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The Fed Designed the GSIB Surcharge to Achieve a Flawed Objective

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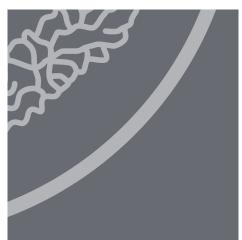*william.nelson@theclearinghouse.org*

INTRODUCTION

An important component of the post-crisis bank regulatory framework is the GSIB (global systemically important bank holding company) capital surcharge. Basically, GSIBs are required to maintain higher capital ratios. In a whitepaper that the Fed released when announcing the surcharge, it explained that the surcharge was designed to achieve "equal expected impact" of the systemic costs of the failure of a GSIB and a reference not-quite GSIB. [1] The BIS also noted the equal expected impact objective as one of its considerations when calibrating the international standard for the GSIB surcharge. In a nutshell, they seek to have the odds of failure times the systemic costs of failure equated for the two types of firms. Since the systemic costs of failure of the GSIB are higher, the GSIB holds more capital to reduce its odds of failure proportionately.

Setting aside significant problems with how the Fed actually calibrated the capital charge (some of which we discuss in a previous research note), there are reasons to be skeptical about the equal expected impact objective itself. Usually economic conditions for optimality equate marginal costs and marginal benefits. In this case, the marginal social cost of becoming more systemic (contagion, moral hazard if viewed as TBTF, etc.) should equal the marginal social benefit of being more systemic (returns to scale to becoming larger, ability to provide global services, etc.). If there are no economic gains to a bank being more systemic, then the correct policy is to reduce the size of all systemic banks to a level where they are no longer systemic.

It is important to note that the equal expected impact objective equates expected systemic failure costs; that is, costs that are externalities such as fire sale impacts on other firms,

not costs that are borne by the creditors of the firm itself. Costs that are borne by the bank's creditors should be reflected in its funding costs leaving no public policy justification for regulation. Moreover, it is assumed that both larger and smaller banks generate failure externalities, otherwise the expected systemic impacts couldn't be equated.

In this note we show that in a simple model of banking, socially optimal bank size does not, in fact, equate the expected systemic impact of banks of different sizes. Because of the existence of failure cost externalities, regulation is required in the case of both GSIB and non-GSIB banks to incentivize them to choose a smaller size and lower level of leverage than they would do on their own. However, conditions are optimal when banks in lines of business with greater returns to scale are larger and have greater expected systemic failure costs than banks in lines of business that operate most efficiently at smaller scales.

We are not aware of an economic model, or even a compelling rationale, where the socially optimal distribution of bank size has the characteristic that the expected systemic cost of failure is equal across sizes.

SIMPLE MODEL OF A BANK

This section provides a simple, single period model of a bank with returns to scale and bankruptcy costs that go up with size. At the start of the period, equity investors provide their own funds and borrow from depositors to invest in assets (loans and securities). The bank either fails or doesn't. If the bank does not fail, depositors have their money returned with interest and the equity investors receive the remaining profits. If the bank fails, depositors are paid to the extent there are proceeds from sales of the assets and profits in excess of bankruptcy costs (ignoring the impact of any Federal insurance proceeds). In either case, depositors also get value from the deposits as money-like assets. Depositors and equity investors are risk neutral and the risk-free rate is zero.

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1   "The white paper focuses on the "expected impact" framework, which is based on each GSIB's expected impact on the financial system, understood as the harm it would cause to the financial system were it to fail multiplied by the probability that it will fail. Because a GSIB's failure would cause more harm than the failure of a non-GSIB, a GSIB should hold enough capital to lower its probability of failure so that its expected impact is approximately equal to that of a non-GSIB." p.iii. Calibrating the GSIB Surcharge, Board of Governors of the Federal Reserve System, July 20, 2015.

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» Banks earn $(1 + r - (s/2)A)A$ on assets (A). "r" is determined in a competitive market and is positive (greater than the risk free rate of zero) because banks provide unique credit services. "$-(s/2)A$" reflects diminishing returns to scale. The smaller is s, the larger is the optimal scale of the bank.

» Depositors get utility from deposits as a money-like investment equal to mD.

» The probability of bank failure $\pi(D/A)$ depends only on the ratio of deposits to assets.

» If a bank fails, there are bankruptcy costs that go up with the size of the bank. We follow the Fed's whitepaper in assuming that bankruptcy costs go up proportionately with the size of the bank and so set costs equal to cA.

  • Note that at this point, none of the costs are modeled as externalities; they are all borne by the depositors. Consequently, the profit maximizing solution to the problem is also the social optimum.

» If the bank fails, equity investors get nothing and depositors get the assets and profits minus the bankruptcy costs.

» If the bank does not fail, depositors get a payout D_1 that provides them an expected return of zero (the risk free rate).

Model
The first step is to solve for the amount depositor receive in the state where the bank does not fail (D_1). We assume depositors have an alternative investment that pays the risk-free rate of zero, and that the market for deposits is competitive, driving the expected return on deposits to zero as well. If deposits have a zero expected return, then the amount they expect to get should equal the amount they invest. In that case,

$$D = \left(1 - \pi\left(\frac{D}{A}\right)\right)D_1 + \pi\left(\frac{D}{A}\right)\left(1 + r - \frac{s}{2}A - c\right)A + mD \quad (1)$$

Solving for D_1,

$$D_1 = \frac{D - \pi\left(\frac{D}{A}\right)\left(1 + r - \frac{s}{2}A - c\right) - mD}{\left(1 - \pi\left(\frac{D}{A}\right)\right)} \quad (2)$$

The return to equity investors is zero in the failure state and the assets plus earnings minus the payment to depositors in the good state.

$$\pi\left(\frac{D}{A}\right)0 + \left(1 - \pi\left(\frac{D}{A}\right)\right)\left(\left(1 + r - \frac{s}{2}A\right)A - D_1\right) \quad (3)$$

Substituting (2) into (3) and simplifying yields

$$\left(1 + r - \frac{s}{2}A\right)A - (1 - m)D - \pi\left(\frac{D}{A}\right)cA \quad (4)$$

Finally, subtracting the initial equity investment $(A-D)$ yields the net return

$$\left(r - \frac{s}{2}A\right)A + mD - \pi\left(\frac{D}{A}\right)cA \quad (5)$$

As noted, at this point, we are assuming that the bankruptcy costs are all borne by the depositors; there are no externalities. Equation (5) is also the social return to banking: the value added from lending and from deposits minus the expected bankruptcy costs.

Solution
To maximize net return (5) we take the partial derivatives with respect to deposits D and assets A.

$$\frac{\partial}{\partial D}: 0 = m - \pi'\left(\frac{D}{A}\right)c \quad (6)$$

$$\frac{\partial}{\partial A}: 0 = r - sA - \pi\left(\frac{D}{A}\right)c + \pi'\left(\frac{D}{A}\right)c\frac{D}{A} \quad (7)$$

Increasing deposits has the benefit of creating additional valuable money-like liabilities but the cost of greater expected bankruptcy costs because the bank becomes more leveraged and therefore more likely to fail. Equation (6), the partial derivative with respect to deposits, indicates that deposits should be increased until the marginal increase in expected bankruptcy costs equals the money premium. Note that the equation uniquely determines the deposit/asset ratio, d*, and the riskiness of the bank π(d*). In particular, d* solves

$$\pi'(d^*) \;=\; \frac{m}{c} \qquad (8)$$

As noted above, we are assuming that π″(d*)>0 (a necessary condition for this to be a profit maximum). If deposits are more valuable, banks are more leveraged and the optimal probability of failure increases. If the cost of failure increases, banks become less leveraged and the optimal probability of failure declines.

Substituting (6) into (7) and recognizing that D/A is determined by (6) yields

$$0 = r - sA - \pi(d^*)c \;+\; md^* \qquad (9)$$

So the optimal asset size of the bank, A*, equals

$$A^* = \frac{r + md^* - \pi(d^*)c}{s} \qquad (10)$$

Intuitively, the optimal size of the bank goes up if it provides a more valuable product (r increases) or operates more efficiently at a larger scale (s falls). Both are consistent with the market reality that GSIBs provide products that small banks can't such as international banking or capital market intermediation.

Systemic Failure Costs
At this point, there is no role for the "equal expected impact" requirement because the bank failure has no systemic

impact; all failure costs are borne by depositors. Suppose, instead, that half of the cost of failure is systemic and not borne by the depositors in failure while the other half is. From the bank's perspective, the cost of failure would be (c/2)A not cA. In that case, as can be seen by equations (8) and (10), the bank would choose size d' and A', where

$$\pi'(d') \;=\; 2\pi'(d^*) \qquad (11)$$

$$A' = A^* + \frac{m(d' - d^*) - (\pi(d')\frac{c}{2} - \pi(d^*)c)}{s} \qquad (12)$$

While it is clear from equation (11) (and the assumption that π″(d*)>0) that leverage and the probability of failure would be higher if the bank does not internalize all the cost of failure, it is less clear from equation (12) whether size goes up or down as internalized failure costs decline.

To see how size changes with the cost of failure, it is necessary to calculate dA/dc. From equation (6), we can calculate the change in leverage w.r.t. the cost of failure, dd/dc

$$\frac{dd}{dc} = \frac{\pi''(d)c}{\pi'(d)} \qquad (13)$$

And from equation (10) and the envelope theorem,

$$\frac{dA}{dc} = -\frac{\pi(d)}{s} \qquad (14)$$

which is always negative. So as the cost of failure internalized by the bank declines (that is, when some of the bankruptcy costs are externalities), the bank increases in size.

In sum, because part of the total cost of failure is not internalized, the bank ends up both too risky and too big. Consequently, a bank regulation that moved the bank with failure cost externalities from the size and riskiness it chose when

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maximizing its net profits to the socially optimal size and riskiness would make the bank smaller and safer, just like the GSIB surcharge. Nevertheless, it would not be the case that the expected systemic of impact of failure of the larger bank would equal the expected systemic impact of the smaller bank except by happenstance, as explained below.

If the smaller bank were also forced to internalize its systemic costs of failure and operate at its optimal scale, the expected systemic costs of impact of the larger bank would be greater than that of the smaller bank. Because at the optimum both bank choose the same probability of failure, the expected systemic cost of failure of the banks at the optimum ($\pi(d^*)cA^*/2$) is larger for the larger bank.

However, the GSIB surcharge applies only to GSIBs even though the logic of the regulation requires that non-GSIBs also have failure cost externalities. If the smaller bank were not forced to internalize its systemic costs of failure, it would choose to be riskier and larger than optimal, increasing its expected systemic cost of failure. While it could be the case that the expected systemic cost of failure of the unbridled smaller bank could therefore equal the expected systemic cost of failure of the regulated larger bank operating at its optimal risk and size, the outcome would only be coincidental.

CONCLUSION

Well-designed regulations are based on a clear and appropriate objective. While the objective of the GSIB surcharge – equating the expected systemic failure costs of a GSIB with the costs of a not-quite-GSIB – is clear, it is not appropriate. An appropriate objective is one that leads to maximizing the net social benefit of economies of scale and scope in the banking system. We show that in a simple model of banking that recognizes both gains and costs to scale, "equal expected systemic impact" is not a condition that holds when banks operate at their socially optimal size.

A model by itself proves nothing, of course, but economists use models to test for the reasonableness of a proposition. If a condition does not hold in at least some simple model, economists typically conclude that the result is highly implausible. We can think of no model for which the equal expected systemic impact objective is a characteristic of the socially optimum outcome.

While there are unquestionably larger failure externalities for a more systemically important institution, there are also unquestionably benefits to having some banks operate at larger scales with an international scope and capital markets presence. Large international corporate clients require a bank that can not only facilitate their international businesses but also their borrowings in capital markets. And large banks have the data and expertise to provide relatively homogenous credit efficiently to households and small businesses.

Thus the stakes are high. A policy that allows for greater-than-optimal scale results in risks that are too high of disruptive failures with potentially catastrophic consequences. But policy that leads to an unnecessarily extensive withdrawal of banks from business models that entail a geographically diversified provision of credit at lower costs to businesses and households will not only reduce economic growth but also result in riskier banks.

Ultimately, unlike the current GSIB surcharge, public policy to manage the systemic costs of the failure of a GSIB should be calibrated using actual data and adjusted to reflect the successful policies already in place to reduce failure costs. But at its base, the policy should be designed to pursue an appropriate objective. Unless there is some simple model in which equal expected systemic impact is a characteristic of the social optimum, it is implausible that it is the right objective to pursue. ∎

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