

Government Assistance and Moral Hazard: Evidence from the Savings and Loan Crisis

By Padma Sharma

Financial regulators aim to maintain a banking system that does not require taxpayer-financed rescues in a crisis. Interventions such as the Troubled Asset Relief Program in 2008, in which the government recapitalized banks facing extraordinary loan losses, are not only costly to taxpayers but may also lead banks to expect future assistance, potentially incentivizing them to take excessive risks. To discourage banks from risky behavior, regulators often try to signal that they will not assist banks in a future crisis; however, there are few historical examples of regulators following through on these promises to suspend assistance to banks.

Regulations passed during the savings and loan crisis in the 1980s provide an example of policies that did discourage risk-taking. In the 1980s, savings and loan institutions (S&Ls)—banks that serve households rather than firms by collecting deposits and financing home mortgages—underwent two waves of failures. After the first wave, the Federal Savings and Loan Insurance Corporation (FSLIC) liquidated or sold some failed S&Ls but assisted other failed S&Ls to keep them in operation. In 1989, however, the FSLIC became insolvent and closed.

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In its place, the U.S. government set up the Resolution Trust Corporation, a temporary agency with the power to liquidate failed S&Ls and sell their assets. Critically, the government prohibited the new agency from assisting failed institutions—thus signaling the suspension of future assistance.

In this article, I examine how suspending assistance to failed S&Ls in 1989 affected the balance sheets of operational S&Ls, based on the approach in Sharma and Banerjee (2019). I find that S&Ls responded to the change in policy differently depending on ownership structure: stock S&Ls, which are owned by equity holders entitled to surplus profits, increased their composition of safe assets relative to mutual S&Ls, which are owned by depositors that are paid out fixed interest. Because owners of stock S&Ls were likely to lose the value of their equity if they failed under the new regime, they responded by reducing risk-taking to a greater extent than owners of mutual S&Ls, who would be compensated with deposit insurance up to the insured limit under both regimes. If government assistance had remained feasible, our estimates suggest that stock S&Ls likely would have continued taking risks, lending an additional \$2.14 billion and reducing their holdings of securities by \$4.5 billion. In contrast, the owners of mutual S&Ls received fixed interest payments that did not change substantially across the two policy regimes. Mutual S&Ls did not engage in excessive risk-taking even when government assistance was feasible, so they had little incentive to further reduce risk-taking when assistance was suspended. These results show that when policymakers credibly signal that public assistance will not be granted to failed financial institutions, operational institutions become more conservative in their risk-taking and take steps to strengthen their balance sheets.

Section I summarizes the nature of the S&L crisis. Section II compares the FSLIC's responses to S&L failures with recommendations for regulatory actions from theoretical studies. Section III evaluates the effect of the policy change in 1989 on risk-taking among stock S&Ls relative to mutual S&Ls. Section IV infers lessons from this episode for current policies.

I. The Savings and Loan Crisis

Since their origin in the 19th century, S&Ls (also referred to as thrifts) have been associated with the broad goal of fostering home ownership. The first S&Ls were formed by groups of individuals who pooled resources and lent funds to members to use toward residential mortgages, a need banks at the time did not fulfill. To encourage homeownership, federal agencies eventually formally required S&Ls to specialize in mortgage lending and provide only fixed-rate mortgages.

This focus on mortgages served S&Ls well through the mid-20th century but was a crucial contributor to a crisis that emerged in the S&L industry in the 1980s. When interest rates rose sharply in the early 1980s, S&L institutions paid out much more in interest on their deposits than they earned on their loans and began to experience large losses. These unsustainable losses ultimately resulted in S&L institutions becoming insolvent and failing, creating the first wave of S&L failures in 1981–83.

Following this first wave of failures, policymakers deregulated the S&L industry to address institutional rigidities. The new deregulatory policies not only permitted S&Ls to expand their loan offerings beyond fixed-rate residential mortgages but also lowered the safety and soundness standards under which S&Ls operated (White 1991). For example, S&Ls were permitted to issue adjustable-rate mortgages and to make business and commercial real estate loans, which were previously the domain of commercial banks. In addition, S&Ls were permitted to directly hold equity interest in real estate, which allowed them to step beyond their traditional role as lenders and operate as investors. This policy allowed S&Ls to take on additional risk, as any losses from adverse price movements on these transactions would affect S&Ls' capital more directly and swiftly than in transactions in which they were lenders. Regulators also relaxed safety standards by reducing the minimum capital thresholds that S&Ls had to maintain and by applying alternative, permissive accounting standards that determined which assets counted as capital. The new standards clouded regulators' assessments of S&Ls' financial health; institutions that would have previously been considered insolvent were considered solvent under the new rules.¹ Overall, the deregulatory policies permitted S&Ls to foray into loan categories typically serviced by commercial banks while operating under lighter regulation.

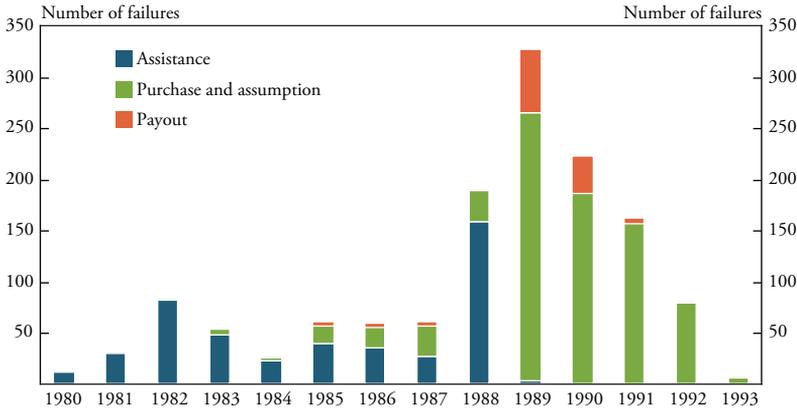
The deregulatory policies meant to alleviate the first wave of failures in 1981–83 thus enabled the risk-taking that led to a second, larger wave of S&L failures in 1985–92. In response to permissive regulations, the industry expanded rapidly over 1982–85—new institutions entered the industry and extant institutions grew larger. Growth was mainly concentrated in business lines that had become newly accessible to S&Ls, such as commercial mortgages and direct equity investment.² But this growth was also concentrated in specific sectors and regions, making S&Ls more vulnerable to sector-specific shocks. For example, S&Ls increasingly financed real estate projects in oil-rich states in the South and Southwest. As oil prices rose, the regions' outlook for growth brightened, and real estate projects developed rapidly. But when oil prices plummeted in 1986, real estate prices in these regions dropped steeply; S&Ls were unable to absorb the credit losses from declining real estate prices and became insolvent. Accordingly, the industry underwent a second wave of failures from 1985 to 1992.

When an S&L institution failed, the Federal Savings and Loan Insurance Corporation (FSLIC), which managed the resolution of failed institutions, could choose one of three actions: “open thrift assistance,” in which they would provide financial assistance either directly to the distressed institution or to an acquirer; “purchase and assumption,” in which they would sell the institution in part or whole to other healthy institutions; or “payout,” in which they would liquidate the institution and pay depositors the insured component of their deposits. Open thrift assistance allowed an S&L's charter to remain open and the S&L to continue operating in its current form. The remaining two options closed the failed S&Ls' charters and discontinued their operations. Under purchase and assumption, parts of the S&L continued to exist through loans and deposits assumed by the acquiring institution. Under payout, or liquidation, all lending and deposit relationships were terminated, and the S&L fully ceased to exist.

In February 1989, open thrift assistance effectively ended when President Bush announced the FSLIC's closure and the creation of a new agency to take over its operations, the Resolution Trust Corporation (RTC).³ The RTC did not initially have the authority to provide open thrift assistance and was only permitted to close or sell failed S&Ls (U.S. Senate 1990, p. 47).⁴ Chart 1 shows the effect of this policy

Chart 1

Distribution of Failed S&Ls across Time and by Resolution Type



Source: FDIC.

change. Starting in 1989, the number of assistance transactions (in blue) approached zero, and failed S&Ls were primarily sold to other institutions under purchase and assumption transactions (in green) or liquidated (in orange).⁵ Failed institutions had no recourse to continue in their current form and were forced to close. Replacing an agency that regularly provided financial assistance with another agency unauthorized to rescue institutions likely signaled to S&Ls the start of a more stringent resolution regime.

II. Predictions from Theoretical Models of Resolution

In theory, the FSLIC's assistance could have induced one of two types of responses from S&Ls. The first is moral hazard, in which assistance incentivizes S&Ls to take on excessive risk, as profits from risky loans accrue to S&L owners but losses are covered by regulators and taxpayers. The second is the franchise value effect, in which assistance programs provide incentives to shareholders to preserve the value of their institution and undertake less risk. In general, franchise value arises from the market share and the customer relationships that institutions have built over time, which enable them to generate a stream of profits into the future (Keeley 1990). When an institution is close to failure and unlikely to survive, its franchise value is diminished, and

shareholders have incentives to take risks to maximize earnings in the limited time the institution has remaining. In such times, assistance programs generate franchise value effects by boosting the probability of an institution's survival and sustaining its capacity to generate profits, which shareholders will likely seek to preserve.

Which of these two effects dominate bank decision-making in the era of FSLIC assistance? From a purely theoretical perspective, the franchise value effect would dominate if institutions were assisted when losses were generated by macroeconomic shocks widely affecting the industry and liquidated when losses were driven by weak management decisions (Cordella and Yeyati 2003). However, empirical evidence shows that the FSLIC often assisted S&Ls during 1984–89 irrespective of whether they failed during macroeconomic distress or due to potentially deficient management decisions (Sharma and Banerjee 2022).⁶ Because the FSLIC deviated from the decision rule that bolsters franchise value effects, I expect to find that moral hazard and excessive risk-taking were relatively more prevalent when the agency was in operation.

III. How Did Stock and Mutual S&Ls Respond to the Withdrawal of Assistance?

To evaluate the effect of the change in assistance policies on S&Ls, I examine differences in balance sheet responses across stock and mutual S&L institutions, which differ by ownership structure. Stock institutions are owned by equity holders whose returns are determined by stock prices. Shareholders at stock institutions have an incentive to engage in riskier investments that frequently result in higher dividends in excess of interest payments. But higher earnings from risky assets to shareholders arise at the cost of lower interest earnings to depositors when losses materialize from risky assets. In contrast, mutual institutions are owned by depositors for whom total returns consist of returns from stocks and interest payments on deposits. Therefore, maximizing earnings on equity at the cost of reducing interest earnings does not benefit owners of mutual S&Ls, as their total return remains unchanged. The ability to separate claims between depositors and shareholders incentivizes shareholders of stock S&Ls to lend high-risk loans that may result in higher returns, but depositor-owners of mutual S&Ls have no such incentive. Indeed, Esty (1997) shows that stock S&Ls engaged in

riskier investments than mutual S&Ls over the period 1982–88. Specifically, Esty illustrates the connection between the type of institution and risk-taking by examining S&Ls that converted from mutual to stock—following reorganization, these institutions increased their risk-taking.

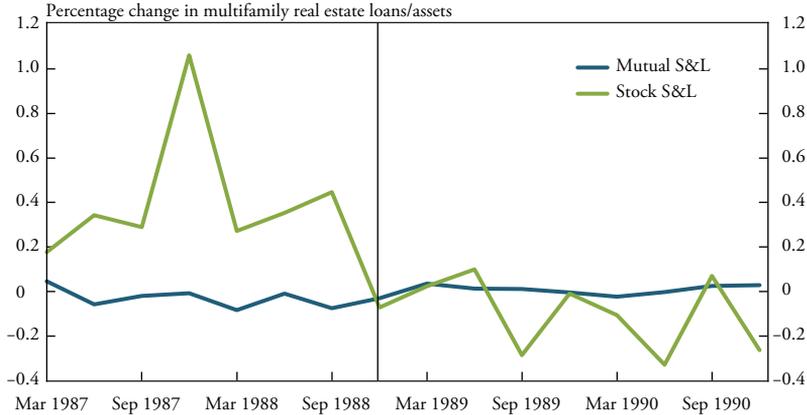
Because shareholders at stock S&Ls have incentives for risk-taking, they are more likely to have expanded risk-taking in the presence of government assistance and curtailed it when assistance was discontinued.⁷ Stock S&Ls may have sought to use the funds from government assistance to lend larger shares of risky loans to generate larger returns for shareholders or to recover prior losses. Therefore, when the FSLIC closed and troubled S&Ls were more likely to be liquidated than assisted, stock S&Ls likely responded by reducing risk-taking. In contrast, depositor-owners of mutual institutions may not have responded to the change in policy, as they would have been fully compensated by deposit insurance regardless. Accordingly, stock S&Ls are considered the “treated” group and mutual S&Ls the “control” group in the ensuing analysis.

Chart 2 illustrates these differences in risk-taking across stock and mutual institutions. Stock institutions accumulated larger shares of multifamily real estate loans, a high-risk loan category, when the FSLIC was in operation, but reduced the share of such loans following its closure in 1989 (green line). Mutual institutions, however, did not shift their composition of multifamily loans before or after the regulatory change—their composition of these loans changed only marginally throughout the sample period.

In Sharma and Banerjee (2019), we quantify the differences in the estimated responses of stock and mutual S&Ls by evaluating the change in the share of each balance sheet component across the two types of institutions before and after the change in resolution policy in 1989. This measure is analogous to the “difference-in-difference” approach to evaluating the effect of policies.⁸ For example, consider the effect of the change in resolution regime on the year-over-year change in the share of securities to total assets. We determine the difference in this measure before and after the change in resolution regime among stock S&Ls and repeat this calculation for mutual S&Ls. Finally, we evaluate the “treatment effect” by subtracting the pre- and post-difference for mutual S&Ls from the corresponding value for stock S&Ls. We repeat

Chart 2

Change in Balance Sheet Composition of Multifamily Real Estate Loans for Stock S&Ls Relative to Mutual S&Ls



Sources: FDIC and Sharma and Banerjee (2019).

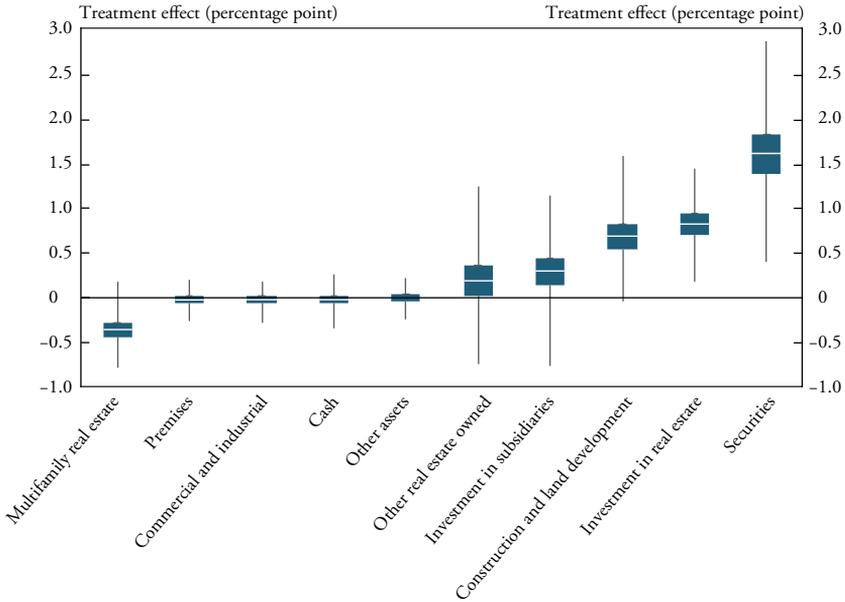
these steps for other assets on S&L balance sheets such as cash, direct equity investment, and several categories of loans. This method carries the advantage of differencing out the effects of other developments that may have affected both stock and mutual institutions, such as additional legislation introduced in 1989 to “re-regulate” the S&L industry.⁹

Chart 3, which depicts these treatment effects for a broad range of assets, shows that stock S&Ls’ distribution of assets shifted away from high-risk loans and toward safer assets. The white horizontal line within each blue box depicts the median value of the treatment effect for a given asset category. The top and bottom of the box represent the 25th and 75th percentiles of the distribution of the treatment effect. Finally, the two ends of the vertical line through each box represent the maximum and minimum values of the treatment effect. This chart depicts the asset categories in increasing order of the median treatment effect from left to right. Median values above zero indicate that stock S&Ls shifted a higher share of assets into an asset category than mutual S&Ls following the regulation change. The estimates are statistically important if the full distribution of the treatment effect lies above or below zero.¹⁰

The shift in the composition of stock S&Ls toward securities, a low-risk asset category, suggests that the shareholders of these institutions recognized the larger losses they would incur in the event of failure

Chart 3

Change in Balance Sheet Composition of Stock S&Ls Relative to Mutual S&Ls



Sources: FDIC and Sharma and Banerjee (2019).

under the new resolution regime and strengthened their balance sheets with larger shares of safe and liquid assets. Subsequently, the share of construction and land development (CLD) loans as well as investment in real estate, which are high-risk asset categories, modestly increased on the balance sheets of stock S&Ls. This increase coincided with the rise in real estate lending across the banking and S&L industry over the course of the early 1990s (Bassett and Marsh 2017). However, the accumulation of multifamily real estate loans, a segment within commercial real estate loans and another category of high-risk loans, declined among stock S&Ls relative to mutual S&Ls. On net, stock S&Ls accumulated lower shares of high-risk loans than mutual S&Ls as increases in shares of CLD loans and investment in real estate were dominated by larger shifts into securities and declines in multifamily real estate loans. The remaining categories of loans did not change in a statistically important manner—the distribution of treatment effects for these loan categories spans both positive and negative values.¹¹

In addition to ownership structure, other characteristics may influence an S&L's risk-taking. For example, larger S&Ls may take fewer risks because their shareholders have more value to lose in the event of failure. To account for these potential effects, Table 1 describes the estimated relationship between S&L-level characteristics and the change in the share of high-risk loans for stock and mutual S&Ls two years before and two years after 1989.¹² High-risk loans refer to the sum of commercial and industrial (C&I), CLD, and multifamily real estate loans, based on a definition used in the FDIC's database of Thrift Financial Reports. The table reports estimates of posterior means and 95 percent posterior intervals to quantify the uncertainty in the estimates.¹³ Reported estimates are statistically important if the upper and lower bounds of the posterior intervals are both the same sign as the mean, and are not statistically important otherwise.

The relationship between S&L risk-taking and their balance sheet attributes is distinct across stock and mutual institutions. Notably, these relationships shifted either in direction or statistical importance before and after 1989 for stock S&Ls, but remained largely unchanged for mutual S&Ls. These differences suggest that the two groups of institutions were likely operating under distinct incentive structures, and provides further evidence that the reforms shifted the behavior of stock S&Ls more than mutual institutions. Bank size was negatively associated with risk-taking among stock S&Ls, but this effect became statistically important only after the regulatory reforms. Bank size is typically considered an indication of its franchise value: the higher this value, the lower the bank's incentive to engage in risk-taking (Keeley 1990). This observation reiterates the earlier finding that franchise value effects dominated over moral hazard effects for stock S&Ls after the reforms. In line with expectations, for mutual S&Ls this effect is not statistically important prior to or following the reforms.

The results for capital ratio provide new evidence on this ratio's relationship with risk-taking, on which previous studies have reached limited consensus. Stock S&Ls increased risk-taking at incrementally higher levels of the capital ratio, and this effect was statistically important after the regulatory reforms. Mutual S&Ls, on the other hand, decreased risk-taking at higher capital ratios. These differences suggest

Table 1

Determinants of Changes in the Share of High-Risk Loans for Mutual and Stock S&Ls before and after the Policy Change

Variable	Stock S&Ls posterior estimates				Mutual S&Ls posterior estimates			
	Pre-1989		Post-1989		Pre-1989		Post-1989	
	Mean	Interval	Mean	Interval	Mean	Interval	Mean	Interval
Constant	-0.03	[-0.4,0.3]	0.06	[-0.2,0.3]	0.10	[0,0.2]	-0.10	[-0.2,0]
log(size)	-0.15	[-0.4,0.1]	-0.15	[-0.3,0]	0.02	[-0.1,0.2]	0.01	[-0.1,0.1]
Capital ratio	0.14	[-0.1,0.4]	0.19	[0,0.4]	-0.22	[-0.4,0]	-0.14	[-0.2,0]
Age	0.44	[-0.2,1.1]	0.18	[-0.2,0.5]	0.13	[0,0.3]	0.10	[0,0.2]
Operating leverage	-0.12	[-0.3,0.1]	-0.01	[-0.2,0.2]	0.12	[0,0.2]	0.11	[0,0.2]
C&I ratio	0	[-0.2,0.2]	0.01	[-0.1,0.1]	-0.10	[-0.2,0]	-0.18	[-0.3,-0.1]
Interest receivable	-0.01	[-0.2,0.2]	-0.12	[-0.3,0.1]	-0.01	[-0.1,0.1]	0.00	[-0.1,0]
Earnings ratio	-0.10	[-0.4,0.2]	0.06	[-0.1,0.3]	0.02	[-0.1,0.1]	0.03	[0,0.1]
Additional control variables	S&L fixed effects, state-level and county-level controls							

that the organizational form and regulatory regime are likely salient in determining the relationship between the capital ratio and risk-taking.

The relationship between bank age and high-risk loans is somewhat surprising for both S&L types. Typically, S&L institutions that are older and more established are expected to take fewer risks than younger banks to protect their higher value against excessive credit losses. While the age of stock S&Ls was not statistically important in determining risk-taking, the relationship is positive for mutual S&Ls across both periods. These findings suggest that older mutual S&Ls likely engaged in risk-taking by relying on their longer experience in the industry.

S&L institutions with high operating leverage are considered to be riskier and more likely to engage in further risk-taking. Operating leverage refers to the ratio of fixed costs to assets, and institutions with larger values of this ratio incur larger fixed costs in maintaining their operations. Mutual S&Ls with higher operating leverage accumulated larger shares of high-risk loans across both periods, but this effect is not present among stock S&Ls.

The final three variables in Table 1—the C&I ratio, interest receivable, and the earnings ratio—show no statistically important associations with high-risk loan growth at stock S&Ls. These findings suggest that the existing stock of high-risk loans, the interest due from non-

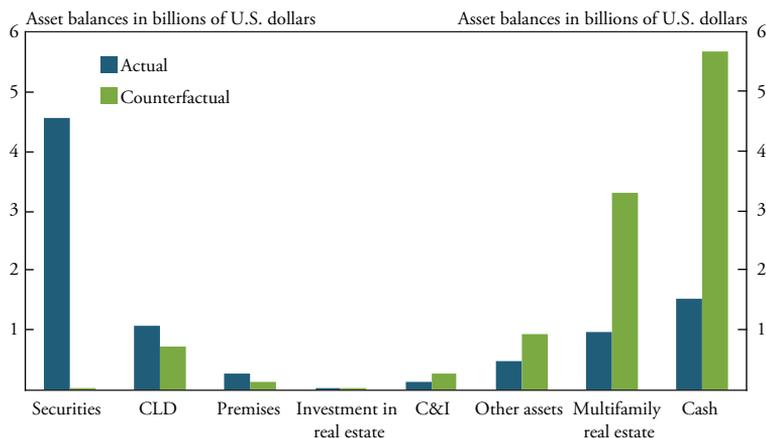
performing accounts, and the ratio of income to assets did not inform risk-taking decisions at stock institutions. These findings also apply to mutual institutions, with the exception that they reduced risk-taking in response to previously accumulated C&I loans.

Overall, the estimated relationships between risk-taking and S&L characteristics describe the differential responses of mutual and stock S&Ls to the policy change. These estimates provide a basis to quantify how risk-taking among the “treated” stock S&Ls would have been different if they had responded to the policy change like the “control” group of mutual S&Ls.

A counterfactual exercise shows that without the change in policy that suspended assistance to failed S&Ls, stock S&Ls would have engaged in greater risk-taking. We can predict how the “treated” stock institutions would have behaved if they had a relatively muted response to the policy change using the estimated relationships between financial characteristics and shifts in the share of assets for the “control” group, mutual S&Ls, which underlie the results in Chart 3. The counterfactual changes in asset shares are obtained by plugging the financial characteristics of stock S&Ls into the estimated relationships for mutual S&Ls. Subsequently, the asset shares are converted into balances by multiplying with asset levels for stock S&Ls over the post-treatment period. Chart 4 presents the observed asset balances for stock S&Ls and the counterfactual levels of these balances. The main finding is that stock S&Ls would have accumulated fewer securities and engaged in more risky lending if the policy change had not shifted their incentives away from risk-taking. In particular, the green bars show that continuing the FSLIC’s resolution policies would have resulted in \$3.6 billion in lending across C&I and multifamily real estate loans (green bars), both high-risk categories, compared with the \$1.1 billion they actually lent under the two categories combined (blue bars). Although stock S&Ls held securities of about \$4.5 billion after the policy change, they would have held a statistically negligible amount of this safe and liquid asset category in the absence

Chart 4

Counterfactual and Observed Asset Balances for Stock S&Ls



Sources: FDIC, Sharma and Banerjee (2019), and author's calculations.

of the change. Under the counterfactual scenario, stock S&Ls would also have held their liquid assets in the form of cash rather than securities, which would have enabled them to deploy this liquidity on short notice to issue new loans.

IV. Lessons for Regulatory Policies

When the U.S. government closed the FSLIC and replaced it with an agency that was restricted from rescuing failed S&Ls, moral hazard incentives were reversed and risk-taking declined among institutions prone to undertake risky investments.

For policymakers, the main lesson from this event is that credible signals about the unavailability of government rescues can be effective in reducing moral hazard incentives. The perception of potential government rescue can result in financial institutions extending high-risk loans. More recently, risk-taking among large institutions contributed to the 2007–09 global financial crisis, and ensuing government assistance was criticized for propagating an entrenched “too-big-to-fail” doctrine. Post-crisis reforms on capital standards were designed to signal the termination of such assistance for large institutions, including living wills that required large institutions to outline how they could be closed without generating systemic repercussions that could necessitate

government assistance. However, the S&L crisis serves as a reminder that moral hazard had afflicted a large number of small institutions when such assistance was available to them, and elicited the subsequent removal of assistance and tightening of regulations. Accordingly, policies that require small institutions to preserve their capacity to withstand losses and prevent such crises remain salient.

One consequence of adopting stricter norms around assistance to troubled institutions is that lending volumes decline along with risk-taking; however, less lending of certain types of loans may in fact have protected S&Ls against additional losses. Stock S&Ls may have lent more commercial real estate and business loans and held fewer securities if assistance policies had continued to be available. But in view of S&Ls' limited experience in underwriting these categories of loans, a shift away from these assets and into holdings of securities likely strengthened the institutions. Overall, stringent regulation may lead to lower lending volumes, but promotes safety and soundness by encouraging lower risk-taking.

The broader lesson from S&Ls' risk-taking response to policy during the S&L crisis may be that lending and investment activities of financial institutions must be carefully considered when they are insured by federal agencies. As financial innovation progresses and banks take on new asset categories on their balance sheets, their unfamiliarity with the attendant risks may result in losses that ultimately cost taxpayers. Accordingly, to prevent the use of taxpayer funds in future crises, financial regulation will need to keep pace with innovations in financial products and services.

Endnotes

¹The prevailing accounting standards were known as Generally Accepted Accounting Principles (GAAP). The new, permissive standards introduced as part of the deregulation of the S&L industry were Regulatory Accounting Principles (RAP).

²S&L assets under nontraditional categories such as commercial mortgages and direct lending nearly doubled from 11 percent of S&L assets in 1982 to 20 percent in 1985 (White 1991).

³The announcement on February 6, 1989, also stated that the FDIC would take over the insurance of S&Ls from the FSLIC.

⁴The unavailability of open thrift assistance was discussed during the Senate Oversight Hearing on the RTC. John E. Robson, the acting chair of the RTC's Oversight Board, noted that while Congress had not mandated that the RTC provide open thrift assistance, the FDIC had the discretion to provide open thrift assistance through the Savings Association Insurance Fund (SAIF) under certain limited circumstances. At the time of the hearing, however, funds were unavailable for this type of assistance. He also noted that the Oversight Board of the RTC had strong reservations about using their authority to divert funds to the FDIC toward open thrift assistance transactions and intended to evaluate the success of the FDIC in the use of assistance prior to committing resources for this purpose.

⁵The number of assistance transactions declined from 158 in 1988 to three in 1989, and none in subsequent years.

⁶Using a Bayesian statistical method, Sharma and Banerjee (2022) show that the FSLIC's decisions cannot be separated into two different decision rules based on the presence of high and low levels of economic distress accompanying S&L failure. In addition, the FSLIC provided assistance to nearly 70 percent of all failed S&Ls, suggesting that this measure was broadly used rather than being limited to S&Ls that failed during macroeconomic shocks.

⁷Although an open thrift assistance transaction dilutes the value of shares held by equity holders, it is the only resolution method that leaves equity holders with a positive share in the S&L and generates larger moral hazard incentives relative to purchase and assumption and payout (White and Yorulmazer 2014).

⁸The method introduced in Sharma and Banerjee (2019) is a novel extension of the standard "difference-in-difference" method and requires fewer assumptions. For instance, this method does not require the parallel trends assumption, which would have required changes in the share of each balance sheet component to move in the same direction across stock and mutual S&Ls prior to 1989.

⁹The Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) was passed on August 9, 1989. The legislation created the Savings Association Insurance Fund (SAIF) to insure deposits in savings associations under the FDIC's administration. FIRREA also established the Office of Thrift Supervision to replace the Federal Home Loan Bank Board in examining and supervising

thrifts and their holding companies. This legislation also imposed stricter capital requirements on S&Ls.

¹⁰The median changes across the asset categories do not add up to zero because they represent a subset of asset categories. In Sharma and Banerjee (2019), we focus our analysis on high-risk and low-risk asset categories and exclude asset types such as residential real estate that were typically held by all S&Ls.

¹¹The remaining asset classes consist of both safe categories, such as cash, and risky categories, such as commercial and industrial loans, other real estate owned, and investment in subsidiaries. “Other real estate owned” refers to the real estate that S&Ls acquired through foreclosure proceedings. As distress in the real estate sector deepened, S&Ls accumulated larger shares of these properties. Investment in subsidiaries also represents risk-taking; S&Ls invested directly in real estate using subsidiaries as it was the only method permitted for federally chartered thrifts to engage in these activities (McKenzie, Cole, and Brown 1992).

¹²The statistical method introduced in Sharma and Banerjee (2019) specifies a different set of estimates for treated and control groups in the pre- and post-treatment periods. This specification allows the relaxation of assumptions of parallel trends that are typically made in classical difference-in-difference estimations. Therefore, the method generates four columns of estimates in Table 1 instead of a single set of estimates that would have been obtained from a difference-in-difference setting.

¹³Posterior intervals refer to the estimation intervals obtained from Bayesian estimation methods. These methods consist of estimating posterior distributions of parameters—that is, distributions that are derived a posteriori from the data (represented in a likelihood function), and prior information (formally represented by a prior distribution). Analogous to confidence intervals, they are useful in performing inference and determining the statistical importance of an estimate. In contrast to confidence intervals, posterior intervals are compatible with a probability-based interpretation. For instance, the posterior interval for $\log(\text{size})$ under stock S&Ls in the pre-1989 period (see Table 1), denotes that the coefficient for this variable lies between -0.4 and 0.1 with a probability of 95 percent.

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