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Yes, the Benefits of a Higher Leverage Ratio Can Exceed the Costs

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April 2018

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AFTER THE 2007–2008 FINANCIAL CRISIS, SOME academics and lawmakers from both parties have proposed simpler, higher bank capital requirements as a way to strengthen banks and prevent future disasters. For instance, Professors Anat Admati and Martin Hellwig suggest raising the so-called equity-to-asset ratio, or "leverage" ratio, for banks to 20 or 30 percent, while Senators Sherrod Brown and David Vitter cosponsored a bill calling for a ratio of 15 percent.[1] Under such proposals, banks would finance their activities with more equity and less debt.

Two questions arise: How much would a higher bank leverage ratio actually cost? And what benefits would result? We answer these questions in our recent Mercatus Center working paper,[2] which is summarized here.

One plausible answer to the first question, suggested by Franco Modigliani and Merton Miller's famous theorem, is that raising the leverage ratio has no associated costs.[3] Intuitively, under certain conditions, a bank with a higher leverage ratio would pay a lower return on equity than its more leveraged competitors since the risk of default would be lower. The reduced return on equity, therefore, could fully offset the increased cost of relying more on equity, which pays a relatively higher return than debt.

Critics of the Modigliani-Miller theorem claim that it does not hold and that a higher leverage ratio *would* raise a bank's overall cost of funds. The bank would then pass along higher funding costs to borrowers, and the end result would be less borrowing, less capital formation, and a lower GDP. If the critics are right, a higher leverage ratio would be acceptable only if the benefits exceed the costs. Thus, before attempting to reduce the likelihood of a banking crisis, we must justify the approach. We must show that, in decreasing the adverse effect such crises have on

GDP, the benefits will exceed any costs that might arise from lower capital formation and lower GDP. We turn to that task now.[4]

COSTS OF A HIGHER LEVERAGE RATIO

To illustrate how a higher leverage ratio could have costs that translate into forgone GDP, consider the example summarized in table 1. In the first quarter of 2008, total assets for US banks in our sample equaled about $10 trillion. An 11 percentage point increase—equal to the increase in the leverage ratio from 4 percent to 15 percent that we consider in the paper—would require the banks to raise an additional $1.1 trillion in equity while retiring $1.1 trillion in debt.

In our highest-cost case, assuming the return on equity equals 12 percent, banks would have to pay an additional $132 billion to shareholders if the leverage ratio rises by 11 percentage points.[5] The increased payments to shareholders would be partially offset by lower interest expenses from retiring the debt. Assuming a 5 percent rate of interest, the reduced debt costs would amount to $55 billion for an 11 percentage point increase in the leverage ratio.

On net, banks with total assets equaling $10 trillion would face additional costs of capital of $77 billion for an 11 percentage point increase.[6] Looked at another way, for a leverage ratio that is 11 percentage points higher, the costs would rise by 99 basis points.[7] Banks might try to recover these costs by charging higher interest rates on their loans, which could translate into less capital formation and thus forgone GDP.

To calculate forgone GDP, one important factor is the degree to which companies rely on banks for funding. In the United States, recent data suggest that bank lending, as a fraction of all corporate funding, averages about 7 percent.[8] If, however, the higher costs in bank lending spill over to other debt markets, then it may be useful to consider not just bank loans but also total debt as a fraction of corporate funding. Accordingly, we use a debt-to-capital ratio of 37 percent in our baseline case and 23 percent as an alternative.[9]

The results show a range of output declines.[10] For a leverage ratio that is 11 percentage points higher, assuming a 7 percent fraction of corporate funding coming from bank loans, output declines by 4.2 percent. Assuming instead a debt-to-capital ratio of 23 percent, output declines by 13.8 percent. And assuming a debt-to-capital ratio of 37 percent, output declines by 22.2 percent.

Table 1. Calculating the Costs of a Higher Leverage Ratio

Q1 2008	TOTAL ASSETS $10 TRILLION
An increase in the leverage ratio of 11 percentage points means banks must raise equity of	$1.1 trillion
Given a 12 percent return on equity, banks then have to pay shareholders	$132 billion
Banks could then retire $1.1 trillion of debt, which would result in a cost saving for banks of about	$55 billion
So, on net, funding costs would rise by	$77 billion
The increase in the weighted average cost of capital for banks that gets passed on to borrowers through higher lending rates equals	0.0099
Assuming the fraction of corporate finance coming from bank loans equal to 0.07 . . .	. . . this results in a change in GDP of −0.042.
Assuming the fraction of corporate finance coming from bank loans equal to 0.23 . . .	. . . this results in a change in GDP of −0.138.
Assuming the fraction of corporate finance coming from bank loans equal to 0.37 . . .	. . . this results in a change in GDP of −0.222.

The probability of a banking crisis varies inversely with the leverage ratio, so that a higher leverage ratio produces benefits in the form of lower crisis costs.

BENEFITS OF A HIGHER LEVERAGE RATIO

One approach to estimating the benefits of a higher leverage ratio is to estimate the relationship between the leverage ratio and the probability of a crisis and then estimate the effects of crises on the rate of economic growth.[11] On the first estimate, we find empirically that the probability of a banking crisis varies inversely with the leverage ratio, so that a higher leverage ratio produces benefits in the form of lower crisis costs.

On the second estimate, the Bank of England's 2010 *Financial Stability Report* and Miles, Yang, and Marcheggiano assume that the cost of a crisis equals a 10 percent decline in GDP and that 75 percent of the effects of a crisis are temporary, lasting five years. For the United States, in our baseline case we assume 90 percent of crisis effects are temporary and last two years. We also estimate that for the United States the cost of a crisis equals a 10.3 percent decline in GDP.[12] Additionally, we examine the impact of assuming crises' effects are either 75 percent temporary or 100 percent temporary. The expected benefit of higher capital requirements per percentage point reduction in the probability of a crisis equals[13]

- 13.3 percent of one year's GDP if crises have 75 percent temporary effects,
- 7.7 percent of one year's GDP if crises have 90 percent temporary effects, or
- 4 percent of one year's GDP if crises have *only* temporary effects.

COMPARING THE BENEFITS AND COSTS

Figure 1 depicts the marginal benefits and marginal costs of changing the leverage ratio from 4 percent (the Basel III US leverage ratio in 2014) to 15 percent. Under the highest cost assumption, which implies that output would decline by 22.2 percent, the marginal benefits of increasing the leverage ratio to 15 percent exceeds the marginal costs when crises have some permanent effects. If crises have only 75 percent temporary effects the benefits of increasing the leverage ratio to 24 percent would roughly equal the costs. If crises have only 90 percent temporary effects the benefits of increasing the leverage ratio to 19 percent would roughly equal the costs. When we assume costs are at their highest and crises have only temporary effects, the marginal costs of raising the leverage ratio to 15 percent exceed the marginal benefits; in that case, the leverage ratio that equates marginal costs and benefits equals 12 percent.

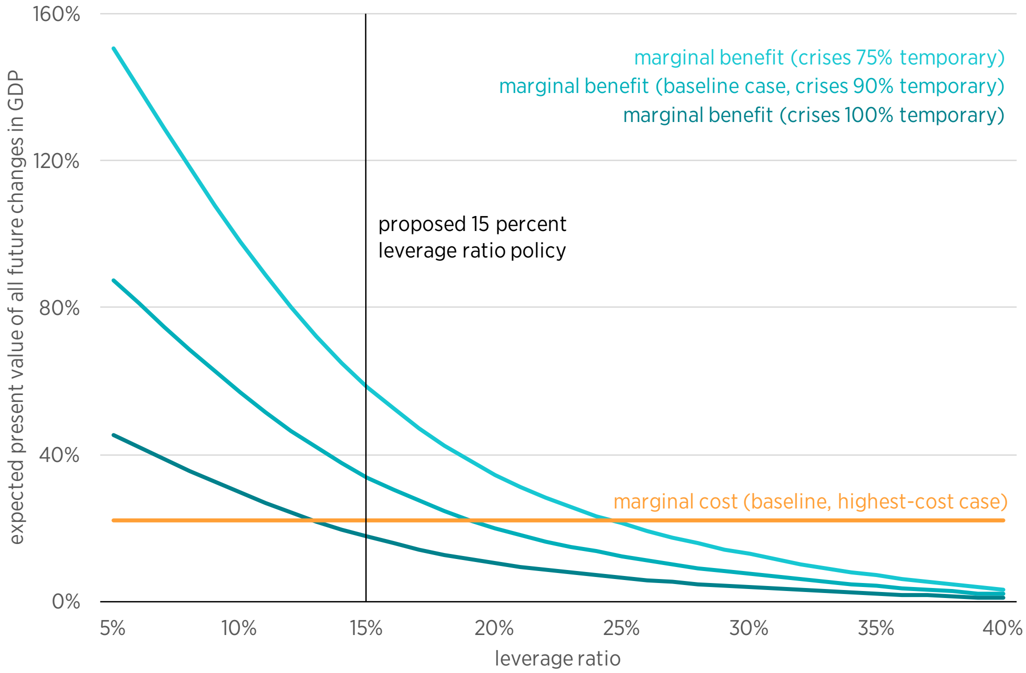
CONCLUSION

We find that increasing bank capital through a higher leverage ratio can help reduce the probability of banking crises and thus prevent the harmful effects that crises exert on the economy. These benefits are high enough to offset the costs of raising the equity-to-assets ratio for banks. They exceed the costs for lower-cost scenarios, but even if we assume that the costs of raising the ratio to 15 percent are high, the marginal benefits can cover the marginal costs.

NOTES

1. See Anat Admati and Martin Hellwig, *The Bankers' New Clothes* (Princeton, NJ: Princeton University Press, 2013). For details about the Brown and Vitter proposal, see Terminating Bailouts for Taxpayer Fairness Act of 2013, S.798, 113th Cong. (2013).
2. Our working paper—James R. Barth and Stephen Matteo Miller, "Benefits and Costs of a Higher Bank Leverage Ratio" (Mercatus

Figure 1. Comparing the Marginal Benefits and Costs of an Increase in the Leverage Ratio from 4 to 15 Percent



Source: Data come from calculations conducted by the authors.

Working Paper, Mercatus Center at George Mason University, Arlington, VA, 2017)—is based on the approach used by Miles, Yang, and Marcheggiano to assess the cost of higher bank capital in the United Kingdom. See David Miles, Jing Yang, and Gilberto Marcheggiano, "Optimal Bank Capital," *Economic Journal* 123, no. 567 (2013): 1–37. To measure costs, we modify their approach by using the leverage ratio rather than capital relative to risk-weighted assets. To measure benefits, we also focus primarily on the US experience from 1892 to 2014, given the availability of data and the high frequency of crises.

3. See Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review* 48, no. 3 (1958): 261–97.

4. Our example is modeled closely on box 7 in the Bank of England's 2010 *Financial Stability Report*. Bank of England, *Financial Stability Report*, Issue No. 28, December 2010.

5. In our baseline case, we adopt Baker and Wurgler's approach; and for the example in table 1 we use their equation 2: Return on Equity = $12 \times \gamma \times (\beta - 1)$ + Risk free rate + β(Market Risk Premium). In that equation, β measures the market sensitivity of a bank's stock returns relative to returns on the market as a whole and $12 \times \gamma$ measures the annualized low-risk anomaly, reflecting the fact that in a risk-adjusted sense, low-risk assets tend to outperform the market, while high-risk assets tend to underperform the market. In Baker and Wurgler's highest-cost case the monthly estimate of the low-risk anomaly $\gamma = -0.0075$. They estimate that for banks in their sample the median of $\beta = 0.67$. Substituting in an assumed risk-free rate of 0.05, a market risk premium of 0.06, $12 \times \gamma = -0.09$ and $\beta = 0.67$, generates an expected return on equity equal to 12 percent. See Malcolm Baker and Jeffrey Wurgler, "Do Strict Capital Requirements Raise the Cost of Capital? Banking Regulation and the Low Risk Anomaly" (NBER Working Paper No. 19018, National Bureau of Economic Research, Cambridge, MA, May 2013).

6. The calculation for an 11 percentage point increase in the leverage ratio comes from $1,100,000,000,000 × (Return on Equity − Risk free rate) = $1,100,000,000,000 × (0.12 − 0.05) = $77,000,000,000.

7. One basis point equals one-hundredth of 1 percent, or 0.0001. Assuming for the sake of simplicity that debt is riskless, using Baker and Wurgler's equation 6, the relationship between changes in the leverage ratio and changes in the weighted average cost of capital can computed as ΔWACC = $-12 \times \gamma \times \Delta$Leverage Ratio = $12 \times 0.0075 \times 0.11 = 0.0099$, or 99 basis points.

8. The average between Q1 1996 and Q4 2014 equals just under 7 percent, which we compute by dividing depository institution loans by total nonfinancial corporate liabilities. See Federal Reserve Bank of St. Louis, "Nonfinancial Corporate Business; Depository Institution Loans Not Elsewhere Classified; Liability, Level," FRED graph, accessed May 27, 2016, https://fred.stlouisfed.org/series/BLNECLBSNNCB; and Federal Reserve Bank of St. Louis, "Nonfinancial Corporate Business; Total Liabilities, Level," FRED graph, accessed May 27, 2016, https://fred.stlouisfed.org/series/TLBSNNCB.

9. These values come from Rajan and Zingales. See Raghuram Rajan and Luigi Zingales, "What Do We Know about Capital Structure? Some Evidence from International Data," *Journal of Finance* 50, no. 5 (1995): 1421–60.

10. The following formula is used to compute the marginal costs of a higher leverage ratio:

$$[(\alpha \times \sigma) / (\alpha - 1)] \times [(\text{Fraction of Corporate Funding from Debt}) / (\text{Firm Cost of Capital})] \times [1 / (\text{Discount Rate})] \times [\Delta \text{WACC} / (\Delta \text{Leverage Ratio})]$$

For a leverage ratio that is 11 percentage points higher, where α is capital's share of income (assumed to equal 0.4) and σ is the elasticity of substitution between capital and labor (assumed to equal 0.5); and assuming the fraction of all corporate funding from debt equals 37 percent, a firm's cost of capital equals 11 percent, and the discount rate equals 5 percent; this translates into a loss of GDP equal to (0.4 × 0.5) / (0.4 − 1) × (0.37 / 0.11) × (1 / 0.05) × 0.0099 = −22.2 percent. Varying the fraction of corporate funding coming from bank loans yields other estimated losses in GDP.

11. The following formula is used to compute the marginal benefits of a higher leverage ratio, assuming a discount rate equal to 5 percent, and assuming the cost of a crisis is negative:

$$[0.9[(1 - (1 - \text{Discount Rate})^{T}) / (\text{Discount Rate})] + 0.1[1 / (\text{Discount Rate})]][(\text{Cost of Crisis}) \times \Delta\text{Pr}(\text{Banking Crisis}) / (\Delta\text{Leverage Ratio})]$$

We estimate the last term from the marginal effects at representative values of the lagged leverage ratio after estimating a probit regression of a banking crisis dummy variable against other variables, including the one-year lagged "aggregated bank capital to aggregated bank assets" leverage ratio. We find that estimates from logit, as well as complementary log-log regressions, which adjust for the asymmetric distribution of banking crises, generate similar results.

12. Our estimate of the cost of a crisis equals a 10.3 percent decline in GDP, which comes from applying an instrumental-variable-treatment regression framework that includes the probit regression in the first stage to annual data from 1892 to 2014. When we exclude the first stage, the alternative cost equals a 4.4 percent decline in GDP.

13. The Miles, Yang, and Marcheggiano study and the Bank of England study both find that a 1 percentage point increase in the capital ratio results in a present value benefit of reducing the probability of a crisis by about 55 percent, assuming the effects are partly permanent. Consequently, our assumptions yield lower estimated benefits of a higher leverage ratio.

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James R. Barth is the Lowder Eminent Scholar in Finance at Auburn University, a senior fellow at the Milken Institute, and a fellow at the Wharton Financial Institution Center. His research focuses on financial institutions and capital markets, both domestic and global, with special emphasis on regulatory issues.

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