

Kupiec, Paul H.

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# The Leverage Ratio Is Not the Problem

Paul H. Kupiec  
*American Enterprise Institute*

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# The Leverage Ratio Is Not the Problem

Paul H. Kupiec

Resident scholar, American Enterprise Institute<sup>1</sup>  
August 17, 2017

## Abstract

Recent proposals have recommended important modifications to the supplemental leverage ratio (SLR) to promote the production of market liquidity and other beneficial banking activities that are alleged to have declined because of the introduction of Basel III capital regulations. These changes would significantly reduce the amount of capital required to engage in these activities. A rigorous analysis of this issue demonstrates that the construction of the SLR is not the source of the problem. The problem is the debt overhang created by the leverage in global systemically important banks and a poorly designed deposit insurance pricing system. A much better solution for promoting liquidity is to significantly raise the minimum SLR to minimize the debt-overhang problem and revise the deposit insurance pricing system so that premiums are much closer to fair market prices for the insurance.

JEL Classification: G21, G28

Key Words: supplemental leverage ratio, Basel III, market liquidity, debt overhang, deposit insurance pricing

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<sup>1</sup> The views in this paper are those of the author alone. Email: paul.kupiec@aei.org

# The Leverage Ratio Is Not the Problem

## I. Introduction

Excessive financial-sector leverage was a primary cause of the recent financial crisis. To prevent institutions from using off-balance sheet activities to exploit Basel risk-weighting rules to create unsustainable levels of leverage, the Basel Committee on Banking Supervision imposed a new minimum leverage requirement as a backstop for Basel risk-weighted minimum capital requirements. This backstop, the supplemental leverage ratio (SLR), was intended to be a safety barrier to ensure that covered institutions that aggressively manage their risk-weighted assets must still maintain adequate capital buffers.

The US implementation of the Basel III SLR regulation, finalized in 2014, put a limit on large banking organization leverage by requiring banking organizations with more than \$250 billion in assets to meet a new capital threshold that treats all holdings with an equal risk weighting. The SLR requirement must be maintained in addition to meeting minimum risk-based capital requirements. The [eight US global systemically important banks](#) (G-SIBs) must maintain an enhanced SLR of 5 percent at the holding company level and 6 percent at the subsidiary bank level. The SLR rules take effect in 2018.

The SLR is the ratio of an institution's Tier 1 capital to its total leverage exposure. Total leverage exposure equals a holding company's consolidated assets plus exposures from derivatives, repurchase agreements, securities lending, lines of credit, guarantees, and other off-balance activities. Such off-balance sheet exposures contributed to the excessive leverage that imperiled many institutions in the prior financial crisis. While all eight G-SIBs satisfied the 2018 5 percent minimum SLR requirement in the first quarter of 2017, many of them could not maintain compliance throughout the 2017 Federal Reserve stress tests scenarios.

Large banks have argued that the risk-insensitive nature of the Basel III SLR restricts their ability to provide market liquidity by increasing the banks' cost of holding so-called safe securities and derivatives for market-making activities. Several proposals, including proposals by [The Clearing House](#)—the trade organization for the US G-SIBs—and the 2017 [US Treasury report](#), have recommended removing risk-free assets and exposures from the SLR calculation.

The SLR is not the only regulatory capital requirement that has been accused of distorting bank investment incentives. Some claim that the Basel III risk-weighted minimum capital rules are also inhibiting interest on reserves (IOR) arbitrage activities. Under current Federal Reserve operating procedures, G-SIB IOR arbitrage is important for the monetary transmission mechanism. Some<sup>2</sup> have argued that IOR arbitrage is inhibited because G-SIB asset and liability positions needed to engage in IOR-arbitrage increase the Basel III G-SIB capital surcharge, and these assets should be excluded from regulatory capital requirements to enhance the Federal Reserve's ability to control interest rates.

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<sup>2</sup> See, for example, Wall (January 2015).

The SLR liquidity issue and IOR-arbitrage concerns are symptoms of the same underlying condition—a Myers (1977) debt-overhang problem created by excessive G-SIB leverage. The construction of the regulatory capital requirements is not the cause of the problem—G-SIB leverage is the root problem. If G-SIBs had a sufficient amount of equity in their capital structure, there would be far less of a dependence on government guarantees, and both the SLR liquidity and the IOR-arbitrage issues would be mitigated. The correct solution for these problems is more G-SIB capital and more accurate pricing of government guarantees—not technical adjustments to the capital ratio definitions.

While the SLR and other regulatory capital adjustments proposed by the US Treasury, the Clearing House and others, may seem like harmless and intuitive fixes, in reality these adjustments have huge potential consequences for taxpayers. The true issue at hand is not the specific formula for regulatory capital rules as proponents contend but is instead a public policy issue of enormous importance—preventing financial institutions from becoming too big to fail. As such, the SLR controversy merits careful analysis and debate.

In this paper, I provide new analysis that help bring clarity to this important public policy debate. Using a simple but rigorous one-period model of risk and return, I recreate conditions under which a G-SIB facing a binding leverage requirement will choose to avoid investing in any new riskless activities because of a leverage ratio constraint. The foregone riskless investments could represent the riskless total leverage exposure necessary to clear derivatives transactions, or the nearly riskless inventories of securities needed to provide liquidity in G-SIB market-making activities, or just a G-SIB's excess reserves held at the Federal Reserve.

Regardless of the interpretation attached to the foregone new riskless exposure, the G-SIB's shareholder managers may choose to forego profitable riskless activities because of a classic debt-overhang problem—the profit from the investment will accrue to G-SIB stakeholders other than G-SIB shareholders. In a nonfinancial corporation facing debt overhang, the benefits from a new safe investment accrue to the corporation's existing debtholders instead of the corporation's shareholders. In the case of a G-SIB with fully government-insured liabilities, the new riskless investment will benefit the government (i.e., taxpayers) and not the G-SIB shareholders.

In the context of this simple model, I demonstrate that removing the riskless exposure from the definition of the regulatory leverage ratio can induce G-SIBs to make a riskless investment, provided that the change in the leverage ratio is accompanied by a change in the G-SIB's government insurance assessment base. The riskless assets at issue must also be removed from the G-SIB deposit insurance assessment base or the G-SIBs will likely refrain from taking the new riskless exposure.

While these changes to the leverage ratio and insurance base may seem harmless, they actually come with a substantial hidden cost. This solution to the alleged liquidity problem overcomes the debt-overhang problem by permitting G-SIB to increase their leverage, which maintains the value of the G-SIB's implicit government insurance subsidy. In other words, the G-SIB shareholders must be subsidized by taxpayers to take on the riskless exposure required to provide

derivatives clearing, market liquidity, or IOR arbitrage. Without the subsidy, the G-SIB will shun these low-risk activities in favor of high-risk endeavors.

Moreover, the Treasury and Clearing House proposed changes to the SLR will encourage regulatory arbitrage. If the changes are enacted, G-SIBs will inevitably restructure their operations to maximize the value of the G-SIB's taxpayer guarantees, which result in increased taxpayer exposure should a G-SIB become financially distressed. The benefits from the proposed SLR changes are real and immediate for G-SIB shareholders. The taxpayer costs of these changes are also real, but they are deferred—the taxpayer costs will remain hidden until the G-SIB becomes distressed.

The proposed solutions to the liquidity and IOR-arbitrage problems will only enhance the too-big-to-fail status of G-SIBs. A much better solution is to (1) require higher equity capital at G-SIB and remove the debt-overhang problem as an operational issue and (2) reform deposit insurance pricing so it does not penalize riskless activities. Any attempt to fix the problem by simply excluding “virtuous” safe activities from the capital calculation will only increase G-SIB leverage and further cement G-SIB status as too-big-to-fail institutions.

The remainder of the paper is organized as follows. Section II provides background on the alleged problems the SLR and other G-SIB capital regulations create and discusses proposals for reform. Section III introduces a simple model that can be used to analyze these issues. Section IV reviews the debt-overhang problem in the context of a nonfinancial corporation and shows that the problem can be alleviated if the firm has a greater share of equity in its capital structure. Section V discusses the debt-overhang problem in the context of a G-SIB whose liabilities are insured by the government. Section VI discusses the proposed solutions for the alleged liquidity and IOR-arbitrage problems. Section VII discusses the regulatory arbitrage opportunities that would be created by the proposed change in the SLR definition. Section VIII discusses an alternative solution that involves raising minimum capital requirements to minimize the debt-overhang problem. Section IX concludes the paper.

## II. Background

Writing for The Clearing House, Stanford University professor Darrell Duffie argues that the imposition of Dodd-Frank Act reforms, including the SLR, have led to higher costs for holding securities and therefore a reduction in securities inventories of the G-SIBs.<sup>3</sup> G-SIBs are also imposing internal funding value adjustments on market-making and derivatives activities to reflect their effect on total leverage exposure in the SLR. The adjustment works like a surcharge, reducing liquidity by raising the bid-asked spread a G-SIB requires to complete a transaction. In his article, professor Duffie argues that using a risk-weighted minimum regulatory capital

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<sup>3</sup> The Clearing House article is the text of Professor Duffie's keynote speech at a Clearing House sponsored research conference. The material in The Clearing House article originally appeared as “Why the Leverage Ratio Distorts Market Making,” *Risk*, January 3, 2017; and [“Why Are Big Banks Offering Less Liquidity to Bond Markets?”](#), *Forbes*, March 11, 2016.

requirement in place of the risk-insensitive SLR could be used to alleviate the debt-overhang problem.<sup>4</sup>

The recent Treasury Department [report](#) includes recommendations for changing the SLR that mirror The Clearing House proposal. Because leverage ratios are not risk sensitive, Treasury claims they encourage G-SIBs to choose risky activities instead of providing customers access to safe central clearing derivatives trades and secured repurchase agreement financing. The Treasury's proposed solution is to deduct the institutions' holding of central bank reserves, US Treasury securities, and initial margin for centrally cleared derivatives from the SLR's total leverage exposure. This solution is equivalent to risk weighting the SLR components and assigning a zero risk weight for the specific exposures the Treasury identified.

One basic tenet of finance theory is that the profitability of an investment does not depend on how it is financed unless serious distortions are at play (Modigliani and Miller, 1958). Professor Duffie argues that the distortion inhibiting G-SIBs from providing liquidity is the so-called debt-overhang problem.<sup>5</sup> Debt overhang occurs when a company has so much outstanding debt that it alters management incentives so that it only approves investments that will not reduce the risk of its future profit stream. Profitable but safe investments will be rejected because a large part of the cash flow from these investments will accrue to debtholders or other firm stakeholders rather than to shareholders.

Similar issues have surfaced in the context of monetary policy operations. [Larry Wall](#), an official at the Federal Reserve Bank of Atlanta, has argued that Basel III G-SIB capital requirements could be hindering the Federal Reserve's ability to control interest rates under its post crisis operating policy that uses interest on reserves (IOR) as the primary policy instrument.

Dr. Wall argues that the Fed may not be able to control short-term market interest rates unless banks are willing to raise additional funds and invest in reserve balances that earn IOR. As long as banks pay less to raise funds than the IOR, banks should be willing to attract new funds and invest the proceeds in reserves. This arbitrage mechanism is the theoretical mechanism that allows the Fed to use IOR to control the market short-term riskless interest rate.

Dr. Wall argues that the Basel III G-SIB supplemental capital surcharge could keep banks from fully arbitraging the IOR. G-SIB supplemental capital charges are higher for banks that use wholesale funding, and wholesale funding is a key component of the IOR arbitrage processes. If IOR arbitrage raises G-SIB minimum capital requirements, G-SIBs may not fully exploit the IOR arbitrage if the additional required bank equity is more expensive than bank debt.

Dr. Wall's solution is to exempt IOR-arbitrage-related balances from G-SIB capital requirements (or assign a zero risk weight) and make adjustments that remove them from the deposit insurance premium base. These changes should remove the wedge that discourages IOR arbitrage and

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<sup>4</sup> In private correspondence and in *Forbes* (March 11, 2016, op cit), professor Duffie indicated that if the SLR is eliminated in favor of a binding minimum risk-based capital requirement, he favors raising the regulatory risk-based capital minimum requirement or the risk weights of some asset classes so that the change does not allow G-SIBs to increase their overall leverage.

<sup>5</sup> The debt overhang issue was identified in Myers (1977).

improve the Fed's ability to control short-term interest rates. While Dr. Wall does not make the connection, the issue he raises is likely another manifestation of a G-SIB debt-overhang problem that professor Duffie has identified.

### III. A Simple Model of Risk and Expected Return

In this section I develop a simple but rigorous model of risk and expected return that has all the features necessary to analyze the issues at hand. The risk-free rate of interest plays no role in the analysis, so for simplicity, I assume the risk-free rate is zero.<sup>6</sup> I assume banks and investors are risk neutral, so they evaluate investments according to the expected value of their future cash flows.<sup>7</sup>

When the risk-free rate is zero, an investment provides an acceptable profit provided its expected net future cash flows equal or exceeds the required initial investment outlay. I assume future uncertainty can be summarized by five possible economic outcomes. Outcomes are rank ordered by their associated economic growth. State 1 represents the highest economic growth outcome and state 5 the lowest. The economic states and their associated probabilities appear in Table 1. Notice that the outcome probabilities sum to one.

Table 1. Possible Economic Outcomes and Probabilities

state	state probability	state characteristic
1	0.05	highest growth
2	0.15	moderate growth
3	0.6	average growth
4	0.15	weak growth
5	0.05	lowest growth

### IV. Overhang Problem in a Nonfinancial Firm

In this section, I construct an example of a nonfinancial corporation that has a debt-overhang problem. Because this firm heavily relies on debt finance, its management will avoid making risk-free investments that are profitable because doing so will lower the net fair market value of the firm's equity.

The nonfinancial corporation state-contingent future cash flows and associated probabilities are given in Table 2. The total fair market value of the firm is equal to the expected value of its

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<sup>6</sup> This simplification avoids the need to discount future cash flows to the present. The analysis can be reproduced assuming the risk-free interest rate is positive, but the extra math required adds nothing to the understanding of the issues of interest in this analysis.

<sup>7</sup> Alternatively, investors could be risk averse, and the probabilities in Table 1 can be interpreted as risk-neutral probabilities instead of physical probabilities.



future cash flows, in this case \$1,000.<sup>8</sup> I assume that the firm is funded using 8 percent equity and 92 percent debt.

The cash payoffs associated with this debt-equity mix appear in the last two columns of Table 2. In states 1–3, the debt receives its promised maturity payment of \$932.25 while shareholders receive the residual cash flow. In states 4 and 5 the firm defaults on its debt because it cannot satisfy the promised debt maturity payment. In these states, debtholders receive the entire firm's cash flow and shareholders receive nothing. These two cash flow streams produce the correct initial funding mix for the firm. The equity has a fair market value of \$80,<sup>9</sup> or 8 percent of the firm asset value of \$1,000. The debt has a fair market value of \$920,<sup>10</sup> or 92 percent of the fair market value of the firm's assets.

Table 2. Highly Leverage Nonfinancial Corporation

state	state probability	future investment payoff	debt payoff	equity payoff
1	0.05	1200	931.25	268.75
2	0.15	1100	931.25	168.75
3	0.6	1000	931.25	68.75
4	0.15	900	900	0
5	0.05	800	800	0
fair market value (\$)		1000	920	80

Now consider the valuation consequences if this firm invests \$10 in a new safe asset and funds the new investment with the exact same capital structure proportions of 8 percent equity (\$0.80) and 92 percent debt (\$9.20). Assume that the debt has the same priority in bankruptcy as the firm's existing debt. Table 3 shows the resulting cash flows and fair market values for the firm's debt and equity.

To raise \$9.20 in new debt funding, the firm must offer the new debt with a maturity value of \$9.288365. In states 4 and 5, the firm cannot honor its promised debt maturity payments, and each debt class (old and new) receives an equal fraction of its promised maturity value. In state 4 this fraction of the maturity payment received is 96.7531 percent;<sup>11</sup> in state 5 the fraction is 86.1209 percent. In states 1–3, the equity holders receive whatever cash flow is left after paying the bondholders their promised maturity payments. In states 4 and 5, shareholders receive nothing.

<sup>8</sup> The expected value of the firm's future cash flow is the sum of the probability – weighted cash flows, or \$1,000 =  $(0.05 \times \$1,200) + (0.15 \times \$1,100) + (0.6 \times \$1,000) + (0.15 \times \$900) + (0.05 \times \$800)$ .

<sup>9</sup> The fair market value of this firm's equity is \$80 =  $0.05 \times \$268.75 + 0.15 \times \$168.75 + 0.6 \times \$68.75$ .

<sup>10</sup> The fair market value of this firm's debt is \$920 =  $(0.05 \times \$931.25) + (0.15 \times \$931.25) + (0.6 \times \$931.25) + (0.15 \times \$900) + (0.05 \times \$800)$ .

<sup>11</sup> This fraction is the funds available in the state (\$910) divided by the promised maturity payments (\$9.288365 + \$931.25). In the text, I have expressed the fraction as a percentage.

Table 3. Debt Overhang for a Nonfinancial Firm

	state	new safe	existing investment	total future	new debt	old debt	new equity
state	probability	investment	payoff	payoff	payoff	payoff	payoff
1	0.05	10	1200	1210	9.288365	931.25	269.4616
2	0.15	10	1100	1110	9.288365	931.25	169.4616
3	0.6	10	1000	1010	9.288365	931.25	69.46164
4	0.15	10	900	910	9.09644	900.9036	0
5	0.05	10	800	810	8.096831	801.9032	0
	fair market value (\$)	10	1000	1010	9.2	920.2307	80.5693

A comparison of Table 2 and 3 will reveal that by making a new \$10 safe investment and maintaining the legacy capital structure, the existing debtholders will end up with larger payoffs in state 4 and 5 (gray-shaded entries)—they receive \$0.9036 more in state 4 and \$1.9032 more in state 5. In other words, the new safe investment decreases the risk faced by existing bondholders, making their bonds more valuable. The new safe investment raises the fair market value of legacy debt by \$0.2307.

To make the new riskless investment, shareholders were required to invest an additional \$0.80, bringing their total invested funds to \$80.80. The entries in Table 3 show the fair market value of shareholders' post-investment position will be only \$80.56931. In other words, shareholders will lose \$0.2307 by making this investment. Using the existing high-leverage capital structure, if shareholders make this safe investment of \$0.80, they will indirectly be transferring \$0.2307 from themselves to the legacy debtholders.

Table 4 provides a contrasting example of the same firm, but without a debt-overhang problem. The firm depicted in Table 4 has the same cash flows as the firm in Table 3, but instead of excessive use of debt funding, it has a balanced capital structure—50 percent debt and 50 percent equity. Because of the limited use of debt, the firm's promised debt payments are riskless. If this firm adds a \$10 safe investment and funds it using the same balanced capital structure as the legacy firm, the shareholders must invest \$5. After their investment the fair market value of their share value rises by \$5, to \$505. This firm's shareholders expect to earn a fair rate of return on their investment, so they are willing to invest in this new safe asset and activity.

#### V. Debt Overhang in an Insured Depository Institution

In this section, I analyze the optimal investment decision of a highly leveraged depository institution whose liabilities are fully insured by the government for a fee. The bank is fully informed about its rate for deposit insurance coverage before it invests or undertakes any new activities.

Table 4. Nonfinancial Corporation with Balanced Capital Structure

state	state probability	new safe investment	existing investment payoff	total future payoff	new debt payoff	old debt payoff	new equity payoff
1	0.05	10	1200	1210	5	500	705
2	0.15	10	1100	1110	5	500	605
3	0.6	10	1000	1010	5	500	505
4	0.15	10	900	910	5	500	405
5	0.05	10	800	810	5	500	305
fair market value (\$)		10	1000	1010	5	500	505

Deposit insurance premium payments are collected at the end of the period when the bank's investments pay off. In this example, I assume that premiums are assessed at a rate of 25 basis points on a base equal to bank's assets minus the bank's book equity value. These insurance premium assumptions approximate the deposit insurance base and premium rates that have been in force since the Federal Deposit Insurance Corporation (FDIC) enacted the changes required by the Dodd-Frank Act.

Table 5. The Value of Stakeholder Claims in a Highly Levered Depository Institution

		risky portfolio investment	debt	insurance premium rate		0.0025
state	state probability	payoff	payouts	insurance payout	insurance premium	equity payout
1	0.05	1200	920	0	2.3	277.7
2	0.15	1100	920	0	2.3	177.7
3	0.6	1000	920	0	2.3	77.7
4	0.15	900	920	20	0	0
5	0.05	800	920	120	0	0
fair market value (\$)		1000	920	9	1.84	87.16
8 percent book equity		80		deposit insurance subsidy	7.16	
92 percent book debt		920			shareholder gain from insurance	7.16

The G-SIB in Table 5 has risky investment cash flows and probabilities that are identical to the nonfinancial firm analyzed in the previous section. The bank is assumed to be constrained by an

8 percent leverage ratio, so shareholders contribute \$80 in equity, and the bank raises \$920 in insured deposits. Since the deposit are fully insured, the deposits pay off \$920 in each state.

In state 4 and 5, the G-SIB's investments produce insufficient cash to fully fund the required debt payment. The insurance fund covers the shortfall (\$20 in state 4 and \$120 in state 5). The fair market value of these expected insurance payments is \$9. The bank's insurance premium is \$2.30, but it can only make these payments in states 1–3. The fair market value of its expected insurance premium payments is \$1.84. On balance, deposit insurance is underpriced by \$7.16.

The final column of Table 5 shows \$87.16 as the fair market value of the G-SIB's shareholder cash payments. This value corresponds to the \$80 shareholder initial investment plus a \$7.16 deposit insurance subsidy that accrues to shareholders.

While some may take issue with my stylized assumption that all G-SIB debt is fully insured, this assumption is less extreme than it may at first appear. When a large bank fails, the FDIC resolution mechanism virtually always requires that the failing bank's deposit franchise be sold to a solvent institution. The sale of the deposit franchise effectively insures all the failing bank's deposits, regardless of its balance relative to legal insurance limits.<sup>12</sup>

Moreover, the FDIC notice of proposed rulemaking explaining the FDIC's [single point of entry strategy for exercising Dodd-Frank orderly liquidation authority \(OLA\)](#) explicitly states the FDIC's intention to use G-SIB parent-holding-company resources to keep a systemically important G-SIB bank subsidiary from defaulting on its noninsured debt. Moreover, if multiple G-SIBs are simultaneously in distress, it is difficult to believe the government would invoke OLA instead of petitioning Congress for resources to recapitalize these institutions.

Table 6 illustrates what happens when this G-SIB considers undertaking a new riskless investment of \$10 and funding it with its legacy capital structure, which is constrained by an 8 percent regulatory leverage ratio requirement. To make the new investment, the G-SIB must commit \$0.80 in additional equity funding and raise \$9.20 in new debt funding. The new investment will also increase its deposit insurance premium by \$0.023, to \$2.323.

If the G-SIB undertakes this investment, after the investment, the fair market price of its equity would be \$87.7816. This new fair market price is \$0.1784 smaller than its pre-investment share value \$87.16 (from Table 5) plus the newly invested \$0.80 in equity. The investment is a bad deal for G-SIB shareholders because the new riskless investment decreases the value of the deposit insurance subsidy by \$0.1784, from \$7.16 (Table 5) to \$6.9816 (Table 6).

New riskless investments will be rejected by the G-SIB shareholders because the majority of the cash flows generated by the new investments will not flow to the G-SIB shareholders but will instead accrue to other G-SIB stakeholders—in this case the government deposit insurer (a.k.a., taxpayers).

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<sup>12</sup> According to a 2016 analysis by [Bert Ely](#), of 522 banks that the FDIC closed since the Indy Mac failure in July 2008, uninsured depositors were protected in all but 30 failures. The largest failed bank resolution to impose losses on uninsured depositors was Silver State Bank, a Nevada bank with \$1.7 billion in deposits when it failed in September 2008.

Table 6. G-SIB Debt-Overhang Example

state	state probability	risky portfolio investment	new riskless investment	total investment	debt payouts	insurance premium rate		0.0025
		payoff	payoff	payoff		insurance payout	insurance premium	equity payout
1	0.05	1200	10	1210	929.2	0	2.323	278.477
2	0.15	1100	10	1110	929.2	0	2.323	178.477
3	0.6	1000	10	1010	929.2	0	2.323	78.477
4	0.15	900	10	910	929.2	19.2	0	0
5	0.05	800	10	810	929.2	119.2	0	0
fair market value (\$)		1000	10	1010	929.2	8.84	1.8584	87.7816
8 percent book equity		80	0.8			deposit insurance subsidy	6.9816	
92 percent book debt		920	9.2				shareholder gain from insurance	6.9816

## VI. The Clearing House and Treasury Proposal

In this section, I analyze the impact of adopting an enhanced version of the changes the US Treasury and The Clearing House have proposed. I modify the leverage ratio by applying a zero risk weight to the new riskless investment, and I remove the riskless investment from the deposit insurance premium base. Table 7 shows the impact of these changes.

Table 7. Enhanced Treasury and Clearing House Leverage Ratio Modifications

state	state probability	risky portfolio investment	new riskless investment	total investment	debt payouts	insurance premium rate		0.0025
		payoff	payoff	payoff		insurance payout	insurance premium	equity payout
1	0.05	1200	10	1210	930	0	2.3	277.7
2	0.15	1100	10	1110	930	0	2.3	177.7
3	0.6	1000	10	1010	930	0	2.3	77.7
4	0.15	900	10	910	930	20	0	0
5	0.05	800	10	810	930	120	0	0
fair market value (\$)		1000	10	1010	930	9	1.84	87.16
8 percent book equity		80	0			deposit insurance subsidy	7.16	
92 percent book debt		920	10				shareholder gain from insurance	7.16

If the new riskless investment is excluded from the G-SIB's total leverage exposure, the G-SIB can maintain an 8 percent leverage ratio while financing 100 percent of the new riskless investment with insured deposits. After this financing choice, the firm's actual leverage ratio (equity-to-asset) will fall from 8 percent to 7.92 percent while its regulatory leverage ratio will remain at 8 percent. If the new riskless investment is omitted from the deposit insurance premium base, the G-SIB's deposit insurance premium payment, after adding the investment, remains unchanged at \$2.30.

When the G-SIB is allowed to fully finance the new riskless investment using debt, and the new riskless investment is excluded from the deposit insurance base, the post-investment fair market value of the G-SIB share price is \$87.16, which is unchanged from its pre-investment share price.

Excluding the new risk-free investment from both the leverage ratio and the deposit insurance premium base gives the G-SIB shareholders a gain of \$0.1784 (from \$87.7816 – \$0.80 to \$87.16). The shareholder gain is completely explained by the increase in the value of the deposit insurance subsidy, from \$6.9816 (Table 6) to \$7.16 (Table 7).

With these changes to the regulations, G-SIB shareholders are perfectly happy to make this new riskless investment. But their newfound fondness for the investment owes entirely to the fact that the regulatory changes allowed the G-SIB to retain the full value of its pre-investment implicit taxpayer subsidy.

## VII. SLR Modifications and Regulatory Capital Arbitrage

Once certain types of exposures are identified as low risk or risk free and are excluded from the leverage ratio and deposit insurance premium base with the explicit intent of encouraging certain types of G-SIB activities, powerful incentives are created that will push G-SIBs to restructure their activities to take full advantage of these new exclusions. Regulatory arbitrage restructuring transactions will almost certainly follow. In the end, the leverage ratio would likely be rendered ineffective.

As an example of the potential impact of regulatory arbitrage, consider restructuring the G-SIB's legacy risk portfolio (Table 5) into two separate investment categories, a risk-free portfolio of 800 that qualifies for a leverage exclusion and a risky portfolio that retains the residual risky cash flows. The risky portfolio must meet an 8 percent leverage ratio. The restructured cash flows of the G-SIB are exactly the same as the cash flows before G-SIB restructuring, only the G-SIB has undertaken transactions that allow the legacy cash flows to be allocated between the new riskless category that is exempt from the leverage ratio and a risky asset category that must meet the 8 percent leverage ratio requirement.

With its restructured portfolios optimized to take advantage of the new leverage ratio definitions, the G-SIB only needs \$16 in equity capital. The G-SIB can pay a dividend of \$64 to its shareholders, and the fair market value of remaining \$16 of book equity will be \$37.432. The restructuring—which changes nothing real about the G-SIB's cash flow risk—creates a shareholder gain of \$14.272 (\$64 dividend + \$37.432 share price – \$87.16 pre-restructuring

share price). This gain exactly equals the change in the market value of the deposit insurance subsidy (\$21.432 – \$7.16). The regulatory arbitrage facilitated by the change in the leverage ratio and deposit insurance premium base has not changed the risk of the G-SIB in any way. It has just created a new avenue for the G-SIB to maximize the value of its implicit taxpayer subsidy.

Table 8. Regulatory Arbitrage and the Modified Leverage Ratio

state	state probability	restructured risky portfolio	restructured riskless	total investment	insurance premium rate			equity payout
		investment payoff	investment payoff		debt payouts	insurance payout	insurance premium	
1	0.05	400	800	1200	984	0	0.46	215.54
2	0.15	300	800	1100	984	0	0.46	115.54
3	0.6	200	800	1000	984	0	0.46	15.54
4	0.15	100	800	900	984	84	0	0
5	0.05	0	800	800	984	184	0	0
fair market value (\$)		200	800	1000	984	21.8	0.368	37.432
8 percent book equity		16	0			deposit insurance subsidy	21.432	
book debt		184	800				shareholder gain from insurance	21.432

Protecting against this kind of activity—regulatory arbitrage—is exactly why the supplemental leverage ratio was introduced. Adopting the Treasury and Clearing House proposal to alter the SLR by creating excluded exposure categories will almost certainly lead to regulatory arbitrage activities that will undermine the SLR’s ability to protect taxpayers from excessive G-SIB risk exposure.

## VIII. The Real Problem Limiting Liquidity is G-SIB Leverage

The true causes of the alleged liquidity and IOR-arbitrage problems are not regulatory capital requirements—leverage or risk based. The true causes are the debt-overhang problem and mispriced G-SIB taxpayer guarantees. The implicit and explicit government guarantees provided G-SIBs are valuable, and they can be made more valuable by increasing G-SIB leverage or increasing the riskiness of G-SIB cash flows. Still, excessive leverage is the basic underlying factor that creates the incentives that encourage G-SIBs to shun low-risk profitable investments in favor of higher-risk alternatives.

Arriving at a fair market price for G-SIB government guarantees is probably an unrealistic goal. It is difficult to accurately assess the riskiness of a bank assets, even for the bank itself. The problem is especially difficult when depository institutions are highly leveraged because these institutions will require insurance assistance in multiple future states of nature. In reality, it is

virtually impossible for the deposit insurer to accurately determine the magnitude of the assistance that will be required in each of the many possible states the bank will face financial distress. Moreover, the insurance pricing function for a highly leveraged bank must be calibrated so that insurance premiums are large and sensitive to small changes in bank risk.

The insurance pricing problem becomes much more manageable if banks are required to have substantial amounts of equity. With substantially more bank capital, fair market bank insurance premiums should be significantly reduced because the insurer only faces exposure in the worst states of nature. Moreover, the accuracy of deposit insurance pricing mechanisms becomes much less of an issue when banks are well capitalized because fair insurance premiums are *de minimis*.

Notwithstanding the difficulties involved, reasonably accurate insurance pricing is necessary to eliminate bank incentives to favor risky activities over profitable low-risk investments. The Dodd-Frank mandated changes to the deposit insurance premium base were probably not helpful in this regard. It is especially difficult to tailor a deposit insurance pricing scheme that imposes actuarially fair rates if these rates must be applied to a base that may be only weakly correlated with the actual balances that are protected by the insurer.

For purposes of illustration, I am going to use a deposit insurance premium base that is equal to insured deposits minus an estimate of a bank's risk-free assets. This base is a more accurate measure of the deposit insurer's potential exposure. Unless premium rates are appropriately adjusted to reflect the exposure impact of new low-risk investments, deposit insurance pricing will remain an impediment to correcting the issues driving calls for SLR reforms.

Table 9 provides the valuation of stakeholder positions of a bank with cash flow and probabilities identical to those in Table 5, but under an 18 percent minimum leverage ratio requirement and the aforementioned modifications to the deposit insurance pricing mechanism. I have adjusted the deposit insurance premium rate to appropriately reflect the risk profile of the bank at its new 18 percent leverage ratio requirement.

Even at an 18 percent leverage ratio, bank deposits in this example are still not risk free. The deposit insurer must supplement bank cash flows by \$20 in state 5. But with the higher bank capital and the new deposit insurance premium base of \$20 (\$820 deposits – \$800 risk-free assets), a deposit insurance premium rate of 5.2632 percent makes the insurance actuarially fairly priced and the bank's shareholders receive no net benefit from the government guarantee.

Table 10 illustrates what happens when this bank invests \$10 in a new riskless activity and funds the investment with \$1.80 in new equity and \$8.20 in new debt. This funding mix keeps the bank leverage ratio at 18 percent. After the investment, the cash flow on the bank's portfolio increase by \$10 in each state. The deposit insurer exposure in state 5 declines from \$20 to \$18.20, but the new riskless investment decreases the base for deposit insurance assessments from \$20 to \$18.2, so the G-SIBs existing insurance remains fairly priced.



The overall impact of the new riskless investment is that G-SIB shareholders must invest \$1.80 in new equity (from \$180 to \$181.80), and the fair market value of their shares rises by exactly \$1.80. With the new higher leverage ratio and revised deposit insurance pricing mechanism, G-SIB shareholders would be willing to make this new riskless investment.

Table 9. G-SIB with Higher Capital and Reformed Deposit Insurance Premium Base

		insurance premium rate*				0.0526
state	state probability	portfolio investment payoff	debt payouts	insurance payout	insurance premium*	equity payout*
1	0.05	1200	820	0	1.05	378.95
2	0.15	1100	820	0	1.05	278.95
3	0.6	1000	820	0	1.05	178.95
4	0.15	900	820	0	1.05	78.95
5	0.05	800	820	20	0.00	0.00
fair market value (\$)		1000	820	1	1	180
18 percent book equity		180	deposit insurance subsidy		0	
82 percent book debt		820				

Table 10. Well-Capitalized G-SIB and New Riskless Investments

		insurance premium rate*				0.0526
state	state probability	new portfolio investment payoff	debt payouts	insurance payout	insurance premium*	equity payout*
1	0.05	1210	828.2	0	0.96	380.84
2	0.15	1110	828.2	0	0.96	280.84
3	0.6	1010	828.2	0	0.96	180.84
4	0.15	910	828.2	0	0.96	80.84
5	0.05	810	828.2	18.2	0.00	0.00
fair market value (\$)		1010	828.2	0.91	0.91	181.8
18 percent book equity		181.8	deposit insurance subsidy		0	
82 percent book debt		828.2				

## IX. Conclusion

Proposals to modify the leverage ratio and other capital regulations by excluding certain classes of low-risk bank exposures are poorly designed to address the problems they seek to address. The true sources of G-SIBs reluctance to invest in activities that are nearly riskless and beneficial for the economy are high G-SIB leverage and a poorly designed insurance pricing mechanism—not the SLR’s lack of risk weighting.

Under the current regulatory system, the equity G-SIBs are required to raise to invest in new beneficial riskless activities is perceived to be too expensive to make these investments profitable. But the new required equity is not truly expensive for the economy writ large. It is only expensive for G-SIB shareholders because the new equity reduces an implicit taxpayer subsidy that benefits them. From the standpoint of society at large, the reduced G-SIB insurance subsidy represents a reduction in the transfer payments from taxpayers to G-SIBs—it is not part of the true cost of raising equity capital.

A better approach for solving the incentive problems that are preventing G-SIBs from investing in low-risk activities that benefit the economy is to remove the debt-overhang problem—the true source of the problem. This requires raising—not lowering—the minimum SLR, keeping the riskless activities in total leverage exposure, and revising the deposit insurance pricing system so that premiums are much closer to a fair market prices for insurance.

## References

- Ely, Bert. 2016. "FDIC's Sudden Concern with Insurance Limit Makes No Sense." *American Banker*. May 18. <https://www.americanbanker.com/opinion/fdics-sudden-concern-with-insurance-limit-makes-no-sense>.
- Duffee, Darrell. 2016. "Why Are Big Banks Offering Less Liquidity to Bond Markets?" *Forbes*. March 11. <https://www.forbes.com/sites/lbsbusinessstrategyreview/2016/03/11/why-are-big-banks-offering-less-liquidity-to-bond-markets/#757e083929de>.
- Duffee, Darrell. 2017. "Why the Leverage Ratio Distorts Market Making." *Risk*. January 3.
- Duffee, Darrell. 2017. "Has Something Gone Wrong with the Over-the-Counter Markets?" *Banking Perspectives*, Quarter 2. The Clearing House Payments Company LLC. <https://www.theclearinghouse.org/research/banking-perspectives/2017/2017-q2-banking-perspectives/over-the-counter-markets>.
- Modigliani, Franco, and Merton H Miller. 1958. "The Cost of Capital, Corporation Finance and the Theory of Investment." *American Economic Review* 48, 261–97.
- Myers, Stewart. 1977. "Determinants of Corporate Borrowing." *Journal of Financial Economics* 5, 147–75.
- Wall, Larry. 2015. "The Impact of Regulation on Monetary Policy." *Notes from the Vault*. Federal Reserve Bank of Atlanta. January. [www.frbatlanta.org/cenfis/publications/notesfromthevault/1501.aspx](http://www.frbatlanta.org/cenfis/publications/notesfromthevault/1501.aspx).
- US Department of the Treasury. 2017. "A Financial System That Creates Economic Opportunities: Banks and Credit Unions." June. <https://www.treasury.gov/press-center/press-releases/Documents/A%20Financial%20System.pdf>.