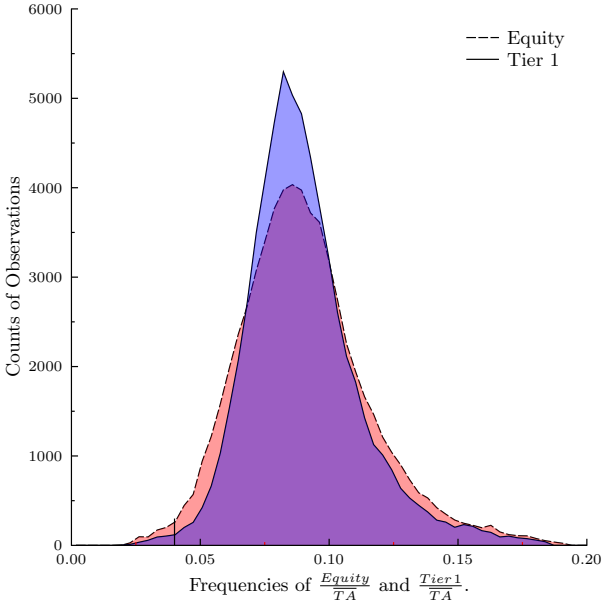

Figure 4. Regulatory adjustments plotted against bank solvency.

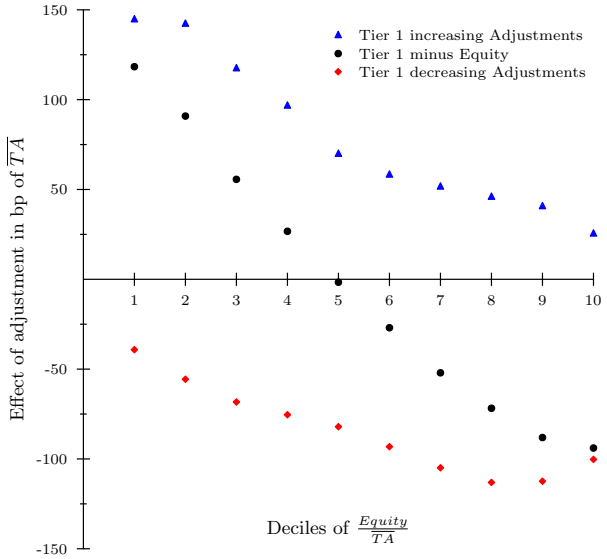

Figure 5. Estimated values of regulatory adjustments.

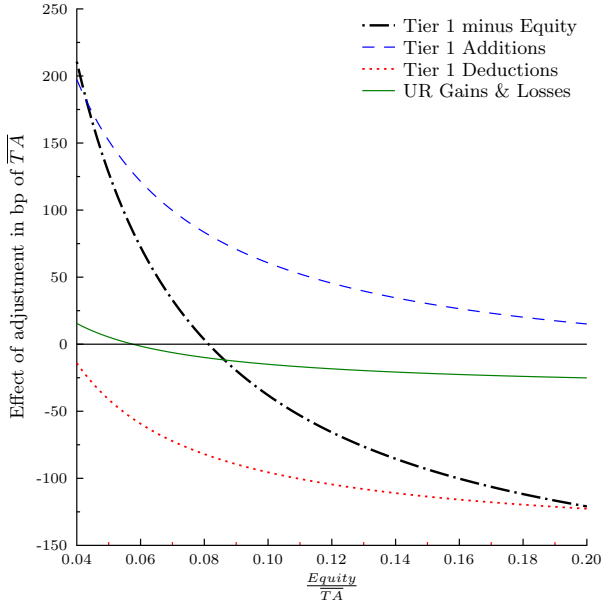

TABLE 1
REGULATORY ADJUSTMENTS APPLIED TO TIER 1 CAPITAL, 2001–2013.

Description	Period	Effect	Value in bp	Value if item $\neq 0$
Qualifying trust-preferred securities [C502]	2004–2008	Addition	95	176
Qualifying restricted core capital elements (other than cumulative perpetual preferred stock) [G215]	2009–2013	Addition	92	150
Qualifying mandatory convertible preferred securities of internationally active bank holding companies [G216]	2009–2013	Addition	0	118
Nonqualifying perpetual preferred stock [B588]	2001–2013	Deduction	0	–71
Disallowed goodwill and other disallowed intangible assets [B590]	2001–2013	Deduction	–72	–104
Disallowed servicing assets and purchased credit card relationships [B591]	2001–2013	Deduction	–1	–3
Qualifying Class A noncontrolling (minority) interests in consolidated subsidiaries [G214] [B589]	2001–2013	Addition	22	115
Disallowed deferred tax assets [5610]	2001–2013	Deduction	–5	–50
net unrealized gains (losses) on available-for-sale securities [8434]	2001–2013	Symmetric, neutralized	–9	–9
Net unrealized loss on available-for-sale equity securities [A221]	2001–2013	Loss is deducted	–1	–4
Cumulative change in fair value of all financial liabilities accounted for under a fair value option that is included in retained earnings and is attributable to changes in the bank holding company's own creditworthiness [F246]	2007–2013	Symmetric, neutralized	0	–6
Accumulated net gains (losses) on cash flow hedges [4336] and, from year-end of 2012 on: amounts recorded in AOCI resulting from the initial and subsequent application of FASB ASC 715-20 (former FASB statement No. 158) to defined benefit postretirement plans	2001–2013	Symmetric, neutralized	–2	–14
Other additions to (deductions from) Tier 1 capital [B592]	2001–2013	Symmetric	0	13

NOTES: Regulatory adjustments for US bank holding companies covering the quarters 2001Q1–2013Q2. *Additions* increase, and *Deductions* decrease *Tier 1 capital [8274]* relative to book equity: *total bank holding-company equity capital [3210]*. A *Symmetric* adjustment adds to and deducts from Tier 1 capital. *Neutralized* means the adjustment renders a fair valued item into accounting cost. *Value in bp* is the average annual year-end value of the adjustment expressed in bp of the *average total assets [3368]*. *Value if item $\neq 0$* excludes quarterly values where a bank holding company reports nil for an item. Source of the definitions is: www.federalreserve.gov/apps/reportforms. All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm).

TABLE 2
DESCRIPTIVE STATISTICS OF US BANK HOLDING COMPANIES ON REPORT FR Y-9C OVER TIME.

Year	$\frac{Equity}{A}$ %	$\frac{Tier\ 1}{A}$ %	*Tier 1 minus Equity (bp)*	*Reg Capital %*	*Total Equity*	*Total Assets*	*ROA%*	*Banks*
2001	8.92	8.63	-28.4	14.08	342	4,218	1.36	1,724
2002	9.06	8.75	-31.5	14.37	347	4,147	1.45	1,853
2003	8.98	8.98	-0.67	14.69	351	4,305	1.43	1,983
2004	8.94	9.09	15.3	14.48	433	4,918	1.38	2,092
2005	8.82	9.24	41.8	14.36	402	4,877	1.43	2,096
2006	8.79	8.90	11.2	13.24	1,065	12,702	1.43	778
2007	8.80	8.77	-3.07	12.83	1,026	13,325	1.12	773
2008	8.52	8.58	6.24	12.73	1,209	13,676	0.04	786
2009	8.59	8.65	5.63	13.67	1,283	14,181	-0.37	819
2010	8.94	9.01	6.97	14.95	1,347	14,207	0.31	822
2011	9.63	9.43	-19.9	15.82	1,371	13,875	0.66	839
2012	9.95	9.65	-30.4	16.00	1,467	14,146	0.95	845
2013	9.82	9.79	-1.70	15.99	1,483	13,898	0.54	841

Year	*Disallowed Goodwill (bp)*	*Sym Adj AFS (bp)*	*Core Elemts & Trups (bp)*	*Loans %*	*Funding Gap %*	*Disallowed DTA (bp)*	*Credit Growth (%)*	*Quarters*
2001	-48.1	-16.3		65.3	-16.5	-1.42	-0.62	6,720
2002	-49.9	-34.8		64.9	-16.8	-1.23	4.04	7,189
2003	-51.0	-16.9		64.8	-16.4	-1.17	5.16	7,760
2004	-56.7	-4.99		66.8	-14.0	-1.33	10.7	8,202
2005	-57.8	15.7	82.7	68.1	-13.3	-1.37	2.41	8,427
2006	-107	7.32	111	70.1	-8.64	-1.82	-16.9	3,073
2007	-113	-1.15	111	71.6	-6.11	-1.87		3,108
2008	-101	3.97	105	71.8	-6.23	-5.98	0.51	3,168
2009	-82.5	-6.75	97.1	67.0	-12.4	-9.58	-3.80	3,321
2010	-80.4	-3.44	94.9	63.8	-16.4	-12.5	-0.02	3,335
2011	-78.5	-28.4	88.3	62.4	-19.3	-12.2	0.41	3,346
2012	-77.4	-33.0	82.3	62.8	-20.4	-12.4	2.32	3,413
2013	-72.6	7.26	75.3	62.5	-19.3	-15.4	0.84	1,694

NOTES: The table reports mean values at the end of fiscal year (Q4) for the years 2001–2012 and for June 30 (Q2) of 2013. Except for *Banks* and *Quarters* and the items that are preceded by '*Total*' (which are expressed in $ millions), all items are standardized by *average total assets [3368]*, or *A*. *Equity* and *Total Equity* are *total bank holding-company equity capital [3210]*, *Tier 1* is *Tier 1 capital [8274]*, *Reg Capital* is *Total risk-based capital [3792]*, *Total Assets* is *average total assets [3368]*, ROA is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*. *Banks* is the number of sample banks at year-end, as well as at end of Q2 of 2013. *Disallowed Goodwill* is *Disallowed goodwill and other disallowed intangible assets [B590]*, *Sym Adj AFS* is *net unrealized gains (losses) on available-for-sale securities [8434]*, where positive (negative) values indicate unrealized gains (losses). *Core Elem. & Trups* is *Qualifying restricted core capital elements (other than cumulative perpetual preferred stock) [G215]* for the years 2009–2013, and, for the years 2004–2008: *Qualifying trust-preferred securities [C502]*. *Loans* is *Loans and leases net of unearned income and allowance [B529] [2125]* and *Loans and leases held for sale [5369]*, *Funding gap* is the difference between loans and deposits, where deposits is the sum of *interest bearing* and *non-interest bearing deposits [6631] and [6636]*. *Disallowed DTA* is *Disallowed deferred tax assets [5610]*, *Credit growth* or *Credit* is the aggregate change in the value of *Loans* of all sample banks relative to the value of *total assets* of the sample banks over four quarters, and *Quarters* is the number of quarterly bank observations. All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm).

TABLE 3
DESCRIPTIVE STATISTICS OF POOLED DATA.

	Mean	Min.	$p5$	$p25$	Median	$p75$	$p95$	Max.
Tier 1 minus Equity (bp)	-5	-443	-235	-72	-11	83	211	311
Additions (bp)	79	0	0	0	21	165	242	569
Deductions (bp)	-85	-589	-307	-119	-46	-11	0	0
$\frac{\text{Equity}}{\overline{A}}$ (%)	9.03	2.32	5.37	7.36	8.80	10.39	13.63	19.20
$\frac{\text{Tier 1}}{\overline{A}}$ (%)	8.98	1.96	5.99	7.60	8.71	10.04	13.02	18.42
$\frac{1}{S}$	12.0	5.2	7.3	9.6	11.4	13.6	18.6	43.1
Net use of adjustments (Incl.)	-0.84	-6	-3	-2	-1	0	1	4
Sym Adj AFS (bp)	-11	-470	-66	-24	-6	4	33	389
Funding Gap (%)	-14.5	-97.9	-39.9	-23.3	-13.5	-5.0	6.9	91.2
Tier 2 LLA (bp)	81	0	46	70	83	94	108	270
Total Assets ($m)	8,061	95	170	276	592	1,165	8,837	2,520,000
Risk	0.72	0.16	0.52	0.65	0.72	0.79	0.89	1.00
ROA (%)	1.11	-15.7	-0.71	0.80	1.28	1.67	2.34	8.43
Liquid assets (%)	4.69	0.02	1.48	2.49	3.55	5.34	11.8	61.3
Credit (%)	2.57	-21.3	-4.0	0.48	3.01	6.22	10.7	11.0

NOTES: The table reports statistics for US bank holding companies over quarters 2001Q1–2013Q2, for 62,756 observations. *pn* refers to percentile *n* values. *Tier 1 minus Equity* is Tier 1 capital [8274] less total bank holding-company equity capital [3210] in basis points of average total assets [3368], where $\overline{A}$ denotes the latter. *Additions (Deductions)* are the aggregate values of items that Table 1 identifies as Addition (Deduction), including the positive (negative) amounts of the Symmetric items. $\frac{1}{S}$ is the reciprocal of solvency: *Average total assets* over *total bank holding-company equity capital*. *Tier 1* is Tier 1 capital [8274]. *Net use of adjustments* is the sum of the use of adjustments mentioned in Table 1: positive adjustments increase the net sum, negative adjustments decrease the net sum; symmetric adjustments are included. *Sym Adj AFS* is net unrealized gains (losses) on available-for-sale securities [8434] in basis points of $\overline{A}$. *Funding gap* is the difference between loans and deposits, as a % of $\overline{A}$, where loans is Loans and leases net of unearned income and allowance [B529 and 2125] and Loans and leases held for sale [5369]; deposits is the sum of interest bearing and non-interest bearing deposits [6631 and 6636]. *Tier 2 LLA* is the allowance for loan and lease losses includible in Tier 2 capital [5310] in basis points of $\overline{A}$. *Total Assets* is average total assets [3368] in millions of dollars. *Risk* is *risk-weighted assets over total assets: ([A223] over [2170])*. *ROA* is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*, measured at year-end. *Liquid assets* is cash and balances due from depository institutions [0010] as a % of $\overline{A}$. *Credit*, or credit growth is the aggregate change in the value of Loans of all sample banks relative to the aggregate value of $\overline{A}$ of the sample banks. The change is measured over the period of a year (four quarters). All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm).

TABLE 4
ESTIMATION OF THE VALUE OF REGULATORY ADJUSTMENTS: TIER 1 MINUS EQUITY.

	β	*p*	β	*p*
$\frac{1}{S}$	16.6	0.00	16.0	0.00
Risk			159	0.00
Size			-22.9	0.00
Tier 2 LLA			1,404	0.22
Funding Gap			33.9	0.03
ROA			527	0.05
Liquid assets			127	0.00
Credit –2006			19.4	0.84
Credit 2006			-172	0.16
Credit 2007-			187	0.15
New York			23.0	0.06
Philadelphia			7.51	0.51
Cleveland			-15.6	0.13
Richmond			17.7	0.07
Atlanta			7.28	0.43
Chicago			-7.92	0.38
St. Louis			9.92	0.29
Minneapolis			-3.99	0.71
Kansas City			5.21	0.62
Dallas			11.1	0.27
San Francisco			15.3	0.17
Intercept	-204	0.00	-26.4	0.46
Prob > F	0.00		0.00	
$\overline{R}^2$	0.24		0.31	

NOTES: This table shows regression results of regulatory adjustments (Δ) for US bank holding companies over the quarters covering 2001Q1–2013Q2, for 62,756 quarterly observations. The dependent variable is the difference between *Tier 1 capital* and *total bank holding-company equity capital*; both standardized for *Average total assets*.

$$
\begin{aligned}
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \varepsilon_{i,t} \\
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \beta_2 Risk_{i,t} + \beta_3 Size_{i,t} + \beta_4 Tier\ 2\ LLA_{i,t} + \beta_5 Funding\ gap_{i,t} \\
&\quad + \beta_6 ROA_{i,t} + \beta_7 Liquid\ assets_{i,t} + \beta_8 Credit_{i,t} + \beta_9 I_{i,t,2006} \cdot Credit_{i,t} \\
&\quad + \beta_{10} I_{i,t,2007-2013} \cdot Credit_{i,t} + \sum_{j=2}^{12} \beta_{j+9} District_{i,t,j} + \varepsilon
\end{aligned}
$$

The regression model relies on *p*-values that account for the two dimensions (banks (*i*) and quarters (*t*)) of within-cluster correlation (Petersen 2009). *p*-values are one-sided for $\frac{1}{S}$, the intercept, Risk, and the *Funding Gap*. To control for outliers, observations in the highest and lowest percentile of variables affected are eliminated from the sample. $\frac{1}{S}$ is the reciprocal of solvency: *Average total assets* over *total bank holding-company equity capital*. *Risk* is *risk-weighted assets over total assets: ([A223] over [2170])*. *Size* is the natural log of one dollar plus the value of *total assets [2710]* in thousands of dollars. *Tier 2 LLA* is the *allowance for loan and lease losses includible in Tier 2 capital [5310]*. *Funding gap* is the difference between loans and deposits, where the former is *Loans and leases net of unearned income and allowance [B529] [2125]* and *Loans and leases held for sale [5369]*; and the latter is the sum of *interest bearing* and *non-interest bearing deposits [6631] and [6636]*. *ROA* is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*, measured at year-end. *Liquid assets* is *cash and balances due from depository institutions [0010]*. *Credit*, or *credit growth* is the aggregate change in the value of *Loans* of all sample banks relative to the aggregate value of *total assets* of the sample banks. The change is measured over the period of a year (four quarters). The change in supervisory threshold for submitting the FR Y-9C reports requires the use of an indicator variable for observations of 2006 as well as one for the years after 2006. *New York–San Francisco* are indicator variables for the 12 Federal Reserve districts, where coefficients are relative to the first district: Boston. All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm)

TABLE 5
SIGNED ADJUSTMENTS APPLIED TO TIER 1 CAPITAL.

	Additions				Deductions			
	β	*p*	β	*p*	β	*p*	β	*p*
$\frac{1}{S}$	9.11	0.00	8.42	0.00	5.43	0.00	5.42	0.00
Risk			59.9	0.00			64.6	0.00
Size			14.5	0.00			-33.5	0.00
Tier 2 LLA			2,664	0.00			-1,324	0.18
Funding Gap			29.7	0.01			6.67	0.62
ROA			-472	0.07			576	0.00
Liquid assets			-80.0	0.01			201	0.00
Credit –2006			-6.23	0.95			58.8	0.11
Credit 2006			-172	0.13			-63.4	0.18
Credit 2007-			377	0.01			-173	0.01
New York			13.2	0.11			10.7	0.33
Philadelphia			11.9	0.15			-6.83	0.53
Cleveland			12.0	0.17			-19.8	0.08
Richmond			27.3	0.00			-10.0	0.29
Atlanta			10.8	0.11			2.64	0.75
Chicago			11.0	0.11			-13.8	0.11
St. Louis			22.6	0.00			-14.0	0.12
Minneapolis			25.2	0.00			-28.6	0.00
Kansas City			27.0	0.00			-22.0	0.02
Dallas			35.5	0.00			-24.3	0.01
San Francisco			17.2	0.03			0.73	0.94
Intercept	-30.5	0.00	-292	0.00	-150	0.00	264	0.00
Prob $> F$	0.00		0.00		0.00		0.00	
$\overline{R}^2$	0.14		0.25		0.04		0.24	

NOTES: This table shows regression results of regulatory adjustments (Δ) for US bank holding companies over the quarters covering 2001Q1–2013Q2, for 62,756 quarterly observations. The dependent variables separately records Additions and Deductions as defined by Table 1.

$$
\begin{aligned}
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \varepsilon_{i,t} \\
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \beta_2 Risk_{i,t} + \beta_3 Size_{i,t} + \beta_4 Tier\ 2\ LLA_{i,t} + \beta_5 Funding\ gap_{i,t} \\
&\quad + \beta_6 ROA_{i,t} + \beta_7 Liquid\ assets_{i,t} + \beta_8 Credit_{i,t} + \beta_9 I_{i,t,2006} \cdot Credit_{i,t} \\
&\quad + \beta_{10} I_{i,t,2007-2013} \cdot Credit_{i,t} + \sum_{j=2}^{12} \beta_{j+9} District_{i,t,j} + \varepsilon
\end{aligned}
$$

The regression model relies on *p*-values that account for the two dimensions (banks (*i*) and quarters (*t*)) of within-cluster correlation (Petersen 2009). *p*-values are one-sided for $\frac{1}{S}$, the intercept, Risk, and the *Funding Gap*. To control for outliers, observations in the highest and lowest percentile of variables affected are eliminated from the sample. $\frac{1}{S}$ is the reciprocal of solvency: *Average total assets* over *total bank holding-company equity capital*. *Risk* is *risk-weighted assets over total assets: ([A223] over [2170])*. *Size* is the natural log of one dollar plus the value of *total assets [2710]* in thousands of dollars. *Tier 2 LLA* is the *allowance for loan and lease losses includible in Tier 2 capital [5310]*. *Funding gap* is the difference between loans and deposits, where the former is *Loans and leases net of unearned income and allowance [B529] [2125]* and *Loans and leases held for sale [5369]*; and the latter is the sum of *interest bearing* and *non-interest bearing deposits [6631] and [6636]*. *ROA* is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*, measured at year-end. *Liquid assets* is *cash and balances due from depository institutions [0010]*. *Credit*, or *credit growth* is the aggregate change in the value of *Loans* of all sample banks relative to the aggregate value of *total assets* of the sample banks. The change is measured over the period of a year (four quarters). The change in supervisory threshold for submitting the FR Y-9C reports requires the use of an indicator variable for observations of 2006 as well as one for the years after 2006. *New York–San Francisco* are indicator variables for the 12 Federal Reserve districts, where coefficients are relative to the first district: Boston. All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm)

TABLE 6
ADJUSTMENTS FOR NET UNREALIZED GAINS (LOSSES) ON AVAILABLE-FOR-SALE SECURITIES.

	β	*p*	β	*p*
$\frac{1}{S}$	2.03	0.00	1.63	0.00
Risk			65.4	0.00
Size			0.81	0.21
Tier 2 LLA			-1,877	0.00
Funding Gap			15.8	0.03
ROA			-300	0.09
Liquid assets			19.7	0.26
Credit –2006			102	0.07
Credit 2006			-249	0.00
Credit 2007-			83.0	0.41
New York			4.55	0.16
Philadelphia			-2.34	0.51
Cleveland			-6.11	0.09
Richmond			-0.50	0.87
Atlanta			-1.08	0.74
Chicago			-9.60	0.00
St. Louis			-1.97	0.51
Minneapolis			-8.10	0.01
Kansas City			-7.05	0.03
Dallas			-2.33	0.50
San Francisco			-1.39	0.66
Intercept	-35.3	0.00	-71.1	0.00
Prob $> F$	0.00		0.00	
$\overline{R}^2$	0.05		0.14	

NOTES: This table shows regression results of regulatory adjustments (Δ) for US bank holding companies over the quarters covering 2001Q1–2013Q2, for 62,756 quarterly observations. The dependent variables are the adjustments for *net unrealized gains (losses) on available-for-sale securities [8434]*, a deduction, multiplied by –1.

$$
\begin{aligned}
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \varepsilon_{i,t} \\
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \beta_2 Risk_{i,t} + \beta_3 Size_{i,t} + \beta_4 Tier\ 2\ LLA_{i,t} + \beta_5 Funding\ gap_{i,t} \\
&\quad + \beta_6 ROA_{i,t} + \beta_7 Liquid\ assets_{i,t} + \beta_8 Credit_{i,t} + \beta_9 I_{i,t,2006} \cdot Credit_{i,t} \\
&\quad + \beta_{10} I_{i,t,2007-2013} \cdot Credit_{i,t} + \sum_{j=2}^{12} \beta_{j+9} District_{i,t,j} + \varepsilon
\end{aligned}
$$

The regression model relies on *p*-values that account for the two dimensions (banks (*i*) and quarters (*t*)) of within-cluster correlation (Petersen 2009). $\frac{1}{S}$ is the reciprocal of solvency: *Average total assets* over *total bank holding-company equity capital*. *Risk* is *risk-weighted assets over total assets: ([A223] over [2170])*. *Size* is the natural log of one dollar plus the value of *total assets [2710]* in thousands of dollars. *Tier 2 LLA* is the *allowance for loan and lease losses includible in Tier 2 capital [5310]*. *Funding gap* is the difference between loans and deposits, where the former is *Loans and leases net of unearned income and allowance [B529] [2125]* and *Loans and leases held for sale [5369]*; and the latter is the sum of *interest bearing* and *non-interest bearing deposits [6631] and [6636]*. *ROA* is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*, measured at year-end. *Liquid assets* is *cash and balances due from depository institutions [0010]*. *Credit*, or *credit growth* is the aggregate change in the value of *Loans* of all sample banks relative to the aggregate value of *total assets* of the sample banks. The change is measured over the period of a year (four quarters). The change in supervisory threshold for submitting the FR Y-9C reports requires the use of an indicator variable for observations of 2006 as well as one for the years after 2006. *New York–San Francisco* are indicator variables for the 12 Federal Reserve districts, where coefficients are relative to the first district: Boston. All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm)

TABLE 7
NET USE OF CATEGORIES OF REGULATORY ADJUSTMENTS.

	Net Sum of Positive Adjustments, Ex.				Net Sum of Positive Adjustments, Incl.			
	β	*p*	β	*p*	β	*p*	β	*p*
$\frac{1}{S}$	0.06	0.00	0.06	0.00	0.09	0.00	0.08	0.00
Risk			0.74	0.00			1.84	0.00
Size			-0.05	0.00			0.00	0.41
Tier 2 LLA			8.17	0.37			-38.0	0.01
Funding Gap			-0.22	0.11			-0.28	0.10
ROA			6.87	0.00			0.62	0.93
Liquid assets			0.28	0.35			-0.84	0.07
Credit –2006			0.74	0.05			4.12	0.09
Credit 2006			-1.47	0.00			-10.4	0.00
Credit 2007-			0.83	0.30			7.78	0.08
New York			0.34	0.00			0.35	0.00
Philadelphia			0.16	0.17			0.08	0.53
Cleveland			0.17	0.06			0.04	0.72
Richmond			0.52	0.00			0.46	0.00
Atlanta			0.52	0.00			0.46	0.00
Chicago			0.29	0.00			0.06	0.53
St. Louis			0.51	0.00			0.37	0.00
Minneapolis			0.41	0.00			0.18	0.06
Kansas City			0.48	0.00			0.25	0.01
Dallas			0.54	0.00			0.39	0.00
San Francisco			0.35	0.00			0.26	0.01
Intercept	-1.29	0.00	-1.66	0.00	-1.88	0.00	-3.07	0.00
Prob $> F$	0.00		0.00		0.00		0.00	
$\overline{R}^2$	0.06		0.11		0.06		0.14	

NOTES: This table shows regression results of regulatory adjustments (Δ) for US bank holding companies over the quarters covering 2001Q1–2013Q2, for 62,756 quarterly observations. The dependent variable is the net sum of regulatory adjustments employed. The net sum is the sum of the use of adjustments mentioned in Table 1: positive adjustments increase the net sum, negative adjustments decrease the net sum. "Ex." ("Incl.") means that symmetric adjustments are excluded from (included in) the net sum of used regulatory adjustments.

$$\begin{aligned}
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \varepsilon_{i,t} \\
\Delta_{i,t} &= \beta_0 + \beta_1 \tfrac{1}{S_{i,t}} + \beta_2 Risk_{i,t} + \beta_3 Size_{i,t} + \beta_4 Tier\ 2\ LLA_{i,t} + \beta_5 Funding\ gap_{i,t} \\
&\quad + \beta_6 ROA_{i,t} + \beta_7 Liquid\ assets_{i,t} + \beta_8 Credit_{i,t} + \beta_9 I_{i,t,2006} \cdot Credit_{i,t} \\
&\quad + \beta_{10} I_{i,t,2007-2013} \cdot Credit_{i,t} + \sum_{j=2}^{12} \beta_{j+9} District_{i,t,j} + \varepsilon
\end{aligned}$$

The regression model relies on *p*-values that account for the two dimensions (banks (i) and quarters (t)) of within-cluster correlation (Petersen 2009). *p*-values are one-sided for $\frac{1}{S}$, the intercept, Risk, and the *Funding Gap*. To control for outliers, observations in the highest and lowest percentile of variables affected are eliminated from the sample. $\frac{1}{S}$ is the reciprocal of solvency: *Average total assets* over *total bank holding-company equity capital*. *Risk* is *risk-weighted assets over total assets: ([A223] over [2170])*. *Size* is the natural log of one dollar plus the value of *total assets [2710]* in thousands of dollars. *Tier 2 LLA* is the *allowance for loan and lease losses includible in Tier 2 capital [5310]*. *Funding gap* is the difference between loans and deposits, where the former is *Loans and leases net of unearned income and allowance [B529] [2125]* and *Loans and leases held for sale [5369]*; and the latter is the sum of *interest bearing* and *non-interest bearing deposits [6631] and [6636]*. *ROA* is *Return on Assets: income (loss) before income taxes and extraordinary items, and other adjustments [4301] over total assets [2710]*, measured at year-end. *Liquid assets* is *cash and balances due from depository institutions [0010]*. *Credit*, or *credit growth* is the aggregate change in the value of *Loans* of all sample banks relative to the aggregate value of *total assets* of the sample banks. The change is measured over the period of a year (four quarters). The change in supervisory threshold for submitting the FR Y-9C reports requires the use of an indicator variable for observations of 2006 as well as one for the years after 2006. *New York–San Francisco* are indicator variables for the 12 Federal Reserve districts, where coefficients are relative to the first district: Boston. All codes in square brackets are reported in Consolidated Financial Statements for Bank Holding Companies (FR Y-9C). Definitions of items are from the Micro Data Reference Manual of the Federal Reserve board (www.federalreserve.gov/reportforms/mdrm/DataDictionary/Search.cfm)