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Modelling the causes and manifestation of bank stress: an example from the financial crisis

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Abstract

In this study, I model the predictors and manifestation of bank stress during the financial crisis using a Multiple Indicator Multiple Cause model. Unlike most early warning models that predict failure probabilities, this article describes a framework for predicting a broader notion of bank stress that need not rely on regulatory decisions. As such, this method can be easily applied to large institutions, and avoids the complications associated with modelling a regulatory decision such as failure or a CAMELS downgrade. Using bank reliance on Term Auction Facility funds and the out-of-sample incidence of failures and acquisitions, I demonstrate that the measure of bank stress generated here accords with other notions of bank-level distress. Finally, this method catalogues predictors of distress during the financial crisis. Thus, this article can help assess the validity of several recent regulatory proposals. I find that those

banks entering the crisis with more Tier 1 capital, more liquid balance sheets, and relatively stable liabilities subsequently came under less stress. These findings support the Basel III recommended increases in banks' capital adequacy, liquidity and stable funding.

Keywords:

bank stress | early warning model | financial crisis | financial regulation | bank failure

JEL Classification:

G17 | G21 | G28

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Notes

[1] I should note that although regulatory forbearance during the early and middle stages of the S&L crisis presents an issue, the regulatory reform during the S&L crisis may mean that the bank failures during 2007–2011 can be used to form a more reasonable baseline for comparison with expected future regulatory procedures and attitudes.

[2] Although I apply the method described in this section to larger financial institutions, the method is very flexible and can easily be applied to small banks as well.

[3] All of the analysis presented in this article is done on a 'highest holder' basis. Specifically, I aggregate to bank holding company level using Call Report information on equity stakes in each bank.

[4] Out-of-sample performance of these institutions is also evaluated below.

[5] Bank mergers that occurred during this time period are handled by aggregating the balance sheet and income statements of the merged banks.

[6] Alternate definitions of the capital ratio were used with little changes to the results reported in the next section. For example, percentage-point changes and percentage changes in the Tier 1 plus Tier 2 capital ratio were used as well as a measure that normalizes by the bank-level excess capital above the regulatory minimum. The main results hold.

[7] Using loan charge-offs in place of securities losses produces very similar results. As mentioned previously, many different indicators of bank stress can be used, but I limit the number presented here for parsimony. Furthermore, loan charge-offs can be subject to evergreening practices and may not be fully realized during a high-stress period.

[8] As will be demonstrated, the conclusions are not sensitive to excluding TARP injections from the measures of bank stress indicators.

[9] Indeed, the stigma associated with accessing the discount window was a motivating factor behind the creation of the Term Auction Facility, which allowed banks to borrow term funds anonymously from the Federal Reserve.

[10] In the accompanying Appendix, I produce a time series of system-wide bank holding company stress by plotting an aggregated version of the latent stress factors over time.

[11] However, in Section V, I present evidence that the latent stress factor derived in the MIMIC model is consistent with other notions of bank stress.

[12] I direct readers to the literature described in Section II and, in particular, the following studies, which have used most of the variables that appear in Table 4: Cole et al. (1995), Cole and Gunther (1995) and Kolari et al. (2002). The data set used for this study may be accessed at http://dx.doi.org/10.1080/00036846.2014.955257

[13] This result extends to alternate definitions of capital adequacy, such as Tier 1 plus Tier 2 capital.

[14] These results are robust to using either savings or demand deposits separately. Additionally, replacing core deposits with nondeposit liabilities shows a significant positive relationship with levels of financial distress.

[15] Interestingly, however, replacing overhead costs with a normalized measure of salaries exhibits an insignificant relationship.

[16] Although left undiscussed due to the lack of statistical significance conditional on other controls, the effect of banks' off-balance sheet activity could represent an area for future study. One might have expected off-balance sheet activity to be correlated with higher levels financial distress during the crisis, but the differential composition of the off-balance sheet activity could be driving the results. For example, some off-balance sheet items could represent beneficial derivative-based hedging activity, while others could be concentrated in toxic collateralized debt obligations and subprime MBSs.

[17] Three of the acquirers in the high stress quintile were among the nine healthiest banks of the quintile.

[18] Because of the unavailability of certain regulatory capital data and definition changes, the stress factor 1 construct here – plotted in Fig. A1 – is generated using the Call Report series RCFD3210 to measure bank capital.

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