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Shortcomings of Leverage Ratio Requirements

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Shortcomings of Leverage Ratio Requirements

- *For large U.S. banks, the leverage ratio requirement is now so high relative to risk-based capital requirements that it frequently acts as a potentially binding constraint, shaping business decisions, rather than solely as a backstop.*
- *A higher, or more constraining, leverage ratio requirement induces banks to take on more risk.*
- *The leverage ratio is a poor measure of bank risk.*
    - *Approximately one-third of the banks that failed during the 2008 financial crisis had leverage ratios above 10 percent just prior to the crisis.*
- *The supplementary leverage ratio is having a significant influence on bank behavior and financial markets by forcing banks to pass costs to customers for engaging in relatively low risk capital market activities.*

BACKGROUND

Capital is the amount by which the value of a corporation's assets exceeds the value of its liabilities. By establishing allowable minimum amounts for capital, regulatory capital requirements help ensure that banks remain solvent—that is, that their assets remain worth more than their liabilities.

Bank capital requirements come in two basic types:

1. A risk-based capital ratio that requires banks to maintain capital in an amount greater than a specified fraction of its "risk-weighted" assets. Risk-weighted assets are measured by assigning each asset a weight that increases according to the risk of the asset. Over time, the method for weighting the assets has varied from standardized approaches (the Basel I and proposed Basel IV measures) to internal ratings-based approaches (Basel II and III).[1]

2. A leverage ratio that requires a bank to maintain capital in an amount greater than a specified fraction of its assets regardless of the risk of those assets – in other words, with every asset weighted at 100 percent for purposes of the denominator.

These two types of capital requirements are currently applied in two ways: first, through static measures that examine the current ratio of capital to assets (though in a risk-based measure, with those assets weighted according to historical loss experience); second, through stress testing – for example, the Federal Reserve's CCAR stress tests require banks to meet four post-stress minimum capital requirements, three of which are risk based and one of which is leverage based.

Commercial banks in the United States have been required to satisfy a leverage ratio requirement since 1981 when U.S. bank regulators first introduced explicit regulatory capital requirements. At the end of 1991, Congress passed the Federal Deposit

1 Basel I, II, and III are internationally agreed standards for bank regulation. Basel IV refers to the set of revisions to those standards that is currently under consideration.

Insurance Corporation Improvement Act, and one of its key provisions—prompt corrective action standards—required U.S. banks to have a tier 1 leverage ratio greater than 5 percent and a tier 1 risk-based ratio greater than 6 percent in order to be considered well capitalized.[2, 3] In practice, risk-based capital requirements were usually more constraining than the leverage ratio requirement, and the leverage ratio requirement acted only as a backstop. Under the Basel I capital rules, the leverage ratio had little influence on bank behavior because a bank that satisfied the risk-based requirement would almost always also satisfy the leverage requirement.

Until recently, banks in other major international jurisdictions have not been subject to a leverage requirement. However, the post-crisis set of internationally agreed regulatory reforms—Basel III—included a minimum leverage ratio requirement of 3 percent for all large banks. The 3 percent leverage requirement included in Basel III is numerically lower than the pre-existing 5 percent requirement in the United States. However, because the denominator of the Basel III calculation contains certain off-balance sheet items not previously included in the U.S. measure, the Basel III leverage ratio is, in fact, roughly equivalent to the previous U.S. requirement. Consequently, especially given the tightening of risk-based requirements, the Basel III leverage requirement still would have acted as a backstop to the risk-based capital requirements for most banks if it had been adopted in the United States as finalized by the Basel Committee and implemented by other global regulators.

On July 9, 2013, however, the U.S. banking agencies proposed that U.S. global systemically important bank holding companies (GSIBs) would be required to satisfy a minimum enhanced supplementary leverage requirement (eSLR) of 5 percent, calculated using the Basel III methodology (that is, using the larger denominator that includes all on-balance sheet assets and certain off-balance sheet items).[4] The proposed rule was adopted on April 8, 2014, to take effect January 1, 2018. These requirements are established only for banks in the United States and not banks in other jurisdictions.

Consequently, for several of the largest U.S. banks, the enhanced supplementary leverage ratio requirement, as opposed to a risk-based requirement, is a current or potential future binding constraint, and thus a requirement that affects bank capital and business planning.[5] In other words, because the leverage ratio is currently binding (it is the first capital requirement that would be violated if the bank's capital were reduced), or could potentially be binding in the future, many banks allocate capital to, and take into account the cost of capital for, very low risk activities even though the activities require little or no capital under risk-based capital requirements. As discussed below, because capital is costly and many of

2 The Prompt Corrective Action Standards became effective in December 1992.

3 Capital ratio requirements also differ in terms of the types of capital included in the numerator. For example, the tier 1 leverage ratio requirement uses tier 1 capital, which is defined as book equity and deducts items that are not loss absorbing such as goodwill, intangibles and deferred tax assets among other deductions.

4 A bank that is a subsidiary of a GSIB is subject to a 6 percent eSLR requirement.

5 *See* "Mutual-Assured Destruction: The Arms Race between Risk-Based and Leverage Capital Regulation," Federal Financial Analytics, Inc., forthcoming.

those activities provide only low returns, the added capital charge is leading banks to cut back on, or get out of, such lines of business.

In particular, currently, the 5 percent enhanced supplementary leverage ratio requirement is closer to binding than the risk-based requirement for 3 of the 8 GSIBs and for 1 GSIB the two measures are about equally binding. Moreover, the leverage ratio impacts the behavior of a broader set of banks through its inclusion in the Federal Reserve's annual stress tests. In order to pass the stress tests, large banks' post-stress projected leverage ratios must be above 4 percent.[6] Based on the results of the 2016 Dodd-Frank Act Stress Tests, the 4 percent post-stress leverage ratio is the requirement that comes closest to constraining equity payouts for 14 of the 33 banks subject to the stress tests.

As discussed below, there are reasons why it is better to have the leverage ratio calibrated as a backstop rather than as a binding, or near-binding, requirement.

WHAT'S THE DOWNSIDE OF A NEAR-BINDING LEVERAGE RATIO?

Because the leverage ratio requirement requires banks to maintain the same amount of capital regardless of the risk of an asset, it provides banks with an incentive to hold riskier assets on their balance sheet. Conversely, it provides them an incentive to shed low risk assets, which, as we will see, has significant ramifications for securities markets, where Treasury collateral plays a crucial role.

6 The leverage ratio requirement was introduced in the U.S. stress tests in 2011, i.e., it was not part of the first round of U.S. stress tests in 2009.

For example, consider a bank that has $100 in equity to invest in loans or cash. In addition to the $100 in equity, the bank can raise deposits to fund such investments. Both assets (loans and cash) are profitable, but loans are more profitable. Cash is riskless while loans entail risk. Assume further that, by regulation, the bank has to satisfy a leverage requirement of 5 percent and a risk-based capital requirement of 10 percent. Under the risk-based capital requirement, loans have a weight of 1 and cash has a weight of zero.

The bank will choose to invest $1000 in loans, which will allow it to just satisfy its risk-based capital requirement of 10 percent ($100 in equity/$1000 in loans = 10 percent). The bank will then invest an additional $1000 in cash, which will leave it just compliant with its leverage ratio requirement of 5 percent ($100 in equity/$2000 in assets = 5 percent) and still compliant with the risk-based capital requirement because the weight on cash is zero.

Now suppose the leverage requirement is raised to 8 percent. The bank will still invest $1000 in loans. But now it will only invest $250 in cash ($100 equity/$1250 in assets = 8 percent). Raising the leverage ratio requirement simply encourages the bank to hold fewer riskless assets, increasing the average riskiness of its overall portfolio.[7]

Viewed another way, the example illustrates the fact that the leverage ratio is a poor measure of bank risk. In particular, the bank improves its leverage ratio by increasing the riskiness of its

7 Reality is, of course, vastly more complicated: For one thing, banks are also subject to liquidity requirements which will limit the amount by which they can reduce the share of their portfolio invested in low risk, liquid assets.

portfolio. The consequences of this perverse incentive are documented in the next section.

WHICH IS A BETTER MEASUREMENT OF BANK RISK: THE LEVERAGE RATIO OR RISK-WEIGHTED CAPITAL?

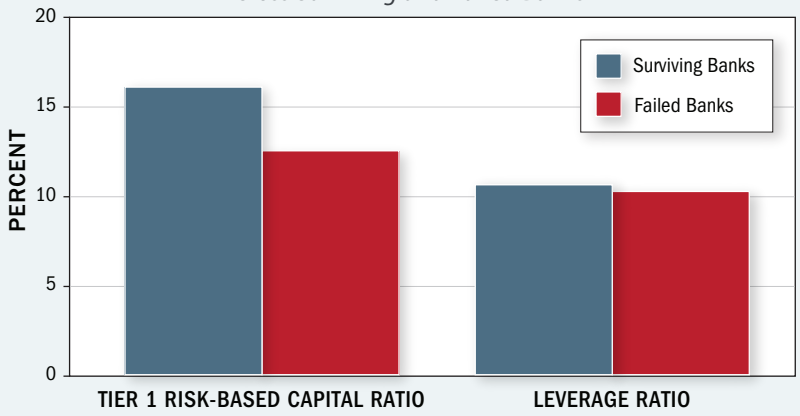
By design, two banks of the same asset size with the same amount of capital will have the same leverage ratios; but the bank with riskier assets will have a lower risk-based capital ratio. As a result, risk-based capital ratios are likely to be a better predictor of bank failure than leverage ratios.

We can test this logic by analyzing which type of capital ratio would have better predicted the bank failures that occurred during the past crisis. Specifically, the analysis calculates the Basel I tier 1 risk-based capital ratio and the leverage ratio, at the end of 2006, for more than 8,000 commercial banks that existed at that time, and tests which regulatory capital ratio has a stronger ability to predict the more than 400 failures that occurred between 2007 and 2011.[8]

Exhibit 1 compares the average regulatory capital ratios at the end of 2006 of the banks that survived and the banks that failed during the past financial crisis. In 2006, banks that would later survive the crisis reported a tier 1 capital ratio (which is risk-weighted) that was about 30 percent higher than the tier 1 capital ratio of banks that failed. In contrast, the leverage ratio of banks that survived is only slightly higher than the leverage ratio of banks that failed. In fact, roughly one-third of banks that subsequently failed—125 banks—had leverage ratios at the end of 2006 at or above 10 percent. Thus, the difference between the surviving banks' and the failed banks' risk-based and non-risk based capital ratios suggests that risk-based capital requirements were a better predictor of bank failure.

EXHIBIT 1: AVERAGE REGULATORY CAPITAL RATIOS

Across Surviving and Failed Banks



NOTE: *Data is of 2006:Q4. The sample of failed banks includes banks which failed between 2007:Q1 and 2011:Q4.* ***SOURCE:*** *FDIC data*

That superior performance of risk-based capital requirements is confirmed using statistical analysis. As shown in the appendix, both the tier 1 risk-based capital ratio and the leverage ratio predict bank failure. In each case, a higher regulatory capital ratio reduced the odds of failure; however the tier 1 risk-based capital ratio has a stronger ability to predict bank failure. For instance, a 1 percentage point increase in the tier 1 risk-based capital ratio lowered the probability of bank failure by more than 60 basis points, whereas the same increase in the leverage ratio reduced the odds of failure by approximately 20 basis points.[9] Lastly, when the tier 1 risk-based capital ratio and the leverage ratio are both included in the regression, banks with a *lower*

8 More than two-thirds of bank failures in the sample occurred between 2009 and 2010, and only one bank was closed by the Federal Deposit Insurance Company in 2007. Thus there is a sizable time gap between the time period in which the regulatory capital ratios are observed and bank failure occurs, which strengthens the validity of the empirical results as it reduces concerns about endogeneity and reverse causality.

9 The result is particularly striking because, since total assets are greater than risk-weighted assets, a one percentage point increase in the leverage ratio requires that the bank have substantially more additional capital than a one percentage point increase in the risk-based capital ratio.

leverage ratio are *less* likely to fail.[10] While the result seems counterintuitive, it may reflect the fact that, as shown in the example above, if two banks have the same risk-weighted capital ratios, the bank with the lower leverage ratio must have a higher share of low-risk and liquid assets.

THE LEVERAGE RATIO REQUIREMENT AND FINANCIAL MARKETS

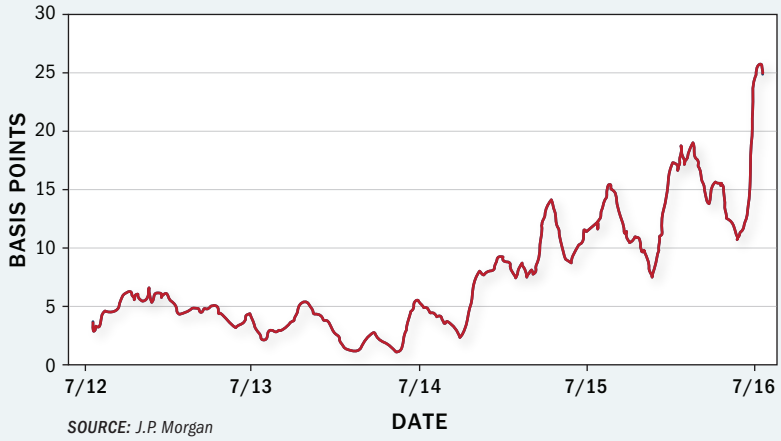
There is considerable evidence that the higher minimum requirement of the supplementary leverage ratio (both static and CCAR), is leaving an imprint on financial markets.[11] Over four-fifths of the respondents to the Federal Reserve's Senior Credit Officer Opinion Survey in June 2015 indicated that liquidity and market functioning in Treasury markets had deteriorated. Over 80 percent of those respondents that reported a deterioration indicated that the most important cause was a decreased willingness of securities dealers to expand their balance sheet for market-making purposes as a result of regulatory change. In explaining the material dislocation that has occurred in the market for corporate bonds since mid-2015, Boyarchenko et. al., in a New York Fed Staff Report, find that the principal cause is the SLR.[12] Additionally, Goldman Sachs indicated in 2014:Q2 that it had reduced its balance sheet by 6.5 percent, half of which was a decline in reverse repo, in response to the supplementary leverage ratio requirement and the stress test.[13] And by the end of 2017, J.P. Morgan Chase will exit the business of settling government securities for most dealers, a decision attributed by press reports in part to heightened liquidity requirements and capital expenses.[14]

Unlike risk-based requirements, the supplementary leverage ratio requirement requires banks to hold substantial capital against very low risk and even riskless assets. Because capital is expensive, it has become more costly for banks to hold such assets, leading banks to charge their customers more for transactions that require the banks to do so.

One such transaction is when a dealer subsidiary of a bank holding company loans a customer funds in the form of a Treasury repo (a reverse repo from the perspective of the dealer).

The increased costs for such transactions are shown in Exhibit 2, which plots the spread between the general collateral financing (GCF) and tri-party Treasury repo rates. Roughly, the tri-party repo rate is the rate at which

EXHIBIT 2: SPREAD BETWEEN THE GCF AND TRIPARTY REPO RATES



SOURCE: J.P. Morgan

10 A similar result was provided in Andrew Haldane in "The Dog and the Frisbee," August 2012. Haldane nevertheless concluded that the leverage ratio is a better measure than the risk-based capital ratio because simpler measures of bank strength performed better in smaller samples, which according to Haldane proxied for an environment with greater model uncertainty.

11 See Barry, Jay, Bruce Sun and Phoebe White, "Times Like These," JPMorgan, February 10, 2016. We would like to thank Mr. Barry for sharing the data underlying Exhibits 2 and 3.

12 Boyarchenko, Nina, Pooja Gupta, Nick Steel, Jacqueline Yen, (2016) "Trends in Credit Market Arbitrage," Federal Reserve Bank of New York Staff Reports No. 784, July 2016, p. 18.

13 Goldman Sachs's 2014:Q2 earnings presentation and call with investors.

14 "JP Morgan to Stop Settling Government Securities for Dealers," Bloomberg L.P., July 21, 2016.

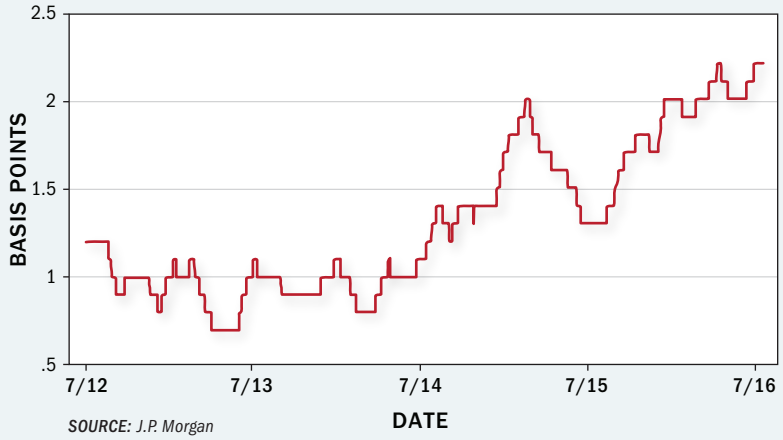
large, high-quality dealers (all of which are subsidiaries of bank holding companies subject to the enhanced supplementary leverage ratio requirement and stress tests) borrow in the repo market while the GCF repo rate is the rate at which they lend through repo to other financial market participants.[15] As a result, the GCF/tri-party spread is a rough measure of the cost for those other financial market participants of going through the high-quality dealer's balance sheet to borrow against Treasury securities. The assets of the dealer created by those transactions – reverse repos backed by Treasury securities – are extremely low risk. Hence, risk-based capital requirements require the dealer to hold very little capital against them. However, the leverage ratio requirement treats all assets the same and so requires the dealer to hold a substantial amount of capital against them. As can be seen, over the past two years, as the implementation date of the supplementary leverage ratio requirement has approached, the spread between the GCF repo rate and the tri-party repo rate has more than doubled.

The much higher cost for market participants of financing their positions in Treasury securities has contributed to increased pricing gaps in the Treasury market that would normally be arbitraged away. That reduced efficiency can be seen in the Treasury yield curve fitting error, shown in Exhibit 3, the amount by which the actual yields on specific Treasury securities differ from the smooth yield curve estimated from those yields. While the fitting errors are small relative to those seen in the crisis period, they have clearly trended up over the past two years.

15 The GCF borrowings occur through a CCP, so the credit risk is mutualized.

EXHIBIT 3: TREASURY YIELD CURVE FITTING ERROR

Root Mean Squared Error



SOURCE: J.P. Morgan

CONCLUSION

Altogether, these results suggest that the risk-based capital ratio is a much better predictor of bank failure than the leverage ratio. The leverage ratio requirement provides banks with an incentive to increase the risk of their assets. Because the eSLR sets the leverage requirement at a higher or potentially more constraining level, it influences bank behavior. In particular, banks have become increasingly reluctant to engage in the low-risk transactions necessary to maintain efficient pricing in the Treasury market, and provide routine services to their customers. Thus, recalibrating the eSLR, which is set by the U.S. bank regulators, not by law, and is not part of an international agreement, to once again serve as a backstop measure would appear to have significant benefits and minimal costs.

APPENDIX

This appendix presents the regression results of the analysis comparing the performance of the risk-based capital ratio versus the leverage ratio during the past financial crisis. Table 1 presents the results from a regression that tests the ability of each of the regulatory capital ratios to predict bank failure. The regression used the same data shown in Exhibit 1: capital and leverage ratios for banks as of 2006:Q4 are used to predict whether banks failed between 2007:Q1 and 2011:Q4. As shown by the results in the first two

columns, when considered individually, the tier 1 risk-based capital ratio and a leverage ratio both predict bank failure. In each case, a higher ratio reduced the odds of failure (as can be seen by the negative regression coefficients). That said, the ability of the tier 1 risk-based capital ratio to predict bank failure is stronger both from an economic and statistical sense. On the economic side, a one-standard deviation increase in the tier 1 risk-based capital ratio lowers the average bank probability of default by 5 percentage points, while a one-standard deviation increase in the leverage ratio lowers the average probability of default by less than 1 percentage point. On the statistical side, there is less than a one percent chance that the coefficient associated with the tier 1 risk-based capital ratio is actually zero whereas there is a five percent chance that the coefficient associated with the leverage ratio actually zero.

TABLE 1: PREDICTING BANK FAILURES: RISK-BASED CAPITAL RATIO VERSUS LEVERAGE RATIO

VARIABLES	(1)	(2)	(3)
Tier 1 capital ratio	-13.58*** (2.2)	––	-33.83*** (4.2)
Leverage ratio	––	-4.69** (2.0)	35.89*** (3.9)
Constant	-1.15*** (0.3)	-2.54*** (0.2)	-2.10*** (0.3)
Observations	8,071	8,071	8,071
Pseudo R^2	0.045	0.003	0.089

*NOTE: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Lastly, as shown in the third column, when the tier 1 risk-based capital ratio and the leverage ratio are both included in the regression, the sign of the coefficient associated with the leverage ratio reverses, implying that banks with a lower leverage ratio are less likely to fail. While the result seems counterintuitive, it may reflect the fact that, as shown in the example on pp. 4-5, if two banks have the same risk-based capital ratios, the bank with the lower leverage ratio must have a higher share of low-risk and probably liquid assets. ■