A TEXAS BANK'S CHOICE IN DEPOSIT INSURANCE:

A PROBIT ANALYSIS FROM 1909-1912

by

KATHRYN E. FLEMMING, B.S.

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Approved

Benjamin David Keen
Chairperson of the Committee

Thomas L. Steinmeier

Accepted

John Borrelli
Dean of the Graduate School

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CHAPTER I

INTRODUCTION

The banking industry before the creation of the Federal Reserve was unstable and disorderly. The dual system that existed encouraged banks to operate in a manor favorable to themselves and not the general public. After the turn of the century, many states enacted laws to require more accountability of banks in order to restore the public's confidence. Eight states, including Texas, created state deposit insurance systems that are similar to the FDIC today. Texas was unique because the deposit insurance that became state law in 1910 gave state banks two options, a guaranty fund and a bond plan. The guaranty fund was the most popular (bond plan membership never exceeded 10% of all state chartered banks) and is most similar to today's deposit insurance. The results in this paper indicate that large banks tended to choose the bond plan which is consistent with the historical record and sentiment at the time.

CHAPTER II

LITERATURE REVIEW

The evolution of the Texas banking system was lead by the banking industry. Early on, there were only private banks to service the public. Those banks were generally located in the commerce centers, leaving a majority of the state and those rural citizens without a bank. Galveston saw the largest concentration of private banks as it was a port city and handled with the majority of trade in and out of Texas. The era of private banks holds solid throughout the Civil War. Even with the advent of the National Banking Act of 1863, which allowed national banks to open in Texas, there still existed primarily only private banks as many Texas citizens did not have the capital of $50,000 to meet the requirements to open a national bank.

Private banks were run by anyone who wanted to start one. There were no rules or regulations on the day to day operations or the requirements for start up. Private banks also lacked any supervision to protect the public. Private banks generally operated in areas that could produce a profit so rural areas would not see a bank until closer to 1900. The existence of private banks was based primarily on the cotton industry that had become the largest in the South after the Civil War.

During this period, the Texas legislature considered on numerous occasions bills that would allow state chartered banks but each time the bill was defeated. In 1885, a group of private bankers decided to form the Texas Bankers Association, based on the American Bankers Association from a decade earlier. This group met yearly to discuss pertinent issues and to try and form a consensus on changes needed in the Texas banking industry and then lobby lawmakers to enact those changes. The main topic for the first few years was the creation of a state banking system. The leaders of the Texas Bankers Association believed that Texas was hurting itself by prohibiting the issuance of state banking charters and that the success of private and national banks were examples that banking could and would survive in Texas. One of the founding members of the Texas Bankers Association, E. M. Longcope, proposed that by allowing state charters, Texas could collect taxes on those banks and use those banks to create a strong state banking industry. The Association created a structure that could be used to create the state banking system, based off of ideas from the Missouri state banking law.

Previously state charters could only be granted by special acts of legislature, a practice that started in 1870. This process had produced eight state banks. The policy was stopped in 1875 in response to the panic of 1873 that had swept through the country. Lobbying by not only the Texas Bankers Association but by William Jennings Bryan finally convinced the Texas legislature to pass the Texas State Bank Law in 1905. Three of the key points from the 1905 law were that there was no branching allowed by state banks, depositors would be paid in full for their losses, and private banks were still not subject to supervision. To charter a state bank a group would have to consist of at least five people and a minimum capital requirement would have to be met based on the population of the city in which the bank was to be chartered. These capital requirements ranged from $10,000 to $100,000.

During this time, national banks had slowly emerged around the state. By 1905 there were 420 national banks. Because of the high capital requirements, there was slow growth in national banks during the 1890's due to the panic of 1893. Though the panic had little direct impact on the state of Texas, it had a huge impact on the National Banking system. Due to the decline in national banks after the 1893 panic, the U.S. government lowered the capital requirements to $25,000 and saw renewed in interest in the national banking system.

Between 1905 and 1910 there were 636 state charters issued, causing some to argue for additional restrictions on the industry. In 1907, there was a decrease in the number of state charters issued due to the panic of 1907, but that number quickly picked back up. Finally in 1913, a bill was passed that allowed the State Banking Board to review and selectively issue state charters.

What makes Texas unique was the creation of its deposit insurance system. State deposit insurance was not a new idea; in fact five states had had some form of deposit insurance before 1866. After the panic of 1907, Oklahoma moved forward with a deposit insurance law followed quickly by Nebraska and Kansas. In Texas, there was debate among the banking community about whether Texas should adopt deposit insurance. Generally small rural state banks supported it and larger state banks did not. National and private banks were against deposit insurance as well. The reasoning behind the positions was clear. Larger banks would have to pay more to insure their large amounts of deposits and bear most of the costs, while the smaller banks would pay less and reap more of the benefits. Smaller banks were also more prone to bank runs leaving them the most vulnerable without deposit insurance. When a bill finally made it to the Texas legislature, the House and the Senate could not agree on what kind of deposit insurance should be used. The final version passed in May of 1909 and called for a dual deposit system that would allow the bank to chose which form of insurance it wanted. Banks had until October 1, 1909 to choose its form of deposit insurance and then had until January 1, 1910 to secure the funds to execute it. This dual deposit system remained in place until 1927 when the law was repealed and the only major change occurred in 1925 when banks were allowed to change between the deposit insurance types.

The most popular form of deposit insurance was the guaranty fund which is similar to the FDIC today. This required member banks in the first year to "…pay a premium of 1% of their average daily deposits over the previous year. Thereafter, each bank was assessed annually 0.25% of its daily average deposits until the fund reached $2 million" (G, H, R 2000, pg. 238). National banks were allowed to participate in the guaranty fund, though not in the bond security system. If the guaranty fund fell below the $2 million maximum banks would then be assessed to restore the fund back to the maximum. These assessments were to be paid in 25% cash and then the remaining balance deposited into a demand deposit account in the name of the State Banking Board (Grant and Crum, pg. 83). If a bank became insolvent, the assets would be liquidated to cover the unsecured and non-interest paying deposits and whatever remained unpaid would be paid from the guaranty fund. The guaranty fund did not cover all deposits at a bank. If the bank could manage to become solvent again, it would have to obtain permission from the commissioner of the State Banking Board.

The bond security system required a bank to obtain a bond, insurance policy or some other guaranty of indemnity and file it with the commissioner on an annual basis.

Private banks were allowed to voluntarily participate in this program. The bond security system did cover all bank deposits unlike the guaranty fund, but was more costly for a bank.

CHAPTER III

ECONOMIC DATA

Variables

A bank utilizes a variety of instruments in its day to day operations. There are certain variables that influence a banks decision regarding deposit insurance. This data was obtained from the Third Biennial Report of the commissioner of insurance and banking, 1909-1910 and from the Annual Reports of the commissioner of insurance and banking, 1910-1912.

The data available from the time period makes running a tight regression more difficult since the monitoring procedures were not as stringent so assumptions have to be made about the basic balance sheet items. That data includes basic balance sheet items, although the regression could be improved if more specific balance sheet items were available.

Bank specific variables included in the initial analysis included BONDS which are bonds and stocks, CASHITEM which is all cash items not including currency and specie, CURRENCY, CAPITAL which is the summation of paid in capital, the surplus fund and retained earnings, TOTAL which is total assets, PROFITS, DEPOSITS which includes only core deposits and OTHERLIA which covers all other liabilities a bank would have beyond deposits, certificates of deposit, and bills payable.

The choice of these variables was based on the previous work done and assumptions of importance to the banks using the history as a guide. The landscape of banking in the early 20th century was different from today given the lack of regulation on the state level and, therefore, the importance of certain items in today's banks would not be there in the banks of the early 20th century. The variables needed to be modified before being run in a regression. Each variable is in dollar amounts, making it difficult to use the variables as they are because of the difference in reporting by each bank. The uncertainty in measurement standards along with the lack of regulations in reporting requires the need to standardize the variables. For this data, set each of the nine variables are turned into a ratio based on TOTAL which is total assets except for TOTAL which is logged.

This regression includes 77 total banks with 11 of them choosing the bond plan and 66 of them choosing the guaranty plan. The sample is large enough to give credibility to the regression results but is smaller than the typical sample. The reason for the size in this regression is the use of data from 1909-1912.

Probit Model

The use of a probit model allows for the inclusion of a dependent dummy variable and calculates the marginal effects which are more useful than just the standard coefficients. In a probit model the traditional coefficients are not useful to the analysis. The marginal effects paint a more complete picture for the influence the variables have on the dummy dependent variable. The use of a probit model in this situation was dictated by previous work in the field. A probit model is based on cumulative normal distributions and since a multitude of economic variables are normally distributed the use of this model becomes appealing.

The dependent model can take on one of two choices. In this case if the bank chose the guaranty plan the dependent variable would be zero. If the bank had chosen the bond plan the dependent variable would be one. Each was run as a regular "probit" and a "dprobit" which both provide the marginal effects. The "dprobit" models which include robustness are listed second. In the analysis of this regression the results with robustness were used more heavily than the regular probit model because of the marginal effects being included.

In both specifications the coefficients remain the same. When robustness is included the standard errors change. Robustness gives another asymptotic measure of the covariance variance matrix for a less than infinite sample. This can be used to corroborate the original probit estimates.

The marginal effects are the slope of an independent variable. Marginal effects are useful to the analysis because they allow the researcher to see the change in the predicted probability given a change in the dependent variable. In this instance, the marginal effects would show the change in probability between the guaranty plan which is zero and the bond plan which is one.

Individual Variable Analysis

The first step was to run regressions with each variable individually to determine which were significant on their own.

The first variable was BONDRATIO which is bonds divided by total assets. In Table 3.1 is the model without robustness, Table 3.2 includes robustness. In each table

BONDRATIO was found to be insignificant, though the p-value does come closer to being significant at the 10% level in Table 3.2.

Table 3.1. Significance of the BONDRATIO Variable

Probit estimates	Number of obs = 77
	LR chi2(1) = 2.38
	Prob > chi2 = 0.1230
Log likelihood = -30.389379	Pseudo R2 = 0.0377

insura~y	dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
bondra~o	2.085783	1.404209	1.51	0.130	.00609	-.666416	4.83798
obs. P	.1428571						
pred. P	.1379729 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Table 3.2. Significance of the BONDRATIO Variable with Robustness

Probit estimates	Number of obs = 77
	Wald chi2(1) = 2.66
	Prob > chi2 = 0.1032
Log pseudo-likelihood = -30.389379	Pseudo R2 = 0.0377

insura~y	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
bondra~o	2.085783	1.313761	1.63	0.103	.00609	-.489142	4.66071
obs. P	.1428571						
pred. P	.1379729 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

The second variable run was the ratio of cash item's to total assets. In Table 3.3, the variable is significant at the 10% level but insignificant at the 5% level. When the probit model is run with robustness in Table 3.4 the p-value becomes larger but it is still significant at the 10% level. The fact that the p-value increases instead of decreasing leads to the conclusion that the variable is probably insignificant to the final model.

Table 3.3. Significance of the CASHITEM Variable

```
Probit estimates                              Number of obs =     77
                                              LR chi2(1)    =  11.51
                                              Prob > chi2   = 0.0007
Log likelihood = -25.822169                   Pseudo R2     = 0.1823

------------------------------------------------------------------------------
insura~y |     dF/dx    Std. Err.      z     P>|z|     x-bar   [    95% C.I.   ]
---------+--------------------------------------------------------------------
cashit~o |  -.4509182   2.219333   -1.76   0.078    .0052  -4.80073   3.8989
---------+--------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0002148  (at x-bar)
------------------------------------------------------------------------------
   z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.4. Significance of the CASHITEM Variable with Robustness

```
Probit estimates                              Number of obs =     77
                                              Wald chi2(1)  =   2.89
                                              Prob > chi2   = 0.0893
Log pseudo-likelihood = -25.822169            Pseudo R2     = 0.1823

------------------------------------------------------------------------------
         |            Robust
insura~y |     dF/dx    Std. Err.      z     P>|z|     x-bar   [    95% C.I.   ]
---------+--------------------------------------------------------------------
cashit~o |  -.4509182   2.315944   -1.70   0.089    .0052  -4.99009  4.08825
---------+--------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0002148  (at x-bar)
------------------------------------------------------------------------------
   z and P>|z| are the test of the underlying coefficient being 0
```

The third variable is the ratio of total loans which include all loans. In both Table 3.5 and Table 3.6, the p-value is 0.000 which is significant on all levels. This variable is clearly significant to the final results with the given p-values.

Table 3.5. Significance of the LOANRATIO Variable

```
Probit estimates                                Number of obs =     77
                                                LR chi2(1)    =  16.31
                                                Prob > chi2   = 0.0001
Log likelihood = -23.422839                     Pseudo R2     = 0.2583

------------------------------------------------------------------------------
insura~y |    dF/dx     Std. Err.      z     P>|z|     x-bar    [   95% C.I.   ]
---------+--------------------------------------------------------------------
loanra~o | -.5099926   .1518621    -3.52   0.000   .416069  -.807637 -.212348
---------+--------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0781535  (at x-bar)
------------------------------------------------------------------------------
    z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.6. Significance of the LOANRATIO Variable with Robustness

```
Probit estimates                                Number of obs =     77
                                                Wald chi2(1)  =  16.90
                                                Prob > chi2   = 0.0000
Log pseudo-likelihood = -23.422839              Pseudo R2     = 0.2583

------------------------------------------------------------------------------
         |              Robust
insura~y |    dF/dx     Std. Err.      z     P>|z|     x-bar    [   95% C.I.   ]
---------+--------------------------------------------------------------------
loanra~o | -.5099926   .1559088    -4.11   0.000   .416069  -.815568 -.204417
---------+--------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0781535  (at x-bar)
------------------------------------------------------------------------------
    z and P>|z| are the test of the underlying coefficient being 0
```

The fourth variable is the currency ratio. When divided by total assets the variable becomes significant on all levels as in Table 3.7. When robustness is added to the regression in Table 3.8, the variable still remains significant on all levels.

Table 3.7. Significance of the CURRENCYRATIO Variable

```
Probit estimates                              Number of obs =     77
                                              LR chi2(1)    =  15.59
                                              Prob > chi2   = 0.0001
Log likelihood = -23.783626                   Pseudo R2     = 0.2469

------------------------------------------------------------------------------
insura~y |      dF/dx   Std. Err.      z    P>|z|     x-bar  [    95% C.I.   ]
---------+--------------------------------------------------------------------
curren~o |  -3.355028   1.060826   -3.25   0.001   .050736  -5.43421 -1.27585
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0611568  (at x-bar)

    z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.8. Significance of the CURRENCYRATIO Variable with Robustness

```
Probit estimates                              Number of obs =     77
                                              Wald chi2(1)  =   6.61
                                              Prob > chi2   = 0.0102
Log pseudo-likelihood = -23.783626            Pseudo R2     = 0.2469

------------------------------------------------------------------------------
         |               Robust
insura~y |      dF/dx   Std. Err.      z    P>|z|     x-bar  [    95% C.I.   ]
---------+--------------------------------------------------------------------
curren~o |  -3.355028   1.085878   -2.57   0.010   .050736  -5.48331 -1.22675
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0611568  (at x-bar)
------------------------------------------------------------------------------
    z and P>|z| are the test of the underlying coefficient being 0
```

The CAPTIAL variable is a summation of paid in capital, retained earnings and the surplus fund. The ratio of capital to total assets gives p-values that mimic the movements of the currency ratio. In Table 3.9 the p-value is significant on all levels. In Table 3.10 when an adjustment is made for robustness, the p-value increases slightly but is still significant on all levels.

Table 3.9. Significance of the CAPITALRATIO Variable

```
Probit estimates                                   Number of obs =     77
                                                   LR chi2(1)    =  16.66
                                                   Prob > chi2   = 0.0000
Log likelihood = -23.251456                        Pseudo R2     = 0.2637

------------------------------------------------------------------------------
insura~y |      dF/dx    Std. Err.      z     P>|z|     x-bar     [    95% C.I.   ]
---------+--------------------------------------------------------------------
capita~o |   .5186338   .1576774     3.77   0.000   .454457   .209592  .827676
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0963794  (at x-bar)

   z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.10. Significance of the CAPITALRATIO Variable with Robustness

```
Probit estimates                                   Number of obs =     77
                                                   Wald chi2(1)  =   7.42
                                                   Prob > chi2   = 0.0064
Log pseudo-likelihood = -23.251456                 Pseudo R2     = 0.2637

------------------------------------------------------------------------------
         |               Robust
insura~y |      dF/dx    Std. Err.      z     P>|z|     x-bar     [    95% C.I.   ]
---------+--------------------------------------------------------------------
capita~o |   .5186338   .1363501     2.72   0.006   .454457   .251393  .785875
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0963794  (at x-bar)
------------------------------------------------------------------------------
   z and P>|z| are the test of the underlying coefficient being 0
```

The profits ratio starts out being questionable in Table 3.11. The p-value is .073 which significant at the 10% level, but not at the more desirable 5% level. In Table 3.12, the p-value drops to .023 becoming significant at the 5% level indicating that this variable is significant to the final regression.

Table 3.11. Significance of the PROFITRATIO Variable

Probit estimates	Number of obs = 77
	LR chi2(1) = 3.76
	Prob > chi2 = 0.0525
Log likelihood = -29.69896	Pseudo R2 = 0.0595

insura~y	dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
profit~o	4.203693	2.393338	1.79	0.073	.011525	-.487163	8.89455
obs. P	.1428571						
pred. P	.1345062 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Table 3.12. Significance of the PROFITRATIO Variable with Robustness

Probit estimates	Number of obs = 77
	Wald chi2(1) = 5.19
	Prob > chi2 = 0.0227
Log pseudo-likelihood = -29.69896	Pseudo R2 = 0.0595

insura~y	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
profit~o	4.203693	1.87718	2.28	0.023	.011525	.524488	7.8829
obs. P	.1428571						
pred. P	.1345062 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Deposits include all core deposits in the bank. This variable is one that we believe is significant and our results concur with that. In Table 3.13, the p-value is significant on all levels. In Table 3.14, the p-value increases somewhat, but is still significant at the 5% level.

Table 3.13. Significance of the DEPOSITRATIO Variable

```
Probit estimates                              Number of obs =     77
                                              LR chi2(1)    =  16.67
                                              Prob > chi2   = 0.0000
Log likelihood = -23.242445                   Pseudo R2     = 0.2640

------------------------------------------------------------------------------
insura~y |      dF/dx   Std. Err.      z    P>|z|     x-bar  [    95% C.I.   ]
---------+--------------------------------------------------------------------
deposi~o |  -.4908594   .1478979   -3.77   0.000   .439953  -.780734 -.200985
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0938845  (at x-bar)

    z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.14. Significance of the DEPOSITRATIO Variable with Robustness

```
Probit estimates                              Number of obs =     77
                                              Wald chi2(1)  =   5.87
                                              Prob > chi2   = 0.0154
Log pseudo-likelihood = -23.242445            Pseudo R2     = 0.2640

------------------------------------------------------------------------------
         |               Robust
insura~y |      dF/dx   Std. Err.      z    P>|z|     x-bar  [    95% C.I.   ]
---------+--------------------------------------------------------------------
deposi~o |  -.4908594   .1298457   -2.42   0.015   .439953  -.745352 -.236366
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0938845  (at x-bar)
------------------------------------------------------------------------------
    z and P>|z| are the test of the underlying coefficient being 0
```

OTHERLIA is a variable that includes liabilities that were not given their own category. The downside to using this variable is that is a catch-all for a variety of items not included and, therefore, the influence on the regression could be coming from a variety of sources. In Table 3.15, the initial results indicate that this variable is significant at both the 10% and 5% levels while in Table 3.16, the p-value rises and becomes insignificant at the 10% level. The implication is that OTHERLIA ratio is not an important variable.

Table 3.15. Significance of the OTHERLIA Variable

```
Probit estimates                                  Number of obs =     77
                                                  LR chi2(1)    =   5.40
                                                  Prob > chi2   = 0.0202
Log likelihood = -28.880428                       Pseudo R2     = 0.0855

---------------------------------------------------------------------------
insura~y |    dF/dx     Std. Err.     z     P>|z|    x-bar    [    95% C.I.   ]
---------+-----------------------------------------------------------------
otherl~o |  3.683499   1.610727    2.38   0.017   .005961   .526531   6.84047
---------+-----------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .1298613  (at x-bar)

   z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.16. Significance of the OTHERLIA Variable with Robustness

```
Probit estimates                                  Number of obs =     77
                                                  Wald chi2(1)  =   2.67
                                                  Prob > chi2   = 0.1019
Log pseudo-likelihood = -28.880428                Pseudo R2     = 0.0855

---------------------------------------------------------------------------
         |             Robust
insura~y |    dF/dx     Std. Err.     z     P>|z|    x-bar    [    95% C.I.   ]
---------+-----------------------------------------------------------------
otherl~o |  3.683499   2.378163    1.64   0.102   .005961  -.977615   8.34461
---------+-----------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .1298613  (at x-bar)
---------------------------------------------------------------------------
   z and P>|z| are the test of the underlying coefficient being 0
```

The final variable is TOTAL itself. The results convincingly show that TOTAL is important to the regression. In both Table 3.17 and 3.18, the p-values are zero showing the importance of the log of total assets to the final regression results.

Table 3.17. Significance of the TOTAL Variable

```
Probit estimates                              Number of obs =     77
                                              LR chi2(1)    =  22.08
                                              Prob > chi2   = 0.0000
Log likelihood = -20.540149                   Pseudo R2     = 0.3496

------------------------------------------------------------------------------
insura~y |      dF/dx   Std. Err.      z    P>|z|     x-bar   [    95% C.I.   ]
---------+--------------------------------------------------------------------
newtotal |   .1248703   .0406797     4.08   0.000   10.9097    .04514  .204601
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0688325  (at x-bar)
------------------------------------------------------------------------------
    z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.18. Significance of the TOTAL Variable with Robustness

```
Probit estimates                              Number of obs =     77
                                              Wald chi2(1)  =  17.91
                                              Prob > chi2   = 0.0000
Log pseudo-likelihood = -20.540149            Pseudo R2     = 0.3496

------------------------------------------------------------------------------
         |               Robust
insura~y |      dF/dx   Std. Err.      z    P>|z|     x-bar   [    95% C.I.   ]
---------+--------------------------------------------------------------------
newtotal |   .1248703   .0410527     4.23   0.000   10.9097   .044408  .205332
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0688325  (at x-bar)

    z and P>|z| are the test of the underlying coefficient being 0
```

Significant Variables Analysis

After running all the variables as a ratio to total assets individually, the significant ones were pulled out and run together. The first regression included five variables, three of which were obviously significant and two that were questionable. In Table 3.19, the results are given showing that the log of total assets (logtotal) and ratio of loans to total assets (loanratio) are both significant with the log of total assets being significant at both the 10% and 5% levels. The other three variables are not significant at the 10% level or lower. In Table 3.20, all variables are significant at the 10% level with the ratio of currency to total assets (currencyratio), loans to total assets (loanratio) and the log of total assets (logtotal) are significant at the 5% level. The log of total assets is the only variable that remained significant on both the 10% and 5% levels in both equations.

Table 3.19. All Significant Variables

```
Probit estimates                              Number of obs =     77
                                              LR chi2(5)    =  43.13
                                              Prob > chi2   = 0.0000
Log likelihood = -10.012449                   Pseudo R2     = 0.6829

------------------------------------------------------------------------------
insura~y |     dF/dx    Std. Err.     z     P>|z|     x-bar    [   95% C.I.   ]
---------+--------------------------------------------------------------------
loanra~o |  -.0655238   .1202846   -2.10   0.035   .416069   -.301277   .17023
capita~o |   .1281058   .2112616    1.36   0.172   .454457   -.285959  .542171
curren~o |  -.2649019   .5035581   -1.33   0.183   .050736   -1.25186  .722054
deposi~o |   .1212559   .1922829    1.29   0.199   .439953   -.255612  .498124
logtotal |   .0210511    .037003    2.19   0.029   10.9097   -.051473  .093576
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0050541  (at x-bar)
------------------------------------------------------------------------------
   z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.20. All Significant Variables with Robustness

Probit estimates — Number of obs = 77; Wald chi2(5) = 33.26; Prob > chi2 = 0.0000

Log pseudo-likelihood = -10.012449 — Pseudo R2 = 0.6829

insura~y	Robust dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
loanra~o	-.0655238	.0612713	-2.40	0.016	.416069	-.185613	.054566
capita~o	.1281058	.1361383	1.90	0.057	.454457	-.13872	.394932
curren~o	-.2649019	.3485909	-2.25	0.024	.050736	-.948128	.418324
deposi~o	.1212559	.1212613	1.84	0.066	.439953	-.116412	.358924
logtotal	.0210511	.0219872	2.93	0.003	10.9097	-.022043	.064145
obs. P	.1428571						
pred. P	.0050541 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Because one of the variables moves from being insignificant to significant on both the 10% and 5% levels in the previous two tables, a test to check for multicollinearity between the variables is done. This involved running each variable with the log of total assets since that is the strongest variable both alone and in this group of five.

The first variable run in conjunction with the log of total assets is the loan ratio. The results are given in Tables 3.21 and 3.22. Both tables show that the loan ratio is significant on all levels and the significance rises in the loan ratio measure when robustness is included.

Table 3.21. LOANRATIO Run with Log of Total Assets

```
Probit estimates                                Number of obs =     77
                                                LR chi2(2)    =  34.93
                                                Prob > chi2   = 0.0000
Log likelihood = -14.113748                     Pseudo R2     = 0.5531

-----------------------------------------------------------------------------
insura~y |     dF/dx    Std. Err.     z     P>|z|    x-bar   [    95% C.I.   ]
---------+-------------------------------------------------------------------
loanra~o | -.2624069   .1643152   -2.94   0.003   .416069  -.584459  .059645
logtotal |  .0629919   .0418919    3.54   0.000   10.9097  -.019115  .145098
---------+-------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0268172  (at x-bar)
-----------------------------------------------------------------------------
   z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.22. LOANRATIO Run with Log of Total Assets with Robustness

```
Probit estimates                                Number of obs =     77
                                                Wald chi2(2)  =  17.28
                                                Prob > chi2   = 0.0002
Log pseudo-likelihood = -14.113748              Pseudo R2     = 0.5531

-----------------------------------------------------------------------------
         |             Robust
insura~y |     dF/dx    Std. Err.     z     P>|z|    x-bar   [    95% C.I.   ]
---------+-------------------------------------------------------------------
loanra~o | -.2624069   .1752233   -3.14   0.002   .416069   -.605838  .081025
logtotal |  .0629919   .0493407    3.99   0.000   10.9097   -.033714  .159698
---------+-------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0268172  (at x-bar)

   z and P>|z| are the test of the underlying coefficient being 0
```

The second ratio variable run is the currency ratio. This is the variable that in the larger regression with the five significant variables moves between the two models. In Table 3.23, the currency ratio starts off significant at the 10% and 5% level but in Table 3.24 it becomes to significant at only the 10% level.

Table 3.23. CURRENCYRATIO Run with Log of Total Assets

Probit estimates	Number of obs = 77
	LR chi2(2) = 28.59
	Prob > chi2 = 0.0000
Log likelihood = -17.285409	Pseudo R2 = 0.4526

insura~y	dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
curren~o	-1.738126	.9195628	-2.30	0.022	.050736	-3.54044	.064184
logtotal	.0598635	.0365907	3.25	0.001	10.9097	-.011853	.13158
obs. P	.1428571						
pred. P	.0353888 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Table 3.24. CURRENCYRATIO Run with Log of Total Assets with Robustness

Probit estimates	Number of obs = 77
	Wald chi2(2) = 14.64
	Prob > chi2 = 0.0007
Log pseudo-likelihood = -17.285409	Pseudo R2 = 0.4526

insura~y	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
curren~o	-1.738126	.7188972	-1.74	0.083	.050736	-3.14714	-.329114
logtotal	.0598635	.0484281	3.52	0.000	10.9097	-.035054	.154781
obs. P	.1428571						
pred. P	.0353888 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Next is the capital ratio. In the model with the five significant variables, it is insignificant in the general probit model, but becomes significant at the 10% level in the model with robustness. When run alone with the log of total assets, the capital ratio is very significant in Table 3.25 and though a higher p-value exists in Table 3.26 the variable is still significant at the 10% and 5% levels.

Table 3.25. CAPITALRATIO Run with Log of Total Assets

```
Probit estimates                                  Number of obs =     77
                                                   LR chi2(2)   =  33.28
                                                   Prob > chi2  = 0.0000
Log likelihood = -14.938856                        Pseudo R2    = 0.5269

------------------------------------------------------------------------------
insura~y |     dF/dx     Std. Err.     z     P>|z|    x-bar     [    95% C.I.   ]
---------+--------------------------------------------------------------------
capita~o |  .3109173   .1583246    3.13   0.002   .454457    .000607  .621228
logtotal |  .0979864    .040391    3.58   0.000   10.9097    .018821  .177151
---------+--------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0567814  (at x-bar)
------------------------------------------------------------------------------
    z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.26. CAPITALRATIO Run with Log of Total Assets with Robustness

```
Probit estimates                                  Number of obs =     77
                                                   Wald chi2(2)  =  17.06
                                                   Prob > chi2   = 0.0002
Log pseudo-likelihood = -14.938856                 Pseudo R2     = 0.5269

------------------------------------------------------------------------------
         |             Robust
insura~y |     dF/dx     Std. Err.     z      P>|z|    x-bar     [    95% C.I.   ]
---------+--------------------------------------------------------------------
capita~o |  .3109173    .096572     2.58   0.010   .454457    .12164  .500195
logtotal |  .0979864    .0471649    3.59   0.000   10.9097    .005545  .190428
---------+--------------------------------------------------------------------
  obs. P |  .1428571
 pred. P |  .0567814  (at x-bar)
------------------------------------------------------------------------------
 z and P>|z| are the test of the underlying coefficient being 0
```

The deposit ratio in the larger model is the least significant of the five variables, but that may be due to the inclusion of other variables. When run alone with the log of total assets, the p-value moves from being significant at both levels in Table 3.27 to significant at only the 10% level in Table 3.28. The movement from highly significant to mildly significant leads to the conclusion that the variable is probably not significant.

Table 3.27. DEPOSITRATIO Run with Log of Total Assets

Probit estimates — Number of obs = 77; LR chi2(2) = 29.21; Prob > chi2 = 0.0000

Log likelihood = -16.974625 — Pseudo R2 = 0.4625

insura~y	dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
deposi~o	-.2680839	.1397966	-2.57	0.010	.439953	-.54208	.005912
logtotal	.0938389	.0376742	3.20	0.001	10.9097	.019999	.167679
obs. P	.1428571						
pred. P	.0629482 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Table 3.28. DEPOSITRATIO Run with Log of Total Assets with Robustness

Probit estimates — Number of obs = 77; Wald chi2(2) = 16.40; Prob > chi2 = 0.0003

Log pseudo-likelihood = -16.974625 — Pseudo R2 = 0.4625

insura~y	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
deposi~o	-.2680839	.103147	-1.85	0.064	.439953	-.470248	-.06592
logtotal	.0938389	.047887	3.31	0.001	10.9097	-.000018	.187696
obs. P	.1428571						
pred. P	.0629482 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

The deposit ratio can be eliminated as a significant variable because it was the least significant when all five were run together and mildly significant when run with just the log of total assets. Inclusion of the currency ratio is questionable but because it remains significant at the 10% level or better most of the time it seems warranted to include it.

In Tables 3.29 and 3.30, both the ratio of loans to total assets and the log of total assets remain significant at both levels. The capital ratio is debatable moving from 10% significance to no significance and again the currency ratio jumps between being insignificant in Table 3.29 and significant at the 10% and 5% levels in Table 3.30 when robustness is added to the model.

Table 3.29. Most Significant Variables

Probit estimates — Number of obs = 77
LR chi2(4) = 40.93
Prob > chi2 = 0.0000
Log likelihood = -11.114041 — Pseudo R2 = 0.6481

insura~y	dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.	]
loanra~o	-.2333359	.1662801	-2.25	0.024	.416069	-.559239	.092567
curren~o	-.7998279	.7681173	-1.26	0.209	.050736	-2.30531	.705654
capita~o	.0388479	.0822491	0.58	0.560	.454457	-.122357	.200053
logtotal	.0438829	.0368796	2.64	0.008	10.9097	-.0284	.116166
obs. P	.1428571						
pred. P	.0229493 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Table 3.30. Most Significant Variables with Robustness

Probit estimates Number of obs = 77
Wald chi2(4) = 52.98
Prob > chi2 = 0.0000
Log pseudo-likelihood = -11.114041 Pseudo R2 = 0.6481

insura~y	Robust dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
loanra~o	-.2333359	.1421282	-2.57	0.010	.416069	-.511902	.04523
curren~o	-.7998279	.6017959	-2.42	0.015	.050736	-1.97933	.37967
capita~o	.0388479	.0852937	0.53	0.595	.454457	-.128325	.206021
logtotal	.0438829	.0318277	3.03	0.002	10.9097	-.018498	.106264
obs. P	.1428571						
pred. P	.0229493 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

The next logical step would to be run a model without the capital ratio. Before running a model without both the capital ratio and the deposit ratio, I want to be positive in my elimination of the deposit ratio so I ran the loan ratio, currency ratio and the log of total assets with the deposit ratio to check for significance. In both Table 3.31 and Table 3.32, the deposit ratio was drastically insignificant in the p-values. This solidified my conclusion that the deposit ratio would be insignificant.

Table 3.31. DEPOSITRATIO Check for Significance

Probit estimates — Number of obs = 77; LR chi2(4) = 40.62; Prob > chi2 = 0.0000; Log likelihood = -11.26864; Pseudo R2 = 0.6432

insura~y	dF/dx	Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
loanra~o	-.2319835	.1799076	-2.52	0.012	.416069	-.584596	.120629
curren~o	-.8739541	.7856914	-1.46	0.145	.050736	-2.41388	.665973
deposi~o	-.0110288	.0643819	-0.18	0.854	.439953	-.137215	.115157
logtotal	.0388488	.0339076	2.57	0.010	10.9097	-.027609	.105306
obs. P	.1428571						
pred. P	.0207323 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Table 3.32. DEPOSITRATIO Check for Significance with Robustness

Probit estimates — Number of obs = 77; Wald chi2(4) = 50.11; Prob > chi2 = 0.0000; Log pseudo-likelihood = -11.26864; Pseudo R2 = 0.6432

insura~y	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
loanra~o	-.2319835	.144386	-2.93	0.003	.416069	-.514975	.051008
curren~o	-.8739541	.7290706	-2.56	0.010	.050736	-2.30291	.554998
deposi~o	-.0110288	.0692251	-0.17	0.867	.439953	-.146707	.12465
logtotal	.0388488	.0284397	2.75	0.006	10.9097	-.016892	.09459
obs. P	.1428571						
pred. P	.0207323 (at x-bar)						

z and P>|z| are the test of the underlying coefficient being 0

Final Regression Analysis

Now that I can eliminate both the deposit ratio and the capital ratio, the only three variables left are the loan ratio, currency ratio and the log of total assets. The final step is to run a regression with those three variables to see if they remain significant when run together. Tables 3.33 and 3.34 show the results from the final model. In both cases, log of total assets and ratio of loans to total assets are significant at both the 10% and 5% levels, while the currency ratio is significant at the 10% level in both tables.

Table 3.33. Final Regression

```
Probit estimates                              Number of obs =     77
                                              LR chi2(3)    =  40.59
                                              Prob > chi2   = 0.0000
Log likelihood = -11.285433                   Pseudo R2     = 0.6426

------------------------------------------------------------------------------
insura~y |      dF/dx   Std. Err.      z    P>|z|    x-bar    [    95% C.I.   ]
---------+--------------------------------------------------------------------
loanra~o |  -.2235914   .1745936   -2.72   0.007   .416069   -.565789  .118606
curren~o |  -.8829635   .7953633   -1.89   0.058   .050736   -2.44185   .67592
logtotal |   .0368675   .0313867    2.61   0.009   10.9097   -.024649  .098384
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0192928  (at x-bar)
------------------------------------------------------------------------------
 z and P>|z| are the test of the underlying coefficient being 0
```

Table 3.34. Final Regression with Robustness

```
Probit estimates                                  Number of obs =      77
                                                  Wald chi2(3)  =  47.94
                                                  Prob > chi2   = 0.0000
Log pseudo-likelihood = -11.285433                Pseudo R2     = 0.6426

------------------------------------------------------------------------------
         |            Robust
insura~y |    dF/dx     Std. Err.     z     P>|z|     x-bar     [    95% C.I.   ]
---------+--------------------------------------------------------------------
loanra~o |  -.2235914   .1493397   -4.01   0.000   .416069   -.516292  .069109
curren~o |  -.8829635   .7796655   -1.88   0.061   .050736   -2.41108  .645153
logtotal |   .0368675    .0273639    2.91   0.004   10.9097   -.016765    .0905
---------+--------------------------------------------------------------------
  obs. P |   .1428571
 pred. P |   .0192928  (at x-bar)
------------------------------------------------------------------------------
z and P>|z| are the test of the underlying coefficient being 0
```

CHAPTER IV

RESULTS

The results of the regression revolve around the importance of the log of total assets. It remains the most significant variable throughout the entire analysis. The sign on the coefficient for log of total assets is positive which consistent with both theory and actual historical records. The more total assets a bank has, the larger the bank. Historically, it was the larger banks who first opposed deposit insurance all together but when the Texas legislature required it was those same larger banks that opted for the bond plan. Also, the cost of paying into the guaranty plan was usually higher than the cost of securing the bonds because the guaranty plan required paying a set percentage based on size of daily deposits.

The coefficients on both the loan ratio and the currency ratio are negative, implying that the higher the percentage of those assets with respect to total assets the less likely the bank would be to choose the bond plan. Focusing first on the loan ratio, if the ratio itself increased by 10% the probability the bank would choose the bond plan would decrease by 22.359%. Loans are typically a major asset to a bank so at first this would seem counter-intuitive. Considering the time period, however, leads to believe that the more loans a bank has out the less equity it has left and less money it had to purchase bonds with.

Currency is like the vault cash to a bank today. The higher the currency ratio the more likely a bank would be to choose the guaranty plan. Again this seems counter-intuitive to conventional thinking. Larger banks tend to have more deposits and from those deposits more currency. The historical record and the results of this paper show that larger banks tended to chose the bond plan. If the results followed this then the sign on the coefficient of the currency ratio should be positive not negative. The reasoning behind the negative sign on the coefficient can be explained by the haziness of the results. The currency ratio bounced between being significant and insignificant. The results are unclear on whether the currency ratio is important to the final regression and that could be causing the counter-intuitive sign on the currency ratio coefficient.

CHAPTER V

CONCLUSION

In this paper, total assets are the most important variable in a banks decision on which plan to choose. History has shown that size played a role in the creation of the deposit system and in which deposit insurance plan banks chose. Generally the more total assets a bank had, the more likely the bank was to choose the bond plan.

While the results of this paper are consistent with the theory, problems do exist. Since all three variables are considered assets to the bank, the chance of multicollinearity within the regression is high. The multicollinearity causes the standard error estimates to increase along with causing the regression to be sensitive to changes in its specification. Multicollinearity can be corrected by removing variables that are related, given the small sample size and our assumptions removing variables from the regression would be difficult.

The dual system of deposit insurance in Texas only lasted for a decade and there is evidence that the deposit insurance eventually helped in the bank failures of the Great Depression. Looking at the state banking industry before the Federal Reserve, it's hard to believe that ideas so common today were once novel. What remains the same is the importance of basic banking instruments like deposits, loans, and currency. These variables were important to the choice of deposit insurance in the early 20th century and remain important to bank operations of today.

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