Too Correlated to Fail

Anticipation of bailouts encourages banks to invest alike, making bailouts more probable and crises more severe

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Executive summary

In this paper, we argue that the anticipation of bailouts creates incentives for banks to herd in the sense of making similar investments. This herding behavior makes bailouts more likely and potential crises more severe. Analyses of bailouts and moral hazard problems that focus exclusively on bank size are therefore misguided in our view, and the policy conclusion that limits on bank size can effectively solve moral hazard problems is unwarranted.

Introduction

Misery loves company.[1]

Since Kareken and Wallace (1978), it has been well understood that deposit insurance creates incentives for banks to take on excessive risk. Protected from losses by deposit insurance, bank depositors will rationally pay little or no attention to the riskiness of their bank's portfolio; consequently, the interest rate a bank needs to offer to attract deposits will not be sensitive to the risk characteristics of its portfolio—undermining the usual risk/return trade-off faced by investors. Banks that seek to maximize shareholder value therefore have an incentive to take on more risk than they would if their deposits were uninsured. Indeed, banks that trade equity on public markets have strong incentives to take on as much risk as regulators allow. This phenomenon of one party taking excessive risks because another party bears all or some of the cost of failure is often referred to, in banking and other spheres, as "moral hazard."

Stern and Feldman (2004) argue that when a large financial institution is confronted with the possibility of failure, policymakers concerned about broader systemic fallout from that failure have strong incentives to intervene. Even uninsured debtholders may be bailed out to prevent failure, and expectations of such bailouts induce them to be relatively unconcerned about the level of risk of their financial institutions. Just as with the *explicit* protection of deposit insurance, the lack of concern generated by *implicit* guarantees of government bailouts encourages banks to take on excessive risk.

Stern and Feldman's argument has been interpreted (or misinterpreted) to mean that policymakers should be concerned about potential failure of *large* financial institutions *only*. This interpretation suggests that a simple method of curing this moral hazard problem is to set regulatory limits to ensure that no individual financial institution is "too" big.

This policy conclusion is mistaken, we argue in this paper. Policymakers do not intervene when big banks

are threatened simply because those *banks* are too big. Rather, they intervene because the potential *systemic costs* resulting from bank failure are considered too big.

Bank size is not the issue

Consider two scenarios, one without regulatory limits on bank size and the other with such limits. Suppose that when regulations do limit bank size, small banks—all below the size limit—choose scaled-down versions of the large bank's portfolio. That is, each small bank's portfolio has holdings in the exact proportion, but smaller size, of that large bank's portfolio. (For simplicity, assume all depositors are identical so that the characteristics of depositors in all banks—large and small—are identical.)

If the aggregate economy is hit with a shock that adversely affects investment portfolios, and the survival of both large and small banks is in doubt, would the aggregate costs of banking system failure differ under the two scenarios? Clearly not. Since the collective financial assets, liabilities and risk profiles are identical whether bank size is limited or not, the systemic costs of not bailing out banks are exactly the same. Therefore, policymaker incentives to undertake bailouts are unaffected by bank size limits, if collections of smaller banks assume the same or similar portfolio risk as would one big bank.

Proponents of bank size limits as a solution to the moral hazard problem induced by bailouts implicitly assume that the combined portfolio of a collection of smaller banks will be less risky than the portfolio of a large bank of equivalent size. This assumption is unwarranted, we contend. In fact, the very prospect of government bailouts creates an incentive for banks—regardless of size—to take on highly correlated risks, which, in turn, raises the likelihood of financial crisis.

Policymakers will intervene when the aggregate assets of threatened financial institutions are sufficiently large to represent a substantial risk to the broader economy should those institutions fail. The following example illustrates the manner by which this policy motivation creates an incentive for banks to take on correlated risks. (We provide a numerical version of this example in the second section of the paper.)

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Consider an extreme case where U.S. banks can invest in mortgages to residents of just two states, either Florida or New York (both have basically the same size population). We'll further assume that just one of these states will have a high default rate, but that banks don't know which state that is until after the mortgages are sold. In a well-functioning market without regulator bailouts of failing banks, banks will invest roughly half their assets in each state, since default rates are not known in advance—thereby providing themselves, through diversification, with the highest possible level of protection from loss.

But suppose that, for some reason, all banks invest in Florida mortgages only. If Florida turns out to have the high default rate, then all banks are threatened with failure, and policymakers have a strong incentive to bail them out. From the perspective of an individual bank considering whether to buy Florida or New York mortgages, it is therefore rational to buy only Florida mortgages. Each bank knows that if Florida mortgages default, it is assured a government bailout precisely because *all* banks are threatened, and the government will therefore intervene to prevent broad systemic failure.

If, again, virtually all banks invest in Florida mortgages, but instead it is *New York* mortgages that have a high default rate, a particular bank that bucked the herd and invested in New York mortgages would not receive a bailout, since the system as a whole is not threatened. Thus, the existence of a bailout policy encourages all banks, regardless of size, to invest similarly and thereby correlate their risk portfolios.

How would banks go about correlating their risks in a more realistic world? One way to do this is through securitization, a practice that has become extremely prevalent in recent decades. Bank loans are securitized by selling claims to a pool of those loans. Securitization of this form allows banks to diversify their portfolios and ensures that their profits are not unduly dependent on the idiosyncratic risk of the loans that they have originated. But because securitized loans are usually held by other banks, the practice ensures that all banks end up holding very similar portfolios and thus have highly correlated risk.

This paper argues that limits on bank size miss the point. What truly matters to the well-being of the broad economy is not the risk profile of any given bank portfolio, large or small, but the risk profile of the *entire banking system*. Regulators therefore need to understand what kinds of events are likely to threaten a significant fraction of the aggregate assets of the entire banking system, rather than concentrate (as current policies do) on a limited number of large banks. In particular, they must focus on how the portfolio of the entire banking system is exposed to such events. Regulation of a given bank then should deal with whether that particular bank's behavior is mitigating or aggravating the risk exposure of the entire system. In brief, we need stress tests of the entire banking system, not just of individual banks.

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A numerical illustration

In this section, we provide a numerical (though still extreme and hypothetical) example of the New York/Florida scenario.

A large number of banks have access to investment funds, and they can invest only in New York or Florida mortgages. Each bank separately chooses what fraction of its funds to put into New York mortgages versus Florida mortgages. In each state, mortgages face both idiosyncratic risk (meaning a risk situation particular to that mortgage) and aggregate risk (experienced by the entire state). Every bank makes an individual decision about the fraction of its funds it will invest in each state, and all banks make their investments before anyone knows what the future risk scenario will be. Banks are aware of investment decisions made by other banks.

We'll assume that, after investment decisions are made, the aggregate economy can be in one of three situations:

- With 5 percent probability, a housing collapse occurs in New York, but not in Florida.
- With 5 percent probability, a housing collapse occurs in Florida, but not in New York.
- With 90 percent probability, no housing collapse occurs anywhere in the United States.

Let's also assume (generously) that a $1 mortgage investment returns $1.50, but only if the borrower doesn't default. In addition, we'll say that 30 percent of borrowers will default if their state suffers a housing collapse, but 10 percent will default if there is no collapse.

Bank investments in New York work as follows (and symmetrically for Florida): If New York experiences a housing collapse, each dollar invested there has a 70 percent chance of yielding $1.50, but a 30 percent chance of yielding nothing. If Florida experiences the housing collapse or the nation as a whole is free of a housing crisis, a dollar invested in New York has a 90 percent chance of a $1.50 return and a 10 percent chance of total loss. In sum, New York mortgage investments (logically) are more likely to yield nothing if a housing market collapses there than if it collapses in Florida or not at all.

Similarly, a dollar invested in Florida mortgages has three times the likelihood of returning nothing if Florida housing collapses relative to the chance of a total loss if the New York market fails or there is no housing crisis anywhere in the United States.

The point of this setup is to present a situation where the banking system's exposure to aggregate risk is determined by the choices of many small actors—in this case, small banks. Here's how it would work, depending on where those small actors invest:

If all banks invest in New York, there's a 95 percent chance that each will get $1.50 back for 90 percent of total dollars invested (given the 10 percent default rate) and a 5 percent chance that each will get a full return on just 70 percent of the bank's total investment (since 30 percent of mortgages will default). That works out to a mean return of $1.335 =1.5*(.95*.9 +.05*.7) per dollar invested.

And if all banks split their investments 50-50 between Florida and New York, or half the banks invest totally in Florida and half just in New York? Here, too, the mean return is $1.335 per dollar invested.[2]

Given this situation, where aggregate risk is determined by many small banks (not simply those considered "too big"), what role does government policy play? More particularly, how does the presence or absence of policy intervention through bailouts affect bank decisions and aggregate risk?

But if banks diversify over states, either by each bank diversifying between New York and Florida or by half the banks investing in New York and half in Florida, the mean total return remains the same, but the variance is lower and the portfolio's worst case scenario is better. (If all banks invest in one state, the worst-case scenario is 30 percent of loans fail. If banks diversify over states, the worst case scenario is 20 percent of loans fail.)

Given this situation, where aggregate risk is determined by many small banks (not simply those considered "too big"), what role does government policy play? More particularly, how does the presence or absence of policy intervention through bailouts affect bank decisions and aggregate risk?

In a world without government intervention, if banks are at all risk-averse, they will each invest half their funds in a large number of New York mortgages and the other half in a large number of Florida mortgages. This ensures that each bank makes a return of $1.35 (= 90 percent of $1.50) per dollar invested if there is no housing collapse and $1.20 (= 80 percent of $1.50) per investment dollar if either Florida or New York suffers a housing collapse. Investing in any other proportion is a "mean preserving spread," something that risk-averse entities, by definition, avoid if costless to do so, as is the case here.

Regardless of the fraction invested in each state, if there is no collapse, a bank's return is $1.35 (= 90 percent of $1.50) per dollar invested. And if there is a collapse—in either New York or Florida—investing half in each market ensures $1.20 (= 80 percent of $1.50 return per dollar). Investing any other proportion introduces further risk to the bank because then its mean return stays constant, but its return when either New York's or Florida's housing market collapses depends on which occurs.

Now introduce government bailouts. In particular, assume that if 25 percent or fewer mortgages fail, this is considered by government to be within the range of "nonemergency" states of the economy, and thus policymakers do nothing. But if more than 25 percent of mortgages fail, the government declares a financial crisis, triggering a bailout of all failed mortgages, possibly using lump-sum taxes on banks to fund these bailouts.

Again we ask, what will banks do? Unlike the situation without bailouts, now what makes sense for a particular bank to do depends on *what other banks do.*

First, suppose all (or almost all) banks invest half their funds in each state, as is the case without the possibility of bailouts. In this case, at most 20 percent of mortgages will fail; thus, a government bailout will never occur. Given no possibility of bailouts, any particular bank should invest 50-50 as well. Thus, all banks investing half in each state is a set of mutually reinforcing behaviors—an equilibrium.

But with a bailout policy in place, there are two other equilibria as well: one in which all banks invest only in New York and one in which all banks invest only in Florida. To see this, suppose a bank sees all (or almost all) other banks investing all their funds in New York. Does that bank profit from investing all in New York as well? If so, then all banks investing only in New York is a set of mutually reinforcing behaviors.

And it indeed does make sense for each bank to invest all in New York if all the other banks are doing so. To see this, consider what happens, scenario by scenario, to a bank that "goes along with the herd" and invests all in New York when all other banks are doing so versus a bank that doesn't go along with herd (and invests 50-50 in each state), again when all other banks invest only in New York.

If no housing collapse happens in either state, it makes no difference whether this bank goes along with the herd or not. It gets a return of $1.50 on 90 percent of its mortgages regardless of where they are.

Next, if the New York housing market collapses, 30 percent of all mortgages will fail, triggering, by assumption, a government bailout of all mortgages. Thus, in the "New York collapse" scenario, it also makes no difference whether this particular bank goes along with the herd or not. Its profits are $1.50

per dollar invested (since all failing mortgages are paid off by the government) less a bailout tax, again, regardless of which states the mortgages are in.

Finally, if a housing collapse occurs in Florida, the 50-50 strategy returns a lower amount than investing all in New York, since 20 percent of the bank's mortgages fail versus 10 percent if the bank had invested only in New York.

Thus, in two scenarios (no collapse and a New York collapse), it makes no difference whether a bank goes with the herd or not, and in the remaining scenario (a collapse in Florida), a bank is strictly better off having gone with the herd. Since banks must choose how to invest before they know which scenario occurs, it makes financial sense for each bank to invest only in New York if all other banks do so as well. (Symmetrically, there is also an equilibrium where all banks invest only in Florida.)

Note here that these two "extra" equilibria—all banks investing only in New York mortgages and all banks investing only in Florida mortgages—exist only because of the anticipation of bailouts. The anticipation of bailouts causes a financial fragility due to the coordinated behavior of small banks that would not exist otherwise.

Conclusion

In this paper, we have argued that the anticipation of bailouts creates incentives for banks to herd. This herding behavior makes bailouts more likely and crises more severe. Analyses of bailouts and moral hazard problems that focus exclusively on size are therefore misguided, in our view, and the policy conclusion that limits on bank size can effectively solve moral hazard problems is unwarranted. R

Endnotes

[1] Attributed to John Ray, English naturalist and botanist. Poet and dramatist Christopher Marlowe is also cited as a source through his use of a similar Latin phrase, Solamen miseris socios habuisse doloris. Doctor Faustus, Sc. 5.

[2] This calculation is the sum of a 90 percent chance of no collapse (and thus a 90 percent repayment rate) plus the 10 percent probability of an 80 percent repayment rate, where the 80 percent repayment rate is the result of averaging a 20 percent default rate over the total investment since both New York and Florida face 30 percent default rates if their market collapses but just 10 percent default if their state market remains healthy. That is, $1.335 = 1.5* (.9*.9+.1*.8).

References

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