

Noninterest Expenses, Early Warning and Bank Failures: Evidences from US Failed and Non-failed Banks

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This paper empirically tests whether there exists a significant difference in noninterest expenses between failed banks and non-failed banks. Second, the paper examines whether noninterest expenses provide early warning signals for bank failure. Noninterest expenses for the failed and non-failed banks with eight quarter lags prior to their failure are tested using parametric test and non-parametric tests. Results of both tests indicate that differences in the mean noninterest expenses are significant. Results also indicate significant deterioration of noninterest expenses three quarters prior to their failure. Policy makers may note that distant lag period expenses, prior to fourth quarter and higher, are not significant for failure.

INTRODUCTION

The banking business consists of two parts: (i) intermediation part which is involved in lending and borrowing and (ii) “back-room” operation part (Sinkey, 1992) where bank officers and other operations support the businesses of bank interest and noninterest incomes. The expenses of “back room” operation activities are called noninterest expenses. Bank noninterest expenses consist of three major components: (i) salaries, wages, and employee benefits (ii) cost of maintaining bank properties, furniture, and equipment, and (iii) other expenses.

In a competitive bank labor market, a bank has very little over bank employee salaries. Similarly, banks have no control over interest expenses in a competitive financial market.

In a financial crisis like the financial crisis of 2008-2010 when nonperformance loan increases, the other expenses significantly increase. These increased extra costs include (Berger and Young, 1997): (i) extra monitoring of the defaulted borrowers and their value of collateral, (ii) attorney costs of dealing with delinquent loans and borrowers, (iii) cost of acquiring, maintaining, and disposal of collateral, if default happens eventually, and (iv) cost of negotiating a possible workout solution or arrangement. Because of extra expenses, banks lose many potential profitable opportunities. All of these increased noninterest costs have impact on the low performance banking. They tend to reduce banks profitability and banks are subject to potential failure.

Thus, an important question relating to the low performance banking and subsequent bank failures is: (i) are noninterest expenses of the low performance (failed) banks same for the high performance (survived) bank? If not, the natural hypothesis is that there exists a significant difference in mean noninterest expenses for failed and successful banks. In other words, there should be significant difference in the relative levels of capitalization between failed banks and survived banks. This study is motivated to test this hypothesis.

The study is important for several important reasons: (i) there are no studies that deal with noninterest expenses for failure. (ii) Determining the lag period/s that are significant in the differences in noninterest expenses for failed banks from a group of non-failed peer banks can be used in providing an early warning signal for bank management and bank regulators. By providing early warning signal from noninterest expenses can save billions of tax-payers 'dollars. During 2008-2010 there are more than 200 hundred FDIC banks failed with a catastrophic impact of the US economy incurring billions of dollar for the taxpayers' money.

The paper is organized as: Section II provides a brief outline of the survey of literature. Data and methodology are discussed in Section III. Empirical results and conclusions are provided in Section IV.

SURVEY OF LITERATURE

The banking literature is wide with respect to bank failure, capital adequacy, bank profitability and performances. There are also studies about bank interest margins. However, bank studies relating to noninterest expenses are virtually absent, although noninterest expenses play an important role in bank performances.

Samad (2012) examined and compared credit risk and found significant differences between the failed and survived banks. (Samad and Glenn 2012) examined the determinants of US bank failure during 2009 and found that Tier 1 risked based capital, total risk based capital, ROA, per employee asset and efficiency ratio were significant in predicting bank failures during 2009. These correctly predicted 86.4 percent of total bank failures. Ford and Olson (1978) examined noninterest expenses and found that a bank's ability to control noninterest expenses was a key factor for high performance banks. Berger and Young (1997) examined the interaction between the problem loans and cost efficiency through Granger causality and they found ambiguous results. Sinkey (1975) provided several characteristics of problem banks and compared them with control group banks using the data for the period 1969-1971. The characteristics of problem banks were expressed in terms various financial ratios. Apilado and Gies (1972) examined and performed capital adequacy hypothesis testing using several measures of capital adequacy for the period 1935-1969. Their test found significant difference. Cotter (1966) compared mean test of the failed banks with the non-failed banks during 1921-1933. Three hypotheses of interest were tested for each of the periods (1914-1921) utilizing several measures of capital adequacy and found a significant differences between the two groups of banks. The hypotheses were: (i) that the mean ratio of the group of banks that failed is equal to the mean ratio of the group of non-failed banks, (ii) that the mean ratio of the individual bank within the failed banks is equal to each other, and (iii) that the mean ratio of the individual banks within the non-failed bank is equal to each other. Test results showed 'significant variation among individual banks within groups' than between groups. Estrella, Park, and Persistiani (2000) examined bank failure during 1988-1992 within the current regulatory framework of Basel Accord. Their examination of relationship between different capital ratios and bank failure suggest that, in addition of risk-weighted ratio, leverage ratio, and gross revenue ratio are significant factors in predicting bank failure. Beaver, W., 1966 studied financial firm failures in relation with financial ratios. Shrieves, Roland E., 1992 investigated the relationship between changes in risk and capital and found a positive relationship between them. Demyanyk, Hassan (2009) examined financial and economic circumstances and found that the association of the US subprime mortgage crisis and the global financial turmoil led to severe crises to other countries.

The short review of existing literature shows that no work relates to the noninterest expenses for the failed and survived banks. There was a great bank failure during 2008-2009. The number of failed banks was more than 120 banks in 2009 (as of October 31). The data of failed and survived banks' noninterest expenses provide a good opportunity for exploring whether there are significant differences that exist between them.

DATA AND METHODOLOGY

Data

Data of the first quarter prior to failure to the eight quarter before the failure for all failed and non-failed banks during 2009 is retrieved from the call reports of FDIC from the Web site: WWW.FDIC.GOV. This paper examines the data of 244 failed and non-failed banks. Non-failed banks are randomly chosen.

Methodology

Ratio

It has been a common practice to measure the cost efficiency/inefficiency in terms of bank specific ratios. This paper uses noninterest expense as a ratio of total earning assets (nonixy). This is because bank examiners largely rely on it and it is available in the call report.

Table 1 provides the descriptive statistics of noninterest expense ratio (nonixy) for the failed banks and the non-failed banks.

TABLE 1
DESCRIPTIVE STATISTICS OF NONINTEREST EXPENSES
FOR FAILED AND NONFAILED BANKS^A

Variable	Failed Banks					Nonfailed banks				
	mean	median	Minimum	Maximum	Jarque Bera	mean	median	Minimum	Maximum	Jarque Bera
Nonixy-1	4.80	4.02	0.88	40.34	15575.59 (0.000)*	3.62	3.36	1.58	17.56	8367.22 (0.000)*
Nonixy-2	4.56	3.69	0.82	63.04	71086.91 (0.000)*	3.56	2.22	1.52	16.82	6066.72 (0.000)*
Nonixy-3	4.35	3.56	0.79	24.44	1630.26 (0.000)*	3.61	3.30	1.49	16.84	4315.63 (0.000)
Nonixy-4	4.30	3.50	0.71	29.63	3700.60 (0.000)*	3.44	3.11	1.20	16.52	5414.86 (0.000)*
Nonixy-5	4.16	3.36	0.63	31.26	4918.01 (0.000)*	3.55	3.29	0.97	15.79	3555.14 (0.000)*
Nonixy-6	3.66	3.23	0.76	23.94	9404.39 (0.000)*	3.53	3.26	0.83	16.02	(0.000)*
Nonixy-7	3.74	3.28	0.74	25.03	8196.09 (0.000)*	3.55	3.25	0.83	16.14	2771.72 (0.000)*
Nonixy-8	3.60	3.25	0.72	21.68	6052.42 (0.000)*	3.55	3.16	0.80	16.82	3187.50 (0.000)*

a= lag is denoted by -, () = the probability of Jarque Bera, * = significant at 1 percent level

Table 1 shows that the mean noninterest expense of failed banks was 4.8 percent and it was significantly high before the first quarter of their failures. Failed banks' noninterest expenses started deteriorated from the fifth quarter before their failure. Non-failed banks' mean noninterest expenses remained stable within the range between 3.44 percent and 3.62 percent. Failed banks' mean noninterest expenses are higher than that of nonfailed banks.

Normality Test

Jarque-Bera is a test statistics used for testing whether the series is normally distributed. The low p-value (probability value) associated with Jarque-Bera tests, in Table 1, leads to the rejection of null hypothesis of normal distribution and this warrants both parametric and non-parametric (Kruskal-Wallis)

tests. So, this paper uses two statistical methods—t-test and Kruskal-Wallis *K*—for determining whether there exists a statically significant difference in noninterest expenses.

T-Test and Kruskal-Wallis K Test

Failed banks' noninterest expenses will be compared with those of non-failed banks using first quarter noninterest expense prior to failure through eight quarter noninterest expense in determining: (a) the quarter when significant differences begins and (b) whether noninterest expenses are statistically significant between the two groups of banks.

The t-test is applied to mean difference in noninterest expenses where the mean difference in noninterest expenses, $\mu_{diff} = (\mu_f - \mu_s)$ i.e. mean noninterest expense of failed banks (μ_f) minus mean noninterest expense of nonfailed banks (μ_s).

Null hypothesis, $H_0: \mu_{diff} = 0$. That is, there is no difference between the mean noninterest expense of the failed banks and the survived banks.

Alternative hypothesis, $H_a: \mu_{diff} \neq 0$: There is a difference in noninterest expenses between failed banks and nonfailed banks.

Where μ_{fbk} = Mean noninterest expense of the failed banks, μ_{sbk} = mean noninterest expense of the survived banks.

Since *t* tests produce strong results due to the non-normal distribution of ratios. This problem is overcome by the non-parametric, Kruskal-Wallis *K* test.

The Kruskal-Wallis *K* tests do not restrict to normality assumption. Kruskal-Wallis test is a rank based non parametric test of hypothesis that the subgroups have the same general distribution against the alternative that at least one subgroup has the distribution. The *K* statistics \approx follows X^2 distribution with *G*- 1 degrees of freedom where *G* = number of groups. Since both failed and non-failed banks have analogous characteristics (ratios), any statistical differences in the banking behavior between them would be due to the difference in their performance behavior.

EMPIRICAL RESULTS

T-Test

Results of t-test between two groups of banks are provided Table 2.

TABLE 2
TEST OF MEAN DIFFERENCES BETWEEN FAILED AND NON-FAILED BANKS

Variable	μ_f	μ_s	μ_{diff}	$H_0: \mu_{diff} = 0$	$H_a: Diff \neq 0$	$H_a: Diff > 0$
Nonixy-1 ^a	4.80	3.62	1.18		(0.0005)*	(0.0002)*
Nonixy-2	4.56	3.56	0.99		(0.02)**	(0.012)**
Nonixy-3	4.35	3.61	0.74		(0.01)*	(0.007)*
Nonixy-4	4.14	3.44	0.69		(0.03)**	(0.01)*
Nonixy-5	3.60	3.55	0.04		(0.84)	(0.41)
Nonixy-6	3.66	3.53	0.13		(0.59)	(0.29)
Nonixy-7	3.73	3.55	0.18		(0.48)	(0.24)
Nonixy-8	3.60	3.55	0.04		(0.83)	(0.41)

^a= -1 represents 1 quarter lag, - 2 represents two quarter lag and so forth. ()= p-values

*= Significant 1 percent level, **= significant at 5 percent level.

An examination of t-test, reported in Table 2, shows that there are significant difference in noninterest expenses between the two group of banks—failed and non-failed. The high significance is supported by a very low *P-value*, reported in the parenthesis.

The important point to notice, in Table 2, is: (1) The difference in mean noninterest expenses between the failed banks and non-failed banks is significantly high in the first quarter of their failures. Noninterest expenses of the failed banks increased significantly three months before their failure. (2) Noninterest expenses of the failed banks begin to deteriorate significantly prior to the fourth quarter. That is, one year before the failure, failed banks show the symptom of significant deterioration of increased noninterest expenses.

The rejection of H_0 provides strong evidences that there are significant differences in noninterest expenses between the failed and non-failed banks.

Kruskal-Wallis

Results for Kruskal-Wallis tests in all four measures of capital adequacy are provided in Table 3.

TABLE 3
KRUSKAL-WALLIS TEST FOR EQUALITY OF MEDIAN FOR THE FAILED
AND NON-FAILED BANKS BEFORE FAILURE

Measure of noninterest expenses	Failed banks Median	Non-failed banks Median	Kruskal-Wallis statistics	Probability
Nonixy-1 ^a	4.02	3.36	17.93	0.0000
Nonixy-2	3.69	2.22	5.98	0.0144
Nonixy-3	3.56	3.30	2.67	0.1001
Nonixy-4	3.50	3.11	1.78	0.1812
Nonixy-5	3.36	3.29	0.11	0.7334
Nonixy-6	3.23	3.26	0.31	0.5765
Nonixy-7	3.28	3.25	0.086	0.7683
Nonixy-8	3.25	3.16	0.26	0.6090

^a - 1 represents 1 quarter lag, - 2 represents two quarter lag and so forth.

The test results, in Table 3, substantiate the previous findings of Table 2 that there are significant differences in noninterest expenses between two groups of banks—failed and non-failed— immediately prior to their failure. The low p-value associated with first quarter lag (nonixy-1), second quarter lag (nonixy-2), and third quarter lag (nonixy-3) suggests that the differences are statistically significant. The significance in difference provides strong evidences in rejecting the null-hypothesis of equality of capital adequacy between two groups of banks.

The failed banks show the symptom of significant deterioration of increased noninterest expenses prior to third quarter of their failure.

CONCLUSIONS

The paper empirically tests the noninterest expenses' hypothesis between the failed and non-failed banks using t-test and Kruskal-Walis K test. The paper finds that the difference in mean noninterest expenses between the failed banks and non-failed banks is significantly high immediate first quarter before their failures. Second, noninterest expenses of the failed banks begin to deteriorate significantly prior to the third and fourth quarter based on Kruskal-Walis K and t-test respectively. Both tests show the symptom of significant deterioration of increased noninterest expenses prior to nine months to one year of their failure.

REFERENCES

- Apilado, V.R and T.G. Gies. 1972. "Capital adequacy and commercial bank failure," *The Bankers Magazine*, (155), pp.24-30.
- Berger, Allen. N and Robert DeYoung. 1997. "Problem loans and cost efficiency in commercial banks," *Journal of Banking and Finance*, 21, 849-870.
- Bevaver, W. 1966. "Financial ratios as predictors of failure," *Journal of Accounting Research*, (supplement), pp. 71-111.
- Cotter, Richard V. 1966. "Capital ratios and capital adequacy," *The National Banking Review*, (3), 3, pp. 333-346.
- Demyanyk, Yuhya and Iftekhar Hassan. 2009. "Financial Crisis and Bank failures: A Review of Prediction Methods," Federal Reserve Bank of Cleveland, Working paper No 09-04R.
- Estrella, Arturo, Sangkyun Park, and Stavros Persistiani. 2000. "Capital ratios as Predictors of Bank Failure," *Economic Policy Review*,(6), 2, pp.33-52.
- Ford, William F and Dennis A Olson. 1978. "How 1,000 High Performance banks whether the Recent recession" *Banking* (April), 36-48.
- Samad, Abdus and Lowell Glenn.2012. "Determinant of Bank Failure? Evidence from US Failed Banks," *International Research Journal of Applied Finance* 4(3):463-479.
- Samad, abdu. 2012. "Credit Risk Determinants of Bank Failure: Evidence from US Bank Failure," *International Business Research*, 5(9): 10-15
- Shrieves, Roland E. 1992. "The relationship between risk and capital in commercial banks," *Journal of Banking and Finance*, (3), pp. 439-457.
- Sinkey, Joseph F. 1992. *Commercial Bank Management*, 4th edition, Macmillan, New York and Canada.
- Sinkey, Joshep F. (1975). Problem Banks; Identification and Characteristics. *Journal of Bank Research*, 5, 208-217.