

IMPACT OF FREE BANKING ON THE FREE BANKING MARKET

by

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(ABSTRACT)

This dissertation examines the free banking laws of seven states and the impact of three provisions of the laws on the states' banking experience. In Chapter I, a review of two current theories of the free banking experience is presented. One theory contends that the laws themselves induced the banking experience of the states. The second theory asserts that economic activity induced the banking experience. This study includes a discussion of both theories in the analysis of the provision's effect on the banking experience.

In Chapter II, a simple model of the operations of a free bank is presented. Also, the laws of the seven states that determine the establishment and the operations of a free bank are reviewed. The review reveals that the states enacted similar provisions, but restrictions included in the provisions differ considerably.

In Chapter III, the experiences of the states are examined. The states represent a spectrum of banking experiences. The experiences of each state are characterized by four measures; the entry rate, the failure rate, the below par rate, and the average loss per dollar. Each of these measures reflects a different aspect of banking behavior and each is examined in order to determine the effect of the provision

and the effect of economic activity on the behavior of the free banks. The analysis shows that both the provisions and the economic activity influence bank behavior.

In Chapter IV, a theoretical analysis of the effect of the stockholders liability provision on entry and on the bank's portfolio is developed. The theory shows that an increase in the stockholders liability of a free bank reduces entry into the free banking market and increases the risky asset-capital ratio of the free bank.

The testing of the theories is presented in Chapter V. The empirical evidence confirms the hypothesis that an increase in the liability of the stockholders increases the risky asset-capital ratio. The evidence does not confirm the hypothesis that an increase in the liability of the stockholder reduces entry.

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CHAPTER I

INTRODUCTION AND SURVEY OF THE LITERATURE

Throughout American history the banking industry has been closely regulated. From the beginning, restrictions have been imposed on bank entry and on bank conduct in one form or another. Generally, bank entry has been regulated by a state or federal regulatory agency while bank conduct has been regulated through the placement of restrictions on portfolio selection, demand deposit creation, and capital adequacy. There is one segment of American banking history in which entry was not determined by legislative charter; this period from 1837 to 1863 is known as the Free Banking Era.

Prior to the Free Banking Era, the banking industry was strictly regulated by the states.¹ The state legislatures regulated entry into the banking market through licensing of bank charters. The charters were individually constructed, containing provisions regulating the activities of the specified bank. One such provision, common to all the charters, allowed the banks to issue bank notes; that is, promisory notes circulating as currency. The banks, however, were required to redeem the bank notes into specie (gold or silver) on demand. Failure to do so would jeopardize charter privileges.

This system of regulating banks gave way in some states to the free banking system which eliminated legislative licensing of bank charters. Certain states enacted free banking legislation which called for free access to the banking market while imposing uniform restrictions on banking operations. Banks in these states were "free" to enter the

banking market as long as they met minimum capital requirements. Free banks desiring to issue bank notes were required to submit marketable securities with the banking authorities as collateral for the notes issued. Like charter banks, the free banks were required to redeem the bank notes into specie on demand. If a bank failed to honor the request of a noteholder, the bank would be required to close and the securities would be sold for the redemption of the circulating notes. Hence, these laws were enacted to eliminate side payments to legislators and to ensure noteholder safety.

Between 1837 and 1863 nineteen states enacted free banking laws. Some of the free banking states experienced few bank failures and small or no losses to noteholders. Other states experienced many bank failures and large losses to noteholders. Economic historians have labeled these states as "wildcat" banking states. The experiences in these states have led to much of the criticism of the free bank experience and have produced the conventional view of the free banking era.

The critics have claimed that these experiences were a result of the free competition among banks. Further, some have associated the free banking period with a period of "laissez-faire" banking. Such association, however, is unwarranted since the free banks were subject to various restrictions.

It has been only recently that researchers, notably Hugh Rockoff (1972), and Arthur Rolnick and Warren Weber (1980), have challenged the conventional view of the free banking experience. These researchers contend that wildcat banking was not a result of the liberal entry

provision but instead argue that the laws influenced the banking experience. Rockoff was the first among the researchers to develop a theory about what went wrong. According to Rockoff, specific provisions in the free banking laws rather than the lack of a central authority induced the wildcat banking experience.² Rockoff asserted that minor changes in the note security provision and the damage clause provision would have been sufficient to eliminate wildcat banking.

Rockoff found that the states that experienced wildcat banking enacted the par evaluation of note security and a low damage clause provision. The par evaluation provision required the state authorities to issue bank notes to the bank equal to the par value of the securities. Consequently, if the market value of the securities was below the par value of the securities, the investor of the free bank would receive bank notes in an amount greater than his investment. The free bank investor who was interested in making a quick capital gain on his investment could issue all the notes, presumably through a loan to himself or to a relative, then close the bank's doors and leave town. This scenario, however, could only be possible when the free bank investor was able to convince the public to accept and to hold the bank notes at face value.³ Thus, the unsuspecting noteholder would be holding bank notes that were not fully backed, and would receive only the market value of the securities, while the free bank investor would receive a capital gain on his investment equal to the difference between the par value and the market value of the securities.

Rockoff also argued that the transfer from noteholder to free bank investor would not have been possible if there were provisions that allowed the noteholder to recoup his losses. The damage clause provision provided for the repayment of noteholder losses. The two provisions suggested by Rockoff which would deter wildcat banking were the interest penalty on unredeemed bank notes and the liability of the stockholders.⁴ Rockoff contends that if the free bank investor was assessed damages equal to the loss of the noteholder, that is equal to his capital gain, he would have no incentive to close the bank. Although Rockoff presents evidence supporting the par evaluation hypothesis, he does not do so with the damage clause hypothesis.

Rolnick and Weber (hereafter referred to as RW), however, reviewed the free banking experience and found evidence that refutes Rockoff's hypothesis.⁵ Although they did not deny that there were frequent bank failures and large noteholder losses within some states, they rejected the hypothesis that the minor specifications in the laws caused the wildcat banking experience. RW presented an alternative theory which suggested that economic disturbances acting upon the regulations may have contributed to the bank failures and to the noteholder losses.⁶

According to RW, a major drop in asset prices, together with the provision requiring banks to redeem their notes at par, would have been sufficient to generate a run on the banks and would have possibly forced some of the banks to close. As a proxy for asset prices, RW use bond prices to measure economic activity. Their reasoning was that bonds

were primarily used as collateral for note issue and in most cases bonds were a large portion of the free bank's asset portfolio. A drop in bond prices would have lowered the market value of the bonds backing the notes as well as lowered the value of the free bank assets. If the noteholder perceived that the drop in bond prices was large enough to jeopardize the solvency of the bank, he would have gone to the bank and have attempted to redeem his notes at par value. The bank would not have honored the request if the noteholder was correct with his assessment. To do so would have meant that the bank's stockholders would have had to invest additional capital. Instead the stockholders of the bank would have allowed the notes to be protested and closed the bank. Consequently, the bonds would have been sold by the state banking authorities at a price below the original purchase price and the noteholders would have been paid off at some fraction of the face value of the note.

Even if the noteholder was wrong in his assessment of the financial position of the bank, the banker still could have been forced to close the bank in order to liquidate some of the assets. RW suggested that some of the solvent banks may have closed permanently rather than continue to operate under such turbulent conditions.⁷

Both studies present hypotheses explaining bank failures, with each study pointing to particular provisions that contributed to free bank failures. The purpose of this study is to look at other provisions enacted by the free banking states and to determine their influence on banking behavior. The provisions that will be examined

are the specie reserve requirement provision, stock reserve requirement provision, and the liability provision. These provisions were selected because they were enacted with the objective of assuring par redemption of notes issued. These provisions also influenced either directly or indirectly the number of entrants into the market, the number of banks failing, and the amount of noteholder losses.

As suggested in the RW study, banking decisions are affected by economic activity. This study will also control for economic activity by dividing the banking era into periods of falling and rising or stable bond prices. Controlling for the changes in economic activity will allow us to show not only the effect the different specifications had on banking behavior but also the effect that changes in economic activity had, and will allow us to determine whether the laws or the economic activity had the greater effect.

Four hypotheses will be examined in this study. The first three will concern the effects of the specie reserve requirement and the stock reserve requirement on entry, bank failures and noteholder losses. The analysis of these two provision is combined because both affect the profits of the stockholders. The last hypothesis will concern the effect of the liability provision on entry. The first hypothesis is that under a high specie reserve requirement and a strict stock reserve requirement there will be lower entry rates than under a low specie reserve requirement and/or a more lenient stock reserve requirement. We argue that specie is a non-interest bearing asset and

if high specie reserve requirements are effectively enforced they could reduce the profitability of the bank which should lead to lower entry rates. In addition, the strict stock reserve requirement reduces the available resources to the banking institution and hence reduces profit opportunities which should deter entry.

The second hypothesis is that with a high specie reserve requirement and a strict stock reserve requirement there will be fewer bank failures than under a low specie reserve requirement and/or a more lenient stock reserve requirement. We contend that the specie reserve requirement reduces the risk of insolvency due to fluctuating asset prices thus preventing failures. Also the excess of market value of the securities over the amount of notes issued will reduce the bank's susceptibility to drops in asset prices which would help prevent bank failures from occurring.

The third hypothesis states that under a high specie reserve requirement and a strict stock reserve requirement there will be lower noteholder losses than under a low specie reserve requirement and/or a more lenient stock reserve requirement. This results from the same reasoning applied to bank failures. Since a high specie reserve and a strict stock reserve reduce the risk of insolvency due to fluctuating asset prices, noteholder losses will be reduced as well.

The last hypothesis concerns the personal liability of the stockholders. It states that when the personal liability of the stockholders is great, the entry rate will be lower than when there is little or no personal liability. We argue that the personal liability

of stockholders would reduce the incentive to enter the market and hence lower the entry rate.

The study will proceed as follows. In Chapter II the free banking laws enacted in seven states are examined. The chapter begins with a discussion of the mechanics of a free bank and the profitability of note issue. The major provisions enacted within each state are then examined. The states selected represent a cross-section of banking experience. In Chapter III the data on the seven free banking states are presented and the hypotheses on the impact of the specie reserve requirement and note issue requirement are tested. The impact of the liability provision on banking behavior is examined theoretically in Chapter IV; in particular, the effect of the provision on the banks' portfolio and on entry are discussed. The model used in the analysis is the state preference model. Chapter V contains the test of the implications derived from the model in Chapter IV. The experience of New York state will be examined since New York was one of the states that amended the liability provision during the period.

FOOTNOTES

¹Prior to free banking the federal government established the First and Second Banks of the United States. Both banks were a strong force in the banking market. They would redeem notes of state banks and return them to the issuing banks. Since the banks of the U.S. were able to collect large amounts of notes of state banks, it could threaten to return these large quantities of notes at any time. This threat forced state banks to limit their circulation of notes or maintain larger amounts of specie.

²Hugh Rockoff, The Free Banking Era: A Reexamination. Dissertation in American History (rev. Ph.D. dissertation, University of Chicago, 1972), New York: Arno press, pp. -10.

³This implies that the profitabillity of the free banker depended on the amount of notes that he could circulate in the market, that is, he wanted to maintain as large a "float" as possible. One means of maintaining a large float was to place the bank office in an unaccessible area, this would reduce the average amount of notes returned for redemption, thereby increasing the number of circulating dollars. This policy would give the free banker more leverage and hence, greater returns on note issue.

⁴Both provisions are discussed in detail in Chapter 2.

⁵Arthur Rolnick and Warren E. Weber, "A New Explanation for Free Bank Failures," Research Department Staff Report 79, Federal Reserve Bank of Minneapolis, 1982.

⁶Arthur Rolnick and Warren E. Weber, "Free Banking, Wildcat Banking and Shimplasters," Federal Reserve Bank of Minnesota, Fall 1982, 6, and Arthur Rolnick and Warren E. Weber, "The Causes of Free Bank Failures: A Detailed Examination," Journal of Monetary Economics, December 1984, Vol. 14, pp. 1-24.

⁷Op. cit., Rolnick and Weber, "A New Explanation for Free Bank Failures," p. 16.

CHAPTER II

COMPARISON OF FREE BANKING LAWS

In this chapter we examine the major provisions of the free banking laws of seven free banking states. First, in Section II:1, we give a brief description of the mechanics of starting and operating a free bank. This will be followed by a listing of the major provisions enacted during the Free Bank Era among the seven selected states in Section II:2. Most of the information on the laws in Section II:2 came from state documents.¹ Section II:3 will present a discussion on the enforcement of the provisions. State Auditor Reports and secondary sources were also used to determine the enforcement and interpretation of the laws.

SECTION II.1 The Mechanisms of a Free Bank

The process of establishing a free bank was simple. Any individual or groups of individuals could start a free bank; all that was necessary was for them to submit an application of operation to the state banking authority. Once the minimal level of capital was acquired, the stockholders would transfer a designated portion of the paid-in capital, in the form of public debt or mortgages, to the state banking authority.² The public debt was comprised of bonds issued by the state or bonds issued by the local municipalities guaranteed by the state. The common terminology at the time for public debt was state stock. After the acceptance of the stock, the authority would issue an equal amount of bank notes of different denominations, registered and countersigned by the authority. These bank notes were promissory notes of the bank which could be issued in exchange for loans.

A simple T-account example will aid in the understanding of the mechanics of a free bank. In this example it is assumed that the paid in capital is equal to \$100,000 and that the state stocks were purchased and accepted at par value. The first T-account, Figure 1, shows that \$100,000 dollars of the paid-in capital was used to purchase state stock. Bankers could submit the stocks to the banking authority and in return receive an equal amount of bank notes to be used for loans. As the bank notes were put into circulation, through loans and discounts, they became a liability to the bank. In this example, \$10,000 of the notes issued were used to obtain specie and \$90,000 of the notes were exchanged for loans.

The profits of the free bank (π), with regard to note issue, would be

$$(1) \quad \pi_1 = i_S S + i_L L,$$

where i_S and i_L are the market interest rates on state stock (S), and loans and discounts (L), respectively. (FN market=coupon) In our example it is assumed that the amount of stock submitted to the banking authorities is equal to the amount of capital (K). Since the bank received an amount of notes (N) equal to the amount of stock submitted, the amount of notes is also equal to the amount of capital. Although bankers could exchange notes for loans and discounts, some notes could also be used to buy specie. Banks were required by law to redeem the issued notes for specie. Therefore, bankers would hold an amount of specie for the immediate redemption of notes. If c represents the

<u>Assets</u>	<u>Liability</u>
State Stocks: \$100,000	Circulation: \$100,000
Specie: 10,000	
Loans and	<u>Capital</u>
Discounts: \$90,000	\$100,000

FIGURE 1

Simple T-Account of a Free Bank Where Market
Price for Stock is Equal to Par

percentage of notes used to purchase specie, then the rate of return for a free bank on note issue would be:

$$(2) \quad \pi_1/K = i_s + (1 - c)i_L.$$

However, the above analysis assumes that the stocks were selling and accepted (by the banking authorities) at par. In certain free banking states bankers were able, for a short while, to submit stocks selling below par and receive notes in exchange equal to the par value. One particular example is shown in Figure 2. Under this example, the profit of the free bank becomes

$$(3) \quad \pi_2 = i_s S + i_L(1 - c)N$$

or

$$\frac{\pi_2}{K} = i_s + (1 - c) i_L \frac{N}{K},$$

where $N > K$. Consequently, the free bank gained more leverage from this provision, resulting in higher rates of returns ($\pi_1/K < \pi_2/K$).³

This concludes the general examination of the free bank's mechanics. The balance sheet framework, described above, is used in the next section to analyze the effects of the different provisions of the free banking laws. In particular, the analysis will focus on the provisions that influenced the asset holdings, the liabilities, and the equity of free banks.

<u>Assets</u>		<u>Liabilities</u>	
*State Stocks:	\$100,000	Circulation	\$200,000
Specie:	20,000	<u>Capital</u>	
Loans and Discounts	180,000		\$100,000

FIGURE 2

Simple T-Account of Free Bank Where Market Price
for Stock is Below Par (50% Discount)

*Valued at market.

SECTION II:2 Major Provision of the Free Banking Law

In this section we will examine the fundamental free banking provisions incorporated in the free banking laws of seven states. This group of states represents a cross-section of the U.S. free banking experience. The free banking authorities of Louisiana and Virginia recorded small or no losses to bank creditors and few or no bank failures, while Michigan and Minnesota experienced just the opposite. New York and Indiana were known for their mixed experiences. During the first few years, both states experienced large losses to bank creditors and numerous bank failures relative to the remaining free banking years. The seventh state to be examined is Georgia. The banking authority of Georgia recorded only two banks entering under the free banking law; both banks failed and redeemed their notes at par.

The states are also representative of the chronology of the free banking laws. Michigan, New York and Georgia were the first three states to enact the free banking laws: Michigan in 1837, New York in 1838, and Georgia in 1839. Virginia followed in 1851; Louisiana and Indiana in 1852. Minnesota did not to enact a free banking law until it became a state in 1858.

The sequence of the analysis will be to examine first the provisions that affected the asset side of the balance sheet, and then the provisions that had an impact on the amount of notes that a bank could issue. Finally, we will look at the provisions which affected the equity of the bank. As we proceed with the analysis, it will become evident that the intent of the provisions was to secure the full redemption of all bank notes issued.

Section II:2.1 Asset Restriction

In this section two major asset restrictions will be examined:

(1) reserve requirements on bank notes and (2) loan restrictions.

A. Reserve Requirements on Bank Notes

Unlike modern reserve requirements which require a bank to hold a minimum cash reserve equal to a fraction of its demand deposits, the free banking laws (in most states) required banks to hold a minimum specie reserve as well as a minimum state stock and/or mortgage reserve against note circulation.⁴ The free bank was required to hold these assets in two separate reserve accounts. The specie reserve account was set up at the bank; the other state and mortgage reserve account was set up with the state. The stock and mortgage reserves account (hereafter denoted as stock reserves) was set up by the free bank that desired to circulate bank notes. The bank would transfer approved state stocks and/or mortgages to the state banking authority and would receive bank notes in return. The state would hold these assets as reserves against the bank notes issued to the bank.⁵ The specie reserve reserve account in the bank was set up only when the bank issued the notes to the public, that is, only when the notes were circulating. The bank was required to hold a fraction of the circulating bank notes in specie. The provisions specifying both reserve requirements will be examined under separate headings.

Stock Reserve Requirements

During the Free Banking Era, each state specified the type of asset that would be accepted as state reserves and specified the amount of

bank notes that would be transferred for the asset. By specifying the type of asset and the note transfer rate, the banking authority could gain some control over the free bank's asset portfolio.⁶

Type of Asset

Two types of asset were eligible as state legal reserves: state stock and mortgages. All the free banking states, except Michigan, allowed state stock as legal state reserves. Two of these states, New York and Georgia, also allowed mortgages on unincumbered land as legal reserves. Michigan was the only state that specified mortgages on unencumbered land as the exclusive legal state reserve. Table 1 lists the type of asset accepted as legal reserves by each state.

In addition to specifying the type of asset eligible for legal state reserves, most of the states limited the type of asset that would be acceptable. Table 2 lists the limitations on the acceptable stock and mortgages for each state. Of those states that accepted state stock, only one state, Virginia, restricted the acceptance to stock that was issued by the State of Virginia or issued by a municipality of Virginia which was guaranteed by the state. Between 1841-1844, New York also restricted the grade of stock solely to stock issued by New York. In 1844 New York relaxed this restriction by allowing U.S. stock to be accepted as legal reserves.⁷ Louisiana was less restrictive, accepting stocks issued by the state, New Orleans, and the federal government. Minnesota, Georgia, Indiana and New York (between 1838-1841) were the least restrictive; each accepting as legal state reserves stock issued

TABLE 1
TYPE OF ASSETS AS LEGAL STATE RESERVES

STATE	MORTGAGES	STATE STOCK
Michigan (1837)*	X	
New York (1839)	X	X
Georgia (1839)	X	X
Virginia (1851)		X
Louisiana (1852)		X
Indiana (1852)		X
Minnesota (1858)		X

*Dates in parenthesis denote when Free Bank law was enacted.

TABLE 2

RESTRICTIONS ON THE GRADE OF ASSET HELD AS LEGAL STATE RESERVES

(I) ON STATE STOCK

STATE	YEARS	OWN STOCK, U.S. STOCK, OTHER	OWN STOCK and U.S. STOCK	OWN STOCK ONLY
New York	1838-1840	X		
	1841-1844			X
	1845-1863		X	
Georgia	1838-1860	X		
Virginia	1851-1860			X
Louisiana	1852-1863		X	
Indiana	1852-1861	X		
Minnesota	1858-1863	X		

(II) ON MORTGAGES

STATE	YEARS	MINIMUM MARKET-MORTGAGE VALUE RATIO	MINIMUM INTEREST ¹
Michigan	1837-1840	1	-
New York	1838-1848	2	6%
	1849-1863	2 1/2	7%
Georgia	1838-1860	2	6%

¹The mortgages were required to bear at least a minimum interest rate.

by its own body, the federal government, and other states which were approved by the state banking authority.

New York, Georgia, and Michigan were the only states that allowed mortgages to be held as state reserves against note issue. Each of the states placed restrictions on the type of mortgage that would be accepted as reserves. These restrictions are shown in Table BI. New York and Georgia classified the acceptable mortgage according to the interest rate and to the mortgage value. Both states would only accept mortgages on unincumbered land that bore an interest rate of at least 6 percent and had a market value that was at least twice the mortgage value. New York later amended this provision to a minimum interest rate of seven percent and a minimum market value-mortgage value ratio of two and a half. The amended provision further restricted the acceptable mortgage by limiting the value of each mortgage to \$5000 and by limiting the cumulative value of mortgage reserves to half the total state reserves. Michigan, on the other hand, required the market-mortgage ratio be greater than or equal to one, and called for no minimum interest rate.

Note Transfer Rate

The states also enacted provisions which specified the amount of state stocks and/or mortgages to be transferred to the state in exchange for bank notes. The amount of notes issued by a state to a bank depended upon the type of asset transferred.

Mortgages

For mortgages, both New York and Georgia issued bank notes equal to 100% of the mortgage value. Since in both states the market value of the land was restricted to be at least twice the mortgage value (two and a half times the mortgage value in New York after 1848] the percentage of notes issued by the state authority relative to the market value of the land was only 50% (40% for New York after 1848). Michigan, however, allowed the amount of notes circulated by the bank to be equal to the market value of the mortgages transferred to the state.

State Stock

The provisions specifying the amount of notes to be issued by the state banking authority for state stock were more complex than the mortgage provisions. The state stock provisions specified: (a) the value at which the stock was to be accepted by the state, (b) the percentage of notes issued by the state based on the accepted value, and (c) the maintenance of the reserves accepted value by the state. Each group of provisions will be examined under separate subheadings.

a. Accepted Value of Stock as State Reserves

Two provisions set the guidelines for determining the value of the stock: the official adjustment of par value and the market valuation of the stock. The market valuation specification was not a part of the first free banking law that enacted a stock reserve provision. It was enacted a few years later (and was enacted in subsequent free banking legislation in other states) to correct some of the deficiencies in the

official adjustment to par provisions (henceforth called the official adjustment specification).

Official Adjustment Specification: The official adjustment specification, first enacted by New York in 1838, specified that state stocks submitted to the state as legal reserves were to "produce" a set interest rate. New York's law, representative of official adjustment provision in all the free banking laws, stated that:

"whenever a free banker transfers to the comptroller an portion of public debt now created or hereafter to be created by the United States or by this State, or such other States of the U.S. as shall be approved by the comptroller, such person or association of persons shall be entitled to received from comptroller an equal amount of such circulating notes...; but such public debt shall be in all cases be, or be made to be, equal to a stock of the state producing five percent per annum and it shall not be lawful for the comptroller to take any stock at a rate above its par value."⁸

The last statement, referring to the public debt, implies that the state banking authority was required to adjust the par value of the stock submitted according to the set standard interest rate of five percent. This meant that stocks issued at different coupon rates, from the standard, would be adjusted by the state banking authorities such that the official par value and the coupon rate would be producing five percent per annum. However, if the adjustment yielded an official par value greater than the face par value, the banking authorities were prohibited to accept such stocks.⁹

The following example should clarify this point. Suppose two stocks, stock A and stock B, both having a par value of \$1,000, were

issued with coupon rates of 10 percent and 5 percent respectively. If state stock A is the standard stock set by the state banking authority, then the "official" par value of state stock B would be \$500.

In the forties, five percent was the standard set by Georgia and New York (see Table 3). In 1848, New York revised the standard to 6%. During the fifties, the six percent rate was also accepted by three of the states: Minnesota, Louisiana, and Virginia. Indiana differed from the other states by allowing the coupon rate on its own stock be five percent, while all other stocks had to be at least six percent. This difference in coupon rate standards was repealed three years later and a new standard was set at six percent for all stocks.

Market Valuation Provision: Although the official adjustment provision corrected the coupon differential, many state stocks sold on the market below the official par value. Hence, the percentage of bank notes backed by the market value of the state stocks could vary from bank to bank.

Two years after the original free banking law, New York amended the valuation rate provision so that the market value of the stock held in reserves would at least equal the value of notes issued by the state. The new provision required the banking authority to exchange notes for stock based on either the official par value or the market value of the stock, whichever had the lower value. If the official par value of the stock equaled \$1000 but the stock sold for \$990, the amount of notes issued would be the latter amount. If the stock sold on the

TABLE 3
STATES ENACTING THE MARKET VALUATION PROVISION
AND RESERVE REQUIREMENTS¹

STATE	YEARS	ACCEPTED VALUE		RESERVE REQUIREMENT	
		MARKET VALUE	STANDARD INTEREST RATE	100%	>100%
New York	1838-1840		5%	X	
	1841-1848	X	5%	X	
	1849-1863	X	6%	X	
Georgia	1838-1863		5%	X	
Virginia	1851-1860		6%	X	
Indiana	1852-1855	X ³	5% or 6% ²	X	
	1855-1863	X	6%		X
Louisiana	1852-1860	X	6%	X	
Minnesota	1858-1863	X ⁴	6%		X

¹All the states listed enacted the official par adjustment provision.

²Indiana stock was set at 5%, while all other states were set at 6%.

³The auditor of Indiana accepted the stocks at par value during this period.

⁴During the first 18 months, the auditor accepted the stock at 95% of par value.

⁵The reserve requirement is based on the accepted value of the stock.

market for \$1010, the amount of notes issued would be \$1000. Thus the new provision assured that the market value of the stock reserves would be at least 100% of par at the time of issue.

Indiana, Minnesota and Louisiana also enacted the market value restriction along with New York.¹⁰ Virginia and Georgia did not enact the market valuation restriction. Georgia, however, did restrict the acceptable stocks to those selling in the market at the official par value.¹¹

The enactment of the market evaluation provision, however, did not guarantee that the law was followed by the banking authorities. Both Indiana and Minnesota experienced short periods where the state banking authority accepted the stock above its market value. According to the 1856 Auditor Report of Indiana, between 1852 and 1855 the auditor of Indiana accepted the stocks at 100% of their par value.¹² In Minnesota, the auditor accepted the stocks of Minnesota at 95% of their par value.¹³ In both states, these stocks were selling below their accepted value.

b. Setting the Reserve Requirement

Once establishing the accepted value of the state stock, the states enacted provisions which specified the amount of bank notes that could be transferred to the bank. (Table 3 summarizes the reserve requirements.) New York, Georgia, Virginia, Louisiana and Indiana issued notes in an amount equal to 100% of the accepted value (that is, the minimum of either the official par or market value). Indiana, however, amended the reserve requirement three years later. Under the amended provision, the

banks were required to submit \$110 worth of stock for every \$100 worth of notes. In other words, the new reserve requirement was equal to 110%.

Minnesota's original reserve requirement provision specified that the amount of notes issued by the state could not exceed 100% of the accepted value of the reserve. However, Minnesota also enacted another provision specifying that

"before any bank shall receive from the auditor of the State, any circulating notes, as provided in Section Five of this Act [the 100 percent clause], the stockholders thereof shall either give to the Auditor of the State good and sufficient bonds to be approved by him to the amount of one-fourth of the notes that banks shall receive, or deposit in lieu of such bonds, ten percent more stock than the circulating notes...as an additional security to indemnify the billholder...."¹⁴

The effect of both provisions was to have a minimum reserve requirement for notes issued of 110%. In 1860, the reserve requirement provision was amended; restricting the state authority to issue notes in an amount equal to 95% of the accepted value of the stock. This change in the provision plus the additional security specified above increased the reserve requirement to at least 115%.¹⁵

c. The Call Provision

The market evaluation and the reserve requirement provision assured at least 100% backing of note issue upon exchange of the securities, but it did not insure 100% backing of the notes in future periods. The stock portfolio held as reserves could depreciate in future periods. This problem was resolved by granting certain powers to the banking authority. The banking authority was granted the power of Attorney to collect the

interest payments on the stocks submitted as the security. Whenever there was insufficient backing of the notes by the stocks, the state authority would have the power to collect all interest and dividends derived from the submitted stocks in order to recover any depreciation. They also were allowed to "call" on the bank to transfer additional stocks or receive circulating notes in order to secure full backing of the notes.¹⁶

All the states except Virginia enacted a call provision. Indiana, Minnesota, Louisiana, and Georgia also required the banking authority to examine the bank's stock reserves periodically to see whether the market value of the stock met the required amount of backing. In addition to the periodic evaluation of the reserve portfolio, Indiana and Minnesota set a standard on the maximum amount a reserve portfolio could depreciate. Indiana set its maximum at five percent while Minnesota set its maximum at ten percent.

In summary, it is evident from this review of the stock reserve requirement provision that most of the states were concerned about providing at least 100% continuous backing of notes issued. They attempted to meet this goal by restricting the type of asset eligible for legal reserves, by determining the acceptable value of the stock and issuing notes based on this value, and by requiring the banking authority to maintain the value of the reserves.

Specie Reserve Requirements

All of the states except Michigan and Minnesota enacted specie reserve requirements. (The specifications of the bank reserve requirement

are given in Table 4.) Four of the states required banks to hold an amount of specie equal to a percentage of the circulating bank notes. Specifically, New York, Indiana, Georgia, and Virginia enacted specie requirements of 12 1/2%, 12 1/2%, 25% and 20%, respectively. Both New York and Virginia explicitly stated that this requirement was to be maintained at all times. Georgia and Indiana granted some flexibility to the specie minima; the percentages of specie required by law were to be met at any time during a space of 30 and 20 days, respectively.

Louisiana was one state which broke away from the traditional specie requirement and imposed a more general liquidity requirement. The free banks of Louisiana were required to hold specie reserves equal to at least one-third of its deposits, and specie or short-term commercial paper equal to the remainder of the liabilities (bank notes). In other words, Louisiana specified a 100% reserve requirement for bank notes and a 33% reserve requirement for deposits.

Only two states, New York and Indiana, repealed the specie reserve requirement. Both states repealed the provision three years after its enactment.

B. Loan Restrictions

The reserve requirement of government debt against note issue was the strongest portfolio restriction placed on the free banks. In addition to the reserve requirement, some states placed restrictions on the total amount of loans and the type of loans a bank could make and the total amount an individual entity could borrow. (Table 5 summarizes these restrictions.)

TABLE 4

SPECIE RESERVE REQUIREMENT AGAINST CIRCULATING BANK NOTE

State	Year	Percentage of Asset to Bank Notes
Michigan	1837-39	-
New York	1838-40	12 1/2
	1841-63	-
Georgia	1839-60	25
Virginia	1851-60	20
Indiana	1852-55	12 1/2
	1856-1863	-
Louisiana	1852-63	100 ¹
Minnesota	1858-63	-

¹Louisiana was also allowed to hold commercial paper as reserves for circulating bank notes.

TABLE 5

Loan Restrictions

States	Years	None	On Directors and Stockholders	On Individual Entity	On Total	Other Type of Restriction ¹
Michigan	1837-39		x	x	x	
New York	1838-63					x
Georgia	1839-63		x			
Virginia	1851-60		x	x	x	
Louisiana	1852-60		x			
Indiana	1852-63		x			x
Minnesota	1858-63	x				

¹New York and Virginia prohibited bankers from making loans which were issued to guarantee circulation. Indiana prohibited loans on real estate.

Virginia and Michigan were the only states which placed a limit on the total amount of loans a bank could make. Virginia restricted the total amount of loans to twice capital while Michigan restricted the total amount to two and a half times the paid-in capital.

Three states placed restrictions on the type of loan a bank could make. Indiana amended its general banking law by including a provision that prohibited loans on real estate. New York and Virginia enacted provisions which prohibited loans in order to guarantee circulation. The Virginia provision stated that:

"No bank shall directly or indirectly loan its bills or notes for circulation to any person, persons or corporation, under any agreement or understanding that such person, persons, or corporation shall protect or guarantee the circulation of such or any other bill or note issue by the bank...."¹⁷

New York specified that "circulation" loans could not be made to persons outside the state.

Several states restricted the amount that could be loaned to certain types of individual. Virginia, Louisiana, Indiana, Michigan, and Georgia placed restrictions on loans made to either directors or stockholders of the bank. Virginia allowed a director to borrow up to \$5,000, while Indiana and Michigan limited the personal loan to a director to two and two and a half times his stock, respectively.¹⁸ Georgia and Louisiana would not allow free banks to make a loan to a stockholder who pledged his stock as collateral.

Not only did Virginia and Michigan place limits on the amount a director or stockholder could hold, they also placed limits on the amount a customer could borrow. Virginia restricted the amount an

individual could borrow to a maximum of \$50,000, while Michigan restricted the amount to 42 percent of the paid in capital.¹⁹

Section II:2.2 Note Restrictions

Under this heading we will examine three provisions that were enacted in order to limit the level of liabilities a bank could assume. The three provisions that will be examined are (A) the maximum level of circulation, (B) the denomination size of bank notes, and (C) the policy for redeeming of bank notes. It should be noted that most of the liability restrictions were directed at note issue and not at deposits.²⁰

A. Circulation

Only two states enacted provisions which limited the total volume of notes in circulation. Michigan limited the maximum circulation for each bank to two and one-half times the paid-in capital stock. Indiana, on the other hand, restricted the total amount of notes in circulation to \$200,000 per bank and an aggregate total of six million for all banks. New York, Georgia, Louisiana; Michigan and Virginia allowed banks to issue bank notes in an amount equal to the securities held by the state; with no limit on the amount of securities placed with the state.²¹

B. Denomination

Another means of limiting the level of circulation was the enactment of a provision setting minimum denomination. It was an early banking belief that notes of small denomination were less likely to be returned

for redemption.²² Since it was in the interest of the banker to maintain a large float, that is, keeping the frequency of notes returned for redemption low, the incentive for the banker was to issue a large proportion of the notes in small denominations.²³ Consequently, some states attempted to limit the amount of circulating bank notes by enacting provisions that limited the size of note denominations. (See Table 6 for a summary of the domination restrictions.)

New York, and Georgia allowed banks to issue notes of any denomination.²⁴ Michigan and Minnesota restricted note size to one dollar. Virginia and Louisiana allowed banks to accept and issue bank notes of five dollars and up, with heavy penalties against banks that violated this provision. Indiana enacted a provision which restricted the volume of notes issued under five dollars. Initially, Indiana restricted the amount of notes issued under five dollars to one-fourth of the total issue. The proportion was later changed to one-twentieth, and changed again later to one-sixth.

C. Convertability of Bank Notes

The last set of provisions that will be examined under the liability restrictions heading are those that affected the redemption of bank notes. It was believed at that time that the redemption of bank notes for specie on demand was considered as a necessary requirement of banking. It was thought that by requiring the banker to meet daily redemption demands, he would be forced to limit the level of bank credit.²⁶ Hence, we will examine the redemption policy as though it were a liability.

TABLE 6

Minimum Denomination Size

State	Year	Any	One Dollar	Five Dollar
Michigan	1839-39		X	
New York	1838-63	X		
Georgia	1839-63	X		
Virginia	1851-63			X
Louisiana	1852-63			X
Indiana	1852-63		x ¹	
Minnesota	1858-63		X	

¹Indiana restricted note issue under five dollars to a fixed proportion of the total issue.

The importance of redeeming bank notes on demand is illustrated by the fact that this provision was enacted in all the states examined. All the states also enacted provisions supporting this policy. These provisions specified the noteholder's recourse and the penalty against the bank when a bank refused to redeem a note on demand. All the states specified the same general procedure and penalty. The first step for noteholder was to register a complaint with the banking authority. Once the complaint was registered with the authority, notification of the claim was issued to the bank. The bank would have to either honor the claim or accept default and be dissolved.

Each state, however, allowed the bank a grace period to honor the claim before dissolution proceedings. Table 7 lists the grace periods for each state. As noted in Table 7, the grace period enacted among the states ranged from 1 to 60 days. Georgia and Michigan (the amended provision) granted a 60 day grace period while Minnesota granted a 40 day grace period. In the original Michigan free banking law the banks were given a 30 day grace period. Indiana originally enacted a 30 day grace period, but later amended it to immediate redemption upon notification from the state authority. New York and Virginia decided 10 days was sufficient time for honoring a redemption request while Louisiana limited it to three days.

All the states enacted similar provisions outlining the dissolution proceedings against banks that failed to redeem the notes within the allotted grace period. First, they would suspend the power of attorney for banks to collect interest and dividends on secured stocks. All

TABLE 7

Grace Period Allowed for Honoring Claim

State	Year	Number of Days
Michigan	1837-38	30
	1838-39	60
New York	1838-63	10
Georgia	1839-63	60
Virginia	1851-60	10
Indiana	1852-55	30
	1856-63	0
Louisiana	1852-60	3
Minnesota	1858-63	40

interest and dividends would be used to redeem outstanding bank notes. Next, the state banking authority would sell the securities that were held to back the notes in order to redeem the outstanding notes.

In addition, New York, Georgia, Indiana, Louisiana, and Minnesota enacted provisions which entitled noteholders first lien held by the banking authority.

In addition to the first lien provision, the noteholders of the failed bank were entitled to receive interest on notes held from the time of their claim to the redemption of their notes. The interest penalty ranging from 10 percent to 20 percent on outstanding notes held, depending upon the state. Table 8 lists the penalties enacted in each state. Indiana in its original free banking law did not charge an interest penalty, but three years later enacted a 10% interest penalty. New York and Michigan originally charged a 14% and 20% penalty but later amended them to 20% and 10%, respectively. Virginia, Louisiana, and Georgia charged 12%, 12% and 18%, respectively, throughout their free banking period while Minnesota set the penalty according to the bank commissioner's judgment of the costs incurred to the noteholder.²⁷

Section II:2.3 Equity Restrictions

Finally, we will examine the restrictions which were placed on the equity of the free bank. The equity restrictions that will be examined are (A) the minimum capital requirements and (B) the degree of stockholders' liability.

TABLE 8
Interest Penalty

State	Year	Penalty
Michigan	1837-38	20%
	1838-39	10%
New York	1838-40	14%
	1840-63	20%
Georgia	1839-63	18%
Virginia	1851-60	12%
Louisiana	1852-60	12%
Indiana	1852-55	0
	1856-63	10%
Minnesota	1858-63	Varied

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TABLE 9
Capital Requirements

State	Minimum				
	\$15,000	\$25,000	\$50,000	\$100,000	Varied ⁴
Michigan	x ¹				
New York (Individual) ³			x ²		
New York (Bank Assoc.)				x ²	
Georgia				x	
Virginia ⁴					x ²
Louisiana				x	
Indiana			x ²		
Minnesota		x			

¹Michigan allowed the bank to commence operations with a minimum capital of \$15,000. Thereafter, the minimum was raised by \$5,000 every six months.

²These states require minimum capital to be transferred to state authorities for note issue.

³This requirement went into effect in 1844.

⁴Virginia's banking law required banks to operate under a legislative approved charter. The capital requirements vary among the charters. Sixty-five banks gained legislative approval with an average minimum capital of \$95,384. See Appendix III for a listing of the capital requirements.

In addition to setting the minimum capital three of the seven states specified that the bank was required to transfer the minimum capital to the state authorities for note issue. These states were New York, Virginia, and Indiana (after 1855).

A. Liability of the Shareholder

One of the privileges that is given to the modern corporation is the protection of the stockholders' private estates in case of bankruptcy; the stockholders of the corporation have limited liability. Although such a privilege is taken for granted by the modern banking community, this was not generally the case for the stockholders of a free bank. Free bank stockholders could have been subject to one of five types of liability provisions: limited, legal limited, double, triple, and unlimited. We will first discuss the different types of stockholder's liability and then examine the liability provisions enacted in the different states.

Limited liability, during the free banking era, was the same type of liability that is common in today's corporate charters; all judgments against the corporation for any debt or liability would be enforced against only the joint property of the association and not against the private estates of the stockholders.

Legal limited liability was a provision generally found in bank corporation charters. Normally, corporations during this time period were granted the special privilege of limited liability which could only be obtained by legislative approval. However, banking institutions were scrutinized closely by the legislators. Consequently, the legislators

would impose a legal limit upon the amount of debt contracted by the banking corporation. Usually, the legal limit was three times the bank's capital. The stockholders would be free from judgment against personal property as long as the debt-capital ratio was less than or equal to 3. If the debt-capital ratio exceeded 3, the stockholders would be personally liable for the debt. The amount of personal liability depended on the stockholder's position within the bank. The directors of the bank, who were required to be stockholders, were personally liable for the full amount of debt. If the private estates of the directors were insufficient to cover all debts, the other stockholders would be personally liable up to the amount of their stock in the bank. Although the legal limit was not commonly found in the free banking laws, one state examined contained this provision.

Both liability provisions discussed above allowed the courts to assess damages only against the assets of the association when presiding over liquidation, unless the directors transgressed the law by violating a legal limit. The next three provisions to be discussed, double, triple, and unlimited liability, permitted the courts to make judgments against the private estates of the stockholder when the assets were not sufficient to cover the liabilities. The third and fourth type, double and triple liability, were devised as a middle ground between the unlimited liability of partnerships and the limited liability of corporations. The double liability provision limited the personal liability of the stockholder to the amount of his investment in the bank. The stockholder under triple liability were personally liable

up to twice the amount of their investment. If a bank failed, the courts could assess damages against the stockholders up to their investment in the bank under double liability and up to twice their investment under triple liability.

The last form of liability law, unlimited liability, was incorporated in two of the seven states analyzed. This provision allowed the courts to make judgments against the private estate of the stockholder until all debts against the association were satisfied.

The liability provisions discussed above were among those that were enacted in the free banking states examined (see Table 10). Virginia and Indiana free banking laws contained the double liability provision, while Minnesota enacted a triple liability provision. New York in the 1838 Free Banking Law enacted a limited liability provision, the only free banking state to do so. However, it was later in 1850, changed by a constitutional mandate to double liability.²⁹ Michigan initially enacted the legal limit provision, but later in 1838 changed it to unlimited liability. Georgia also enacted the unlimited liability provision.

In Louisiana, the liability of the shareholder's depended upon the number of shareholders of the bank. If there were less than five shareholders, the banking establishment was considered a partnership; the shareholders would "be liable to the full amount of their obligations and contracts."³⁰ Banks with five shareholders or more were allowed to incorporate. Under incorporation the shareholders would be liable up to the amount of their share (double liability). All the banks that entered the Louisiana market were corporations.

TABLE 10
Liability Provisions

State	Years	Limited	Legal Limit	Double	Triple	Unlimited	Continuation After Sale or Transfer
Michigan ³	1837-38		X ²			X ²	X
	1838-39						
New York	1838-49	X					
	1850-60			X			
Georgia	1839-63					X	
Virginia	1851-63				X ²		
Louisiana ¹	1852-60				X ²	X	
Indiana ³	1852-55			X			X
	1856-63			X ²			
Minnesota ³	1858-63				X		X

¹The liability of stockholders depended on the number of stockholders.

²These states required the director and/or the stockholders to be residence of the state.

³The liability provisions in these states were generally ineffective. Michigan's free banking law was challenged in the courts and in 1844 was declared unconstitutional. Minnesota and Indiana (1852-55) could not prosecute stockholders who lived outside the state which was the case for many of the failed free banks.

Some states also enacted provisions which continued the personal liability of the shareholder after the transfer or sale of their bank stock. These states were Michigan, Indiana, and Minnesota. Minnesota's law is representative of this type of provision:

"...and such individual liability shall continue for one year after any transfer or sale of stock by any stockholder or shockholders."

Michigan and Indiana also enacted a continuation of shareholder's liability of one year after transfer or sale of stock.

In summary, free bank stockholders could have sustained losses beyond their investment in the bank. The courts were able to assess judgments against their private estates when the banks' resources were insufficient to cover the bank liabilities. Therefore, the liability provision during free banking functioned as an insurance policy to the bank's creditors.

Section II.2.4 Enforcement of the Provisions

The effectiveness of the provisions depends upon the enforcement of the laws. There are numerous reports recorded by the banking authorities and historians showing improper enforcement of particular provisions. Few reports, however, show the actual interpretation and enforcement of the provisions. There are two provisions for which the evidence shows a lack of enforcement in certain states: stockholder's liability and stock evaluation. Both will be discussed under separate headings.

A. Stock Evaluation

It has been recorded in Minnesota and Indiana that the state banking authorities did not follow the guidelines prescribed in the enacted provision. Both states required the banking authorities to accept stocks at market value, but the authorities for a short period accepted them at par value. In Minnesota, the state auditor accepted Minnesota 7's--Minnesota stock issued with a seven percent coupon rate--at 95 percent of par value, even though they were selling for less than 95 percent of par.³¹

Indiana also faced similar circumstances. According to the Auditor's Report of 1856, the auditor from 1852-1855 accepted Indiana's stock at par value instead of market value.³² In addition, a report by the General Assembly, dated January 23, 1857, presented evidence showing that all stocks were received at par value.³³ After 1855, the state auditor kept strict control over the stock security portfolio of each bank, issuing margin calls to any bank whose portfolio depreciated. As for the remaining state, there is no evidence indicating misadministration of the stock evaluation provision.

B. Stockholder Liability

There is some evidence indicating that the liability provision may have been inoperative in two states: Indiana and Michigan. In Indiana, the State Auditor Report of 1856 states: "In no case, as applied to foreign bankers [stockholders outside the state], was the principle of individual liability resorted to by the billholder...."³⁴ There is evidence, however, that Indiana stockholders were taken to court for the

unpaid debts of the bank. In *Conwell v. Hill*, the Indiana Supreme Court declared that the noteholder has the right to sue bank officers for recovery of unpaid debts, supporting a lower court decision assessing judgments against the stockholders of the bank.³⁵ Hence, the enforcement of the liability provision in Indiana was the responsibility of the noteholder.

In Michigan, there is some question whether the stockholder's liability was fully enforced, that is, whether the litigations resulted in a transfer of stockholder's wealth to the noteholder. In one report,

"some litigation occurred after the failure of the associations. There was no competent authority to discharge mortgages that had been given as security and many persons were much concern as to their liability under the law. This was disposed of by a decision of the Supreme Court [Michigan], in January 1844, which pronounced the law, or part of it, unconstitutional."³⁶

However, prior to the Supreme Court's decision, the circuit courts enforced claims against stockholders of Michigan Free Banks. Therefore, it is reasonable to conclude that the liability provision was technically enforced; some of the litigations between stockholders and noteholders may have been settled prior to 1844.

In New York, Minnesota, and Georgia where personal liability was enacted and where losses to noteholders occurred, the courts supported the liability provisions.³⁷ It was the responsibility of the noteholder in Minnesota to present claims against stockholders. New York enacted legislation specifying the procedures that the state banking authority must take to recoup losses for the noteholders.³⁸ Georgia required

stockholders to pay all the liabilities of the bank before securities are returned by the comptroller.³⁹

Section II:3 Conclusion

In summary, the free banking laws imposed a number of provisions on the free bank; some states enacted more liberal provisions than others. The liberality of a provision may be defined as a provision that allows the free bank the greatest amount of freedom to operate or a provision that imposes the lowest penalty on the free bank for delinquency. To illustrate this definition, a provision that allows a bank 60 days to honor the redemption of a bank note is more restrictive than a provision that allows a bank 10 days to honor the redemption of a bank note. Likewise, a provision that imposes unlimited liability is more restrictive than a provision that imposes limited liability.

According to these definitions, the free banking laws of Michigan, Georgia, and Minnesota were the most liberal laws among the free banking states. Out of the 10 provisions examined, one of the provisions enacted by these states could be considered the most restrictive while four of the provisions enacted by the states could be considered the most liberal provision. At the other end of the spectrum, Virginia and Louisiana enacted the most restrictive free banking laws. Out of the 10 provisions examined, 5 of the provisions enacted by these states could be considered the most restrictive provisions while only one of the provisions could be considered the most liberal provision.

New York and Indiana free banking laws may be considered as moderate free banking laws. Both states enacted one provision, that may be considered as the most restrictive provision and one provision that may be considered the most liberal provision.

FOOTNOTES

¹See Bibliography for listing of state documents.

²New York and Indiana (1855-1863) required the minimum capital to be in the form of public debt.

³Under this simplified analysis, it must be assumed that the discount at which the notes could circulate remained unchanged.

⁴Louisiana required banks to hold specie and/or commercial paper against note issue, and hence was not strictly a specie reserve.

⁵Michigan was an exception to this procedure. Michigan bankers were responsible for printing the bank note instead of the state.

⁶Harry E. Miller, Banking Theories in the United States Before 1860 (Cambridge: Harvard University Press, 1927), Chapter 15, *passim*.

⁷Between 1835 and 1841 there was no federal government stock outstanding.

⁸New York [Banking] Law, 1838, Chapter 260, Section 2.

⁹Obviously, if the coupon rate equaled the state standard, no adjustment would be necessary; the face value of the stock would also equal the official par value.

¹⁰The Minnesota market evaluation provision defined the term "market value." It was the only state to do so.

¹¹Georgia's law stated:

"It shall not be lawful for said comptroller and commissioners to take any stock at a rate above or below its (official) par value."

Therefore, it can be surmised that the only stocks eligible as state reserves are those selling in the market at par value. Georgia Banking Law, 1838, Section 2.

¹²Report of the Legislature.

¹³Sydney A. Patchin, The Development of Minnesota Banking (Minnesota History Bulletin Vol. II), pp. 152-153.

¹⁴Minnesota General Laws, 1858, Chapter 32, Section 6.

¹⁵According to the State Auditor Reports of Minnesota 1859, personal bonds were submitted as were required by law.

¹⁶The enactment of the par evaluation provision allowed the state authorities to issue notes based on the par value, although the stock may have been selling in the market below par. The call provision, on the other hand, was enacted to insure full backing of the notes issued.

¹⁷Code of Virginia, Chapter 58, Section 23.

¹⁸Virginia law also required that the interest charged on the director's loan to be the going market rate.

¹⁹The exact specification of Michigan's law was that the maximum amount an entity could borrow could not exceed one-sixth of the total allowable loans; the total allowable loans equaled two and a half times the paid-in capital. (Michigan Law FN)

²⁰Miller, Banking Theories in the United States Before 1860, p. 116.

²¹Indiana and Minnesota issued notes equal to some percentage of the securities.

²²It was also contended that it was in the interest of banks to circulate the smaller notes. Small notes were found to be less likely to come back for redemption. This would allow banks to inflate their issues, cashing in on the profit making opportunity. Dewey, D.R., State Banking Before the Civil War, Washington Government Printing Office, 1910, page 64.

²³R. Hildreth contends that the existence of small country banks depended upon the issuance of small note denominations.

"For any thing beyond the bare interest on their capital, those banks (country banks) are mainly dependent upon their circulation, and that circulation is mainly a small-note circulation so that the prohibition of the issue of notes under twenty dollars, would cause the shutting up of the greater part of the country banks..."

Hildreth, R., Banks, Banking and Paper Currencies, New York: Greenwood Press, 1968, p. 198.

²⁴There is no indication that banks issued notes less than one dollar denomination.

²⁵According to Miller, convertibility was the predominate attitude of writers. Miller also points out that the suspension of specie payments by banks during a "crisis" was accepted by the public. Miller, Banking Theories in the United States Before 1860, pp. 128-129.

²⁶Not all states, however, allowed noteholders to redeem their notes at other banking establishments. Michigan, Louisiana, and Minnesota restricted the noteholder to redeeming notes into specie only at the bank of issue, while New York, Georgia, Virginia and Indiana allowed noteholders to redeem their notes at other banking establishments. New York, Georgia, and Indiana, however, placed a limit on the amount that could be redeemed outside the place of issue. In New York and Georgia, any note over \$1,000 could only be redeemed at the office of issue which was the banking establishment or agency, while Indiana set the amount at \$500 or above. In 1857 Virginia enacted a number of provisions that specified redemption procedure. One provision allowed banks to exchange other bank notes for their own if the other bank notes were redeemable at par. Another provision allowed banks to refuse redemption of other bank notes if the other bank was not redeeming their own notes in specie.

²⁷Virginia imposed an additional penalty on failed banks, equal to 1/2 percent per month on their capital stock.

²⁸Michigan was also concerned about the composition of ownership. In order to assure the public that the established banks were of sound character, Michigan required that at least 1/3 of the capital stock be provided by residents of the county in which the bank was operating. This provision was meant to insure that those men who established a bank were in the community.

²⁹New York's double liability law was the most extensive law among the states examined. It outlined the conditions of the liability and the judgment procedure against the stockholders.

³⁰Louisiana Free Banking Law, Section 7; found in Herman E. Kross, Documentary History of Banking and Currency in the United States, Vol. II (New York: McGraw-Hill, 1969).

³¹Sydney A. Patchin, The Development of Minnesota Banking, Minnesota History Bulletin, Vol. II, pp. 152-157.

³²Indiana Auditor's Report, 1856.

³³Indiana General Assembly, Report of the Joint Committee on the Securities of the Free Banks of Indiana, 1857. It also implies that the call margin was not enforced.

³⁴Indiana Auditor's Report, 1856.

³⁵Indiana Reports, Vol. 14, pp. 106-110.

³⁶Cook v. Wheeler: Harrington Chancery Reports, Michigan, 1842, pp. 443-448.

³⁷Allen v. Walsh: Minnesota Reports, Vol. 25, pp. 543-557.

³⁸Gibbson v. Oliver Lee & Co. Bank: New York Reports, 1860, pp. 9-22. Receiver of the U.S. Trust Company of N.Y. v. the U.S. Fire Insurance Company and Others, New York Reports, 1858, pp. 199-229.

³⁹Georgia Laws, 1853, Chapter 157.

CHAPTER III

FREE BANKING EXPERIENCE

The examination of the laws in the previous chapter reveals that the intent of the states was to establish a system of free entry in which the noteholder would be assured of par redemption. The means of securing par redemption varied from state to state; each state enacting different restrictions of the major provisions.

Not only did the restrictions differ from one state to another, but the experiences varied also. Some states have been classified as being "unstable," with instability being defined by a large number of bank failures and large losses to noteholders.¹ Other states have been classified as being "stable" systems; that is, having few or no bank failures and small or no losses to noteholders.

The variety of free banking experiences leads us to question the cause of the instability. Rockoff argues that the laws themselves induced the bank failures.² According to Rockoff entry and exit decisions made by free bankers were based on profit opportunities created by the law. Rolnick and Weber, on the other hand, suggest that other factors such as asset price fluctuations, acting upon the laws, may have influenced the exit decisions of free bankers. They contend that the provisions regarding par redemption of notes secured by marketable assets may have influenced bankers to close their operations during periods of substantial drop in asset prices.³ Both studies, however, point to the banking laws as a contributing factor to the banking experience.

In this chapter we will apply the Rockoff and Rolnick and Weber hypotheses to the provisions. Specifically, we will examine the impact of the specie reserve provision and the stock reserve provision on the banking market. First, we will examine how the different restrictions of each of these laws affected entry and then examine our hypothesis that a high specie reserve requirement combined with a strict stock reserve requirement will result in low entry rates. Again looking at entry, we will examine how different periods of economic activity, represented by fluctuating asset prices, affected the banks.

Second, we will see how the specie reserve requirement and the stock reserve requirement affected bank failures, examining our hypothesis that a high specie reserve requirement combined with a strict stock reserve requirement will result in few failures, with more failures occurring as these provisions become more lenient. As in the case of entry, different periods of economic activity will also be analyzed to determine the effect of fluctuating asset prices on bank failures.

Finally, our hypothesis that a high specie reserve requirement combined with a strict stock reserve requirement will produce low noteholder losses will be examined. Again, asset price fluctuations will be analyzed to determine their effect on noteholder losses. By examining both the specifications of the laws and the laws under different periods of economic activity, we will be able to determine whether the laws or the economic activity had the greatest effect on banking behavior.

In this study the period of economic activity will be divided into two different categories; falling asset prices and rising and steady asset prices. For New York and Indiana, Indiana bond prices will serve as a proxy for the overall movement in asset prices. Indiana bonds were selected as a proxy because a large portion of the failed banks in New York and Indiana had portfolios that were made up of Indiana state bonds. Although Indiana bonds were not included in the portfolios of the banks in Virginia, Louisiana, Minnesota, and Georgia, the prices of Indiana bonds closely parallel the available bond prices from these states. In addition, Indiana bond price data were the most complete data available and the bond price data covered most of the free banking period (1841 to 1863). For Michigan, land prices will serve as a proxy for the overall movement in asset prices since mortgages on unencumbered land were the primary asset in the Michigan free bank portfolio.

Bond prices and land prices, however, are not as readily available for the periods prior to 1841. Two states in our study, New York and Michigan, enacted free banking legislation in 1837 and 1838, respectively. Bond price data are available on New York bonds from January, 1838 to March, 1839. This series shows that New York bond prices were stable or rising for this period.⁴ In the fall of 1839, some states defaulted on or repudiated their debt, suggesting that a general decline in bond prices may have occurred soon after.⁵ For this study, it will be assumed that the bond prices started to decline in

June, 1840. In Michigan, where land prices are used to determine the periods of economic activity, several reports indicate that land prices were stable or rising from June, 1837 to July, 1838, and declining thereafter.⁶

The provisions, variables, and data used in the analysis are discussed in Section 3.1. In Section 3.2 the impact of the specifications on the experiences in each state is examined. A set of figures is used to illustrate the experiences resulting from each provision and a discussion of the results will follow each figure. In Section 3.3, the implications of the findings is discussed.

Section III.1: Provisions, Variables, and Data Used in the Analysis

The provisions that will be used in the analysis are the stock reserve requirement and the specie reserve requirement. These provisions were selected for analysis because they were enacted with the objective of securing par redemption of bank notes. Each provision had restrictions which may have determined the levels of noteholder losses. These restrictions may also have affected the rate of return on note issue, thereby possibly affecting entry into the market.⁷ Specifically, states whose restrictions included 110% market valuation of legal state reserves and high specie reserves would be expected to experience the smallest losses to noteholders and the lowest rates of entry, whereas states whose restrictions called for par valuation of legal state reserves and no specie reserve requirement would be expected to experience the largest losses to noteholders and highest rates of entry.

The effects of these restrictions can be determined by examining measures of entry, failure and noteholder losses. The measures used to represent entry will be determined by dividing the number of entrants into the market by the total number of banks in operation, summing these figures for all years and dividing by the number of years in the free banking period. Thus, a figure will be derived for each state which represents the average yearly percentage increase in the size of the free banking market. This measure will also be subdivided into the average yearly percentage increase in the size of the free banking market during periods of either falling or steady and rising asset prices. This will yield a variable that measures average rate of entry per year adjusted for the market size within each state and within the economic conditions specified. The purpose of dividing entry by both the number of banks operating and by time is to eliminate the bias toward states that had much larger banking markets and/or much longer free banking experiences, and the bias toward rising or steady asset price periods which covered many more years than falling asset prices.

Two variables will be used to measure bank failures. Again, both will be constructed for the entire period as well as for falling asset price periods and for steady and rising asset price periods. The first variable will be the failure rate; the failure rate is the number of failures in a given state divided by the number of free banks that existed during the entire period. Thus, this variable measures the percentage of all existing banks that were failures. The reason for examining failures in terms of all existing banks is to facilitate comparisons between states, For example, New York had a much larger

banking market than a state such as Georgia. Thus more failures would naturally be expected in New York. Dividing by the total number of banks eliminates the problem of comparing a large banking market to a small one.

The second failure variable will be the below-par rate; the below-par rate is the number of failures in a given state during the entire free banking period or the number of banks that failed during either falling or steady and rising asset prices divided by the number of free banks in that state that left the market during the specified period of economic activity. This variable will measure the percentage of all banks leaving the market that were failures. The purpose of this variable will be to indicate the effects that different provisions had on the likelihood that an exiting bank would be a failure.

The last variable, representing noteholder losses, will be average loss per dollar of circulation. The estimate of average loss per dollar is derived according to the method developed by Rolnick and Weber.⁸ This measure indicates the loss per dollar a noteholder could expect given his bank has failed.

The data used in deriving the statistics came primarily from State Auditor Reports. All of the states required banks to submit condition reports at least once a year. In Michigan, however, many of the banks did not comply with this regulation. For the first five years of New York's banking period, bank condition reports are not available. Therefore, secondary sources were used to supply the missing information. All other states examined met the requirement.⁹

There are two problems that exist when trying to analyze experiences under the alternative legal restrictions. First, the enacted restrictions may not be uniformly applied to all banking institutions for a particular period. Some states amended restrictions which did not apply to existing banks; other amendments allowed existing banks a grace period in which to comply to the new restrictions. Therefore, in order for the statistic to reflect the law's impact on bank behavior, the bank are grouped according to the particular restriction under which they were operating rather than according to the period of operation.

The second problem is that a restriction may not have been enforced or correctly administered. Several of the states analyzed had enforcement problems. In these instances, the banking experience will be classified under the actual enforcement of the restriction.¹⁰

Section III.2: Free Banking Experience

In this section we present the experience of the states under different specifications of the stock reserve evaluation provision and the specie reserve provision. These provisions are examined together because both affect the profit opportunities of the stockholders. These provisions also restrict the asset portfolio of the bank and thus influence the bank's susceptibility to failure. The evidence will be examined variable by variable for both provisions, beginning with entry. The examination of the entry rate will be followed by an examination of the failure rate, the below-par rate and the average loss per dollar.

This order has been chosen since entry is a measure of the increase in the banking market in each state and the percentage of operating banks that failed is based on the size of the banking market in each state. The percentage of exiting banks that failed is also a measure of failures but is a more narrow measure and thus will follow the percentage of total banks that failed. Finally, the average loss per dollar gives specific information about the effects of the failures and therefore will be the last measure examined.

In addition to the variable-by-variable examination of the states' experience, the analysis will be divided into a general discussion of the effects of the differing restrictions of the provisions and a discussion of the effects of the differing economic conditions, represented by rising and falling asset prices.

The variables are represented for each state in Figures 3 through 18. Both Indiana and New York appear more than once on all figures. This is because both states experienced major changes in their provisions. For each state a 1 will designate the experience prior to the change and a 2 will designate the experience after the change. The differing laws in these states will be treated as separate experiences throughout the remainder of the chapter.

Entry Per Year

Entry per year is represented in Figures 3 through 6. Figure 3 depicts the experiences under the specie reserve provision. Under this

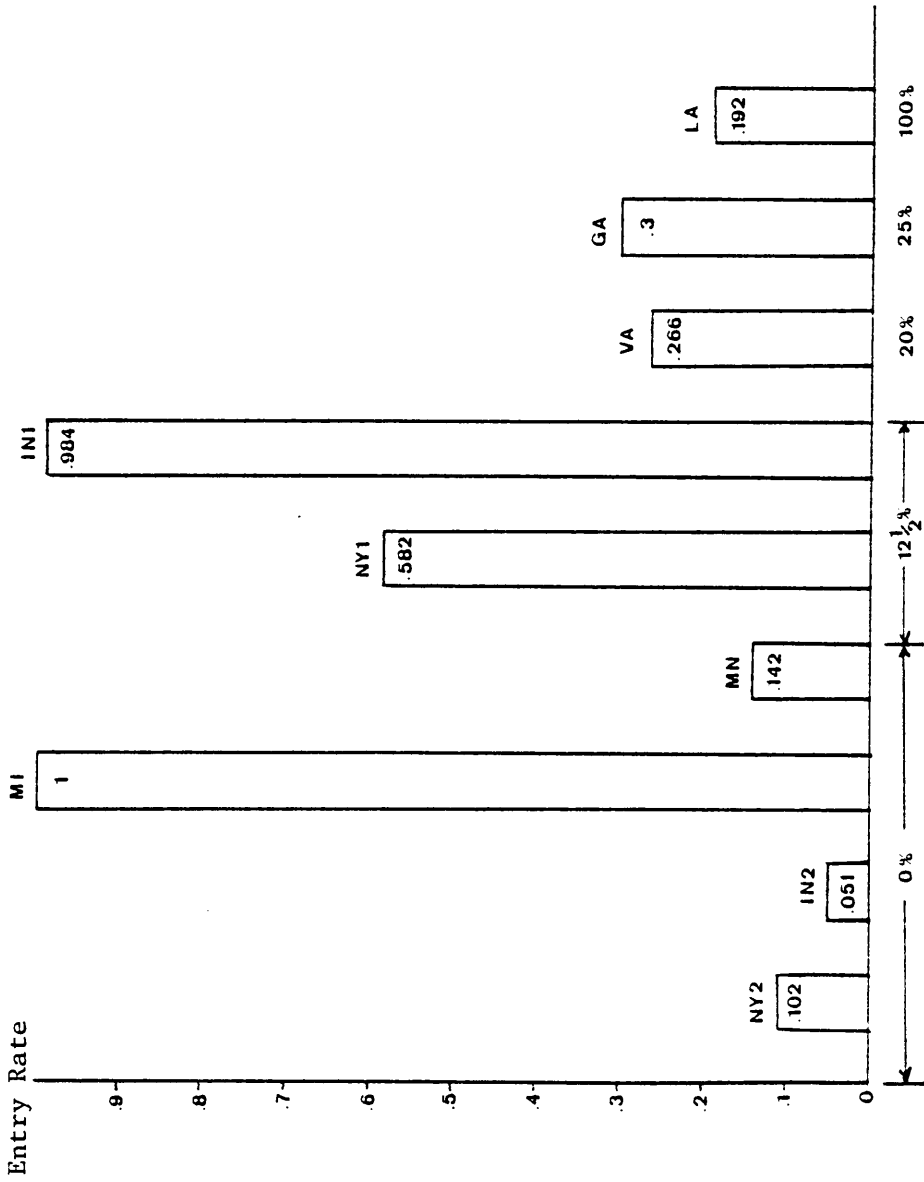


FIGURE 3
Entry Under the Specie Reserve Requirement

provision, the zero percent specie reserve requirement shows all states experiencing some entry but three of the states, New York 2, Indiana 2 and Minnesota show average entry rates of less than 20 percent per year. While Michigan shows an extremely high rate of entry. Under the 12 1/2 percent reserve rate both New York 1 and Indiana 1 show entry rates greater than 50 percent. All three states, namely Virginia, Georgia, and Louisiana with a specie reserve requirement greater than 12 1/2 percent show entry rates of 30 percent or less per year. These experiences give no clear cut indication of the relationship between entry and the specie reserve requirements.

By examining the stock reserve evaluation provision, Figure 4, in conjunction with the specie reserve provision some indication of a pattern emerges. Two of the five states operating under the par evaluation, New York 1 and Indiana 1 have entry rates greater than 50 percent; both of these states also operate under the 12 1/2 percent specie reserve requirement. Michigan which operates under both zero reserve requirement and par valuation also has a high entry rate.¹¹ Virginia and Georgia also operated under the par provision but have entry rates of 30 percent or less. This may be explained by the fact that they are also subject to reserve requirements greater than 12 1/2 percent. All three states operating at market or above show entry rates of 20 percent or less. These experiences may indicate that a par valuation combined with low specie reserve requirements encourage entry while market valuation discourages entry. The only exception to this pattern is Minnesota which operated under par valuation and zero reserve requirement but still experienced every low entry rates.

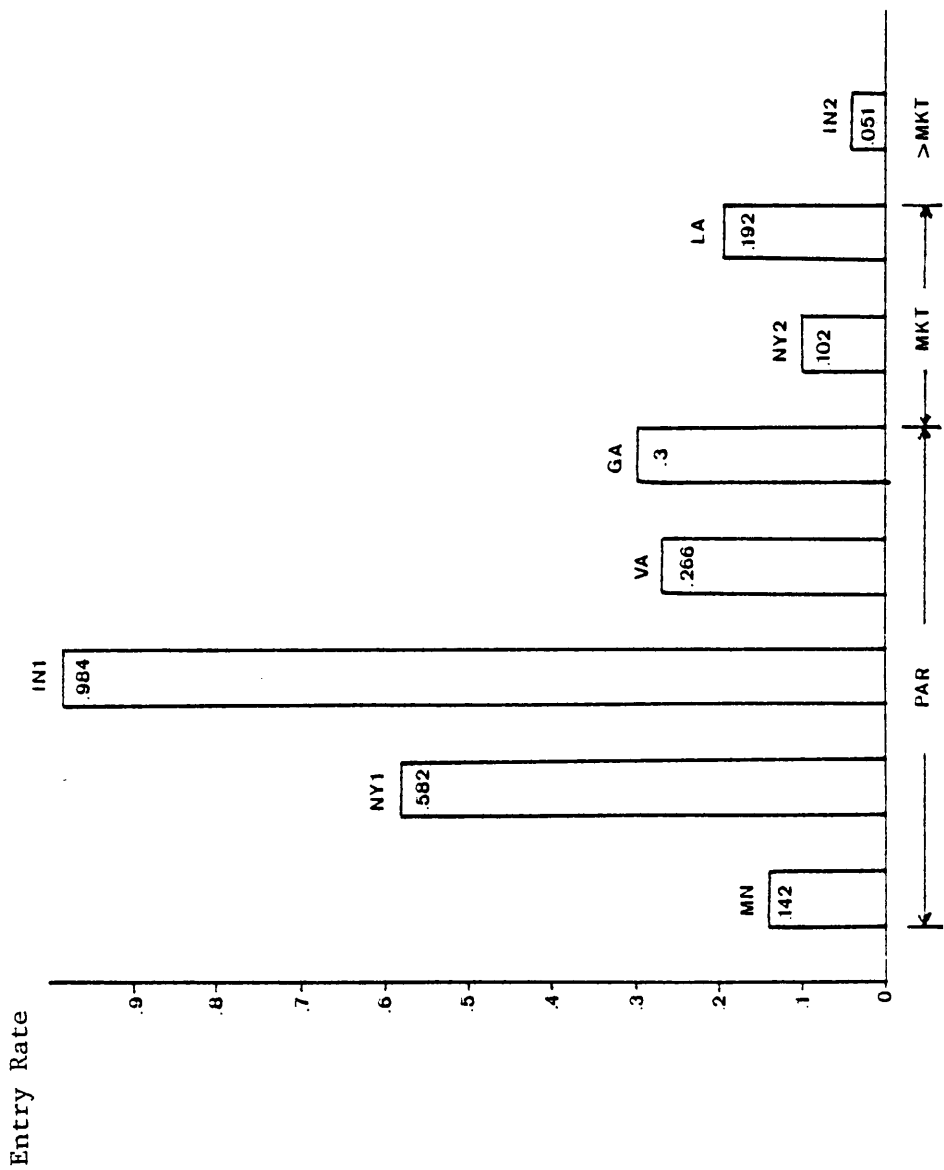


FIGURE 4
Entry Under the Stock Reserve Evaluation Provision

In conclusion it appears that of the two provisions the stock reserve evaluation provision has the greatest effect on entry with par valuation requirements resulting in high entry rates and market valuation requirements resulting in low entry rates. But it should be pointed out that neither of the two provisions give a complete explanation of entry. When examined together some discrepancies can be alleviated but exceptions still remain where a par valuation results in low entry.

Another means of explaining entry besides the laws is the fluctuations in asset prices that occurred during the free banking years. From Figure 5 there is some evidence that rising/steady asset prices encourage entry. In two of the states, Michigan and Minnesota, no entry occurs during falling asset prices but entry is experienced during rising/steady asset prices. In five of the remaining seven stated entry occurs under both falling and rising/steady periods, but the rising/steady periods witness greater entry than do falling periods. Only two states, Georgia and Louisiana, experience greater entry during falling asset prices and in Louisiana the difference in entry under falling and rising/steady prices is small.

From the examination of Figures 5 and 6 there appears to be a stronger relationship between asset price fluctuations and entry. It appears that rising/steady asset prices encourage entry while falling asset prices discourage entry.

*Denotes rising/steady asset price periods

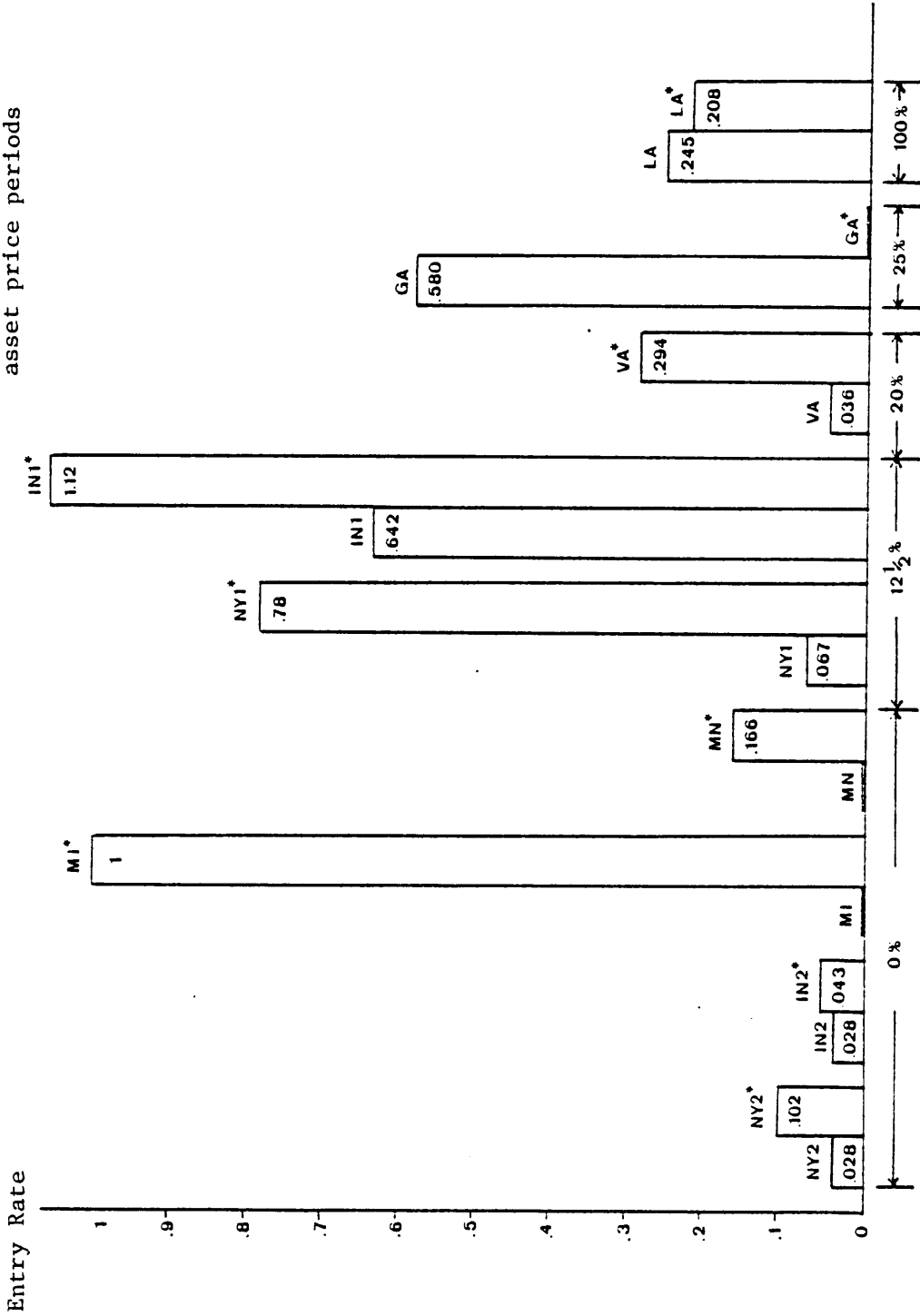


FIGURE 5

Entry Under Specie Reserve Requirement for Falling and Rising/Steady Asset Prices

*Denotes rising/steady asset price periods

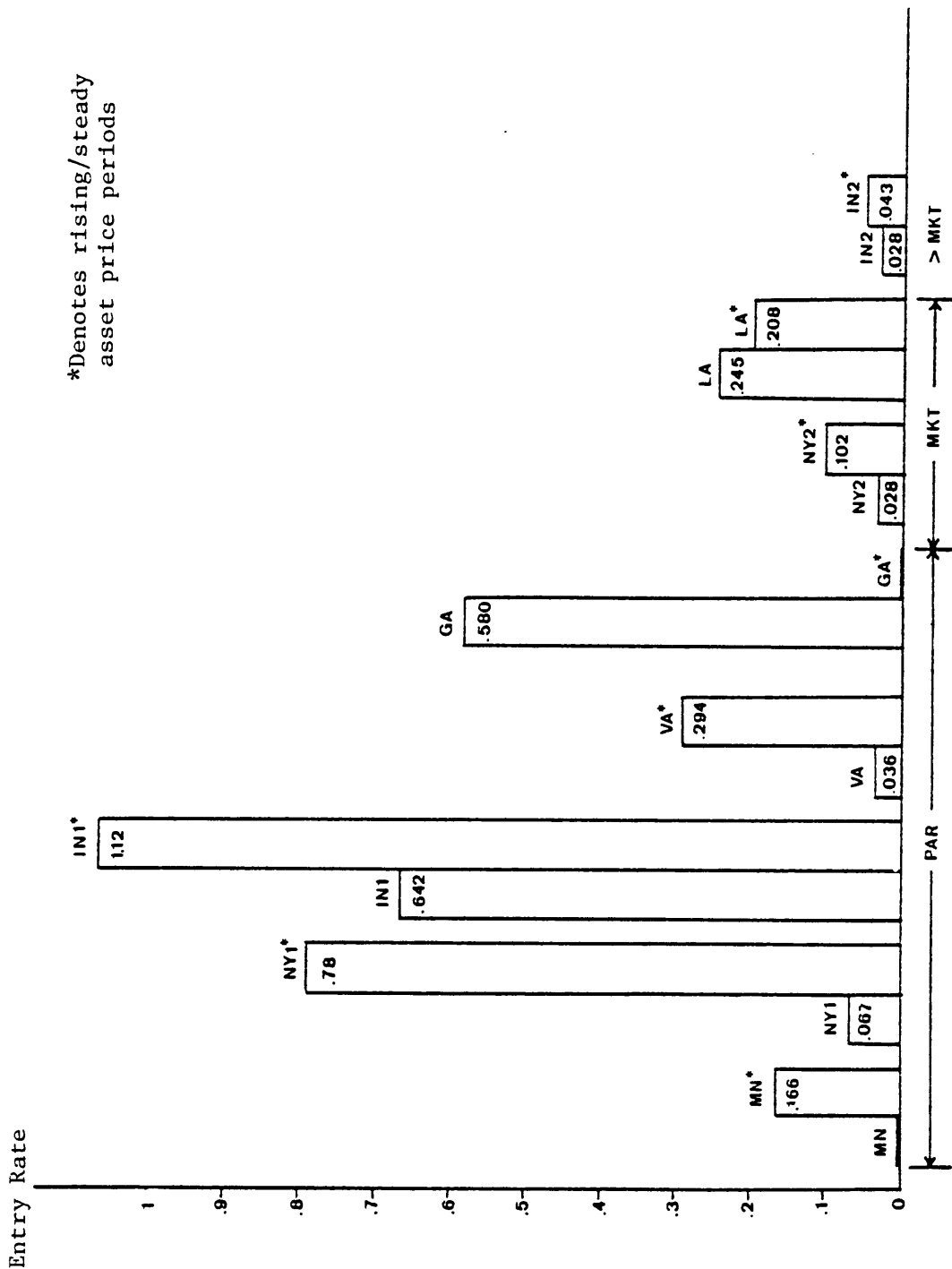


FIGURE 6

Entry Under Stock Reserve Evaluation for Falling and Rising/Steady Asset Prices

Failure Rate

The percentage of operating banks that failed is depicted in Figures 7 through 10. Figure 7 shows the effect that the specie reserve restriction had on the percentage of failures. Each state that operated under a zero specie reserve showed some failures. The experience under the 12 1/2 percent specie reserve was split with New York 1 showing no failures and Indiana 1 showing a failure rate of 25 percent. At a reserve requirement greater than 12 1/2 percent no failures occurred. As in the case of entry, there appears to be a relationship between specie reserve levels and the failure rate.

Again the stock reserve evaluation provision can assist in explaining specific experiences (Figure 8). When analyzed by itself, the stock reserve requirement has states with both failures and no failures under the par evaluation and market evaluation provisions. One trend that does appear under the stock reserve evaluation is that when failures do occur, they occur at a higher rate under par than under market evaluation.¹²

This trend can be used to help explain some discrepancies seen under the specie reserve provision. Of the four states showing failures under the zero percent specie reserve requirement, Michigan and Minnesota showed failure rates of 56 percent or more. Both of these states operated under the par evaluation provision. The other two states, New York 2 and Indiana 2, were operating under the market evaluation provision and showed failure rates of 8 percent or less. This implies that high failure rates resulted from both a zero specie

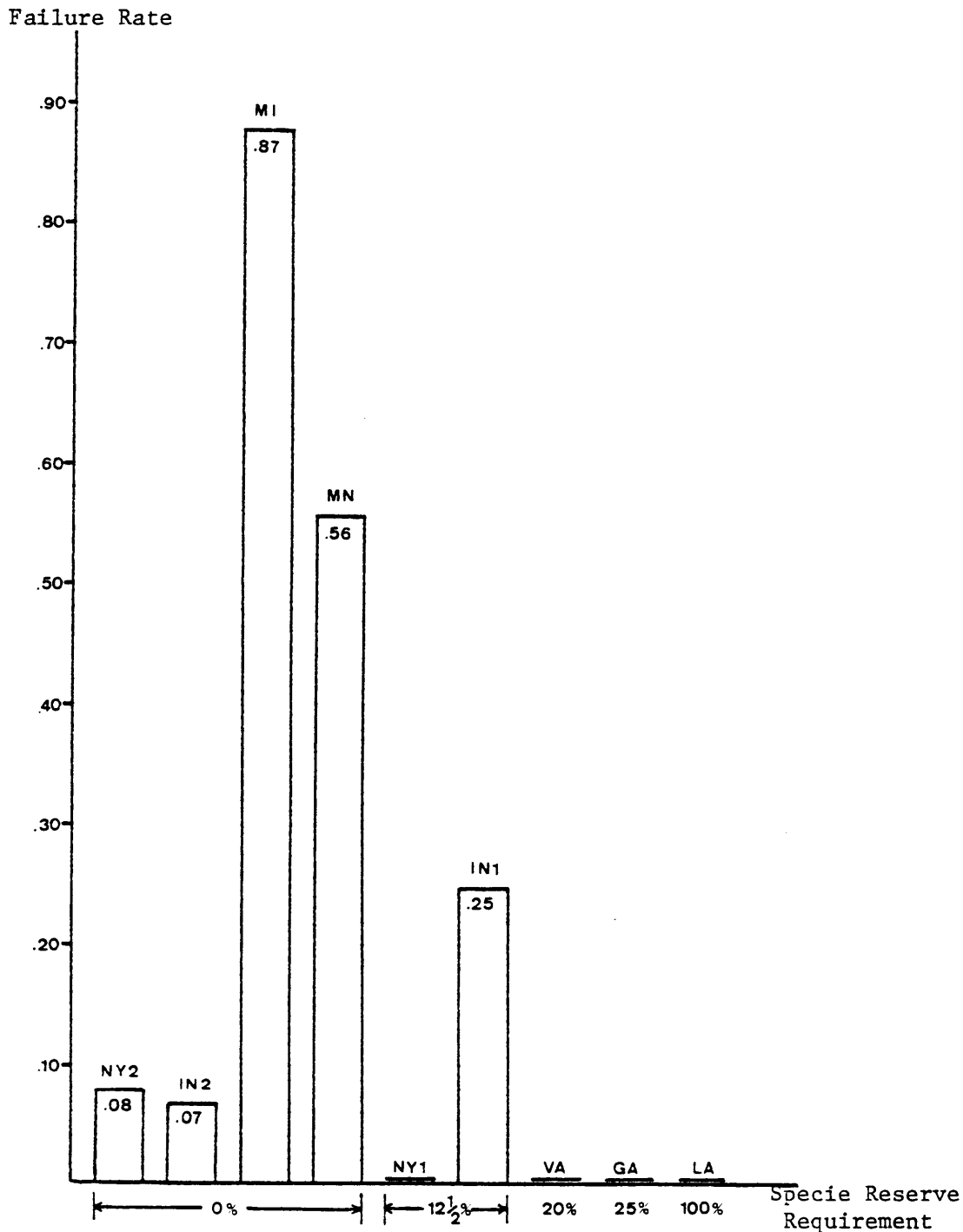


FIGURE 7

Specie Reserve Requirement and the Failure Rate

Failure Rate

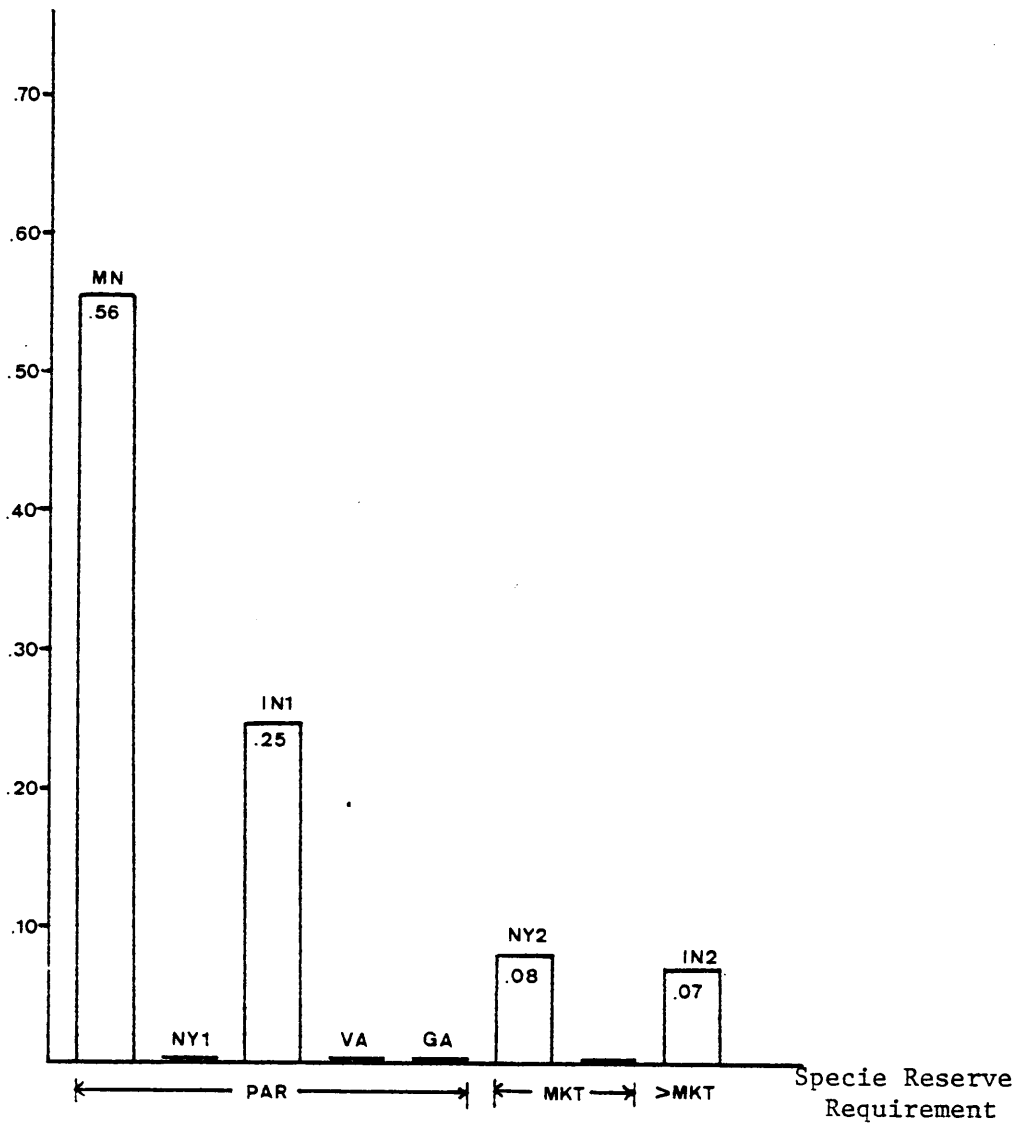


FIGURE 8

Stock Reserve Requirement and the Failure Rate

reserve requirement and a par evaluation requirement. Whereas the low failure rates seen under the zero reserve requirement resulted from the market evaluation provision. When the specie reserve requirement is increased to 12 1/2 percent the experiences of the states are split. Indiana 1 which also operated under the par evaluation provision experienced a failure rate greater than the states operating under market evaluation and zero reserve requirement and experienced a failure rate less than the states operating under a par evaluation and the zero reserve requirement. New York 1, the other state operating under the 12 1/2 percent requirement, also operated under par but experienced no failures. All states with greater than 12 1/2 percent reserve requirement suffered no failures regardless of whether they were operating at market or par.

Here again it appears that when specie reserve requirements are raised beyond 12 1/2 percent, specie reserves requirements have a stronger influence on the banking market than stock reserve requirements. At specie reserve rates below 12 1/2 percent the specie reserve working in conjunction with the stock reserve can explain the experiences of all the states except New York 1.

When examining the alternative explanation, asset price fluctuations (shown in Figures 9 and 10), the effect of fluctuations on the failure rates is not as clear as the effect of fluctuations on entry. Here, one state, Michigan, shows a strong failure rate under rising/steady asset prices, whereas four other states show a larger percentage of failures under falling than under rising/steady

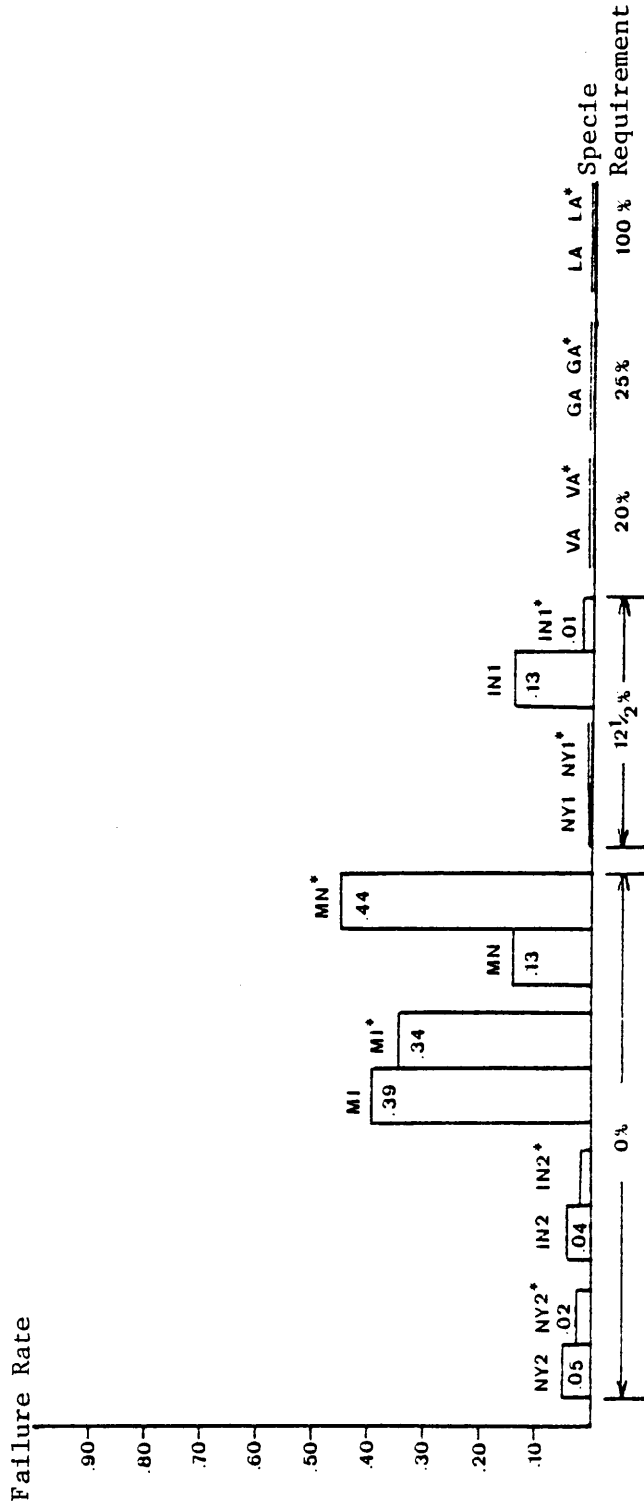


FIGURE 9

Specie Reserve Requirements Effect and the Failure Rate Divided by Periods of Falling and Rising/Steady Asset Prices

*Denotes Rising and Steady Bond Prices Periods

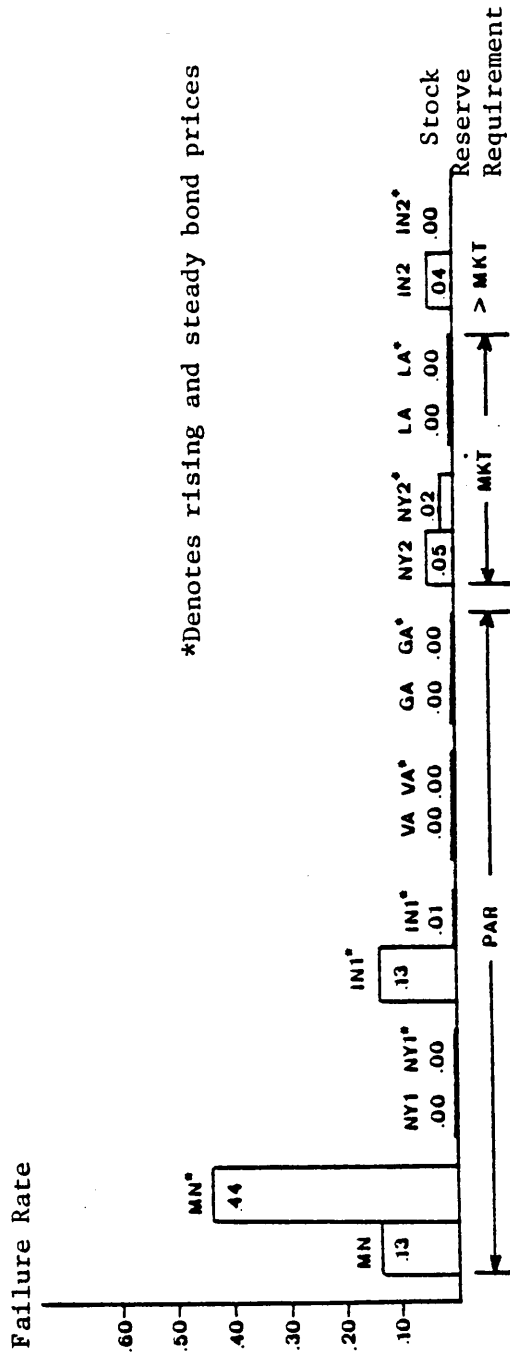


FIGURE 10

Specie Reserve Requirements Effect and the Failure Rate Divided by Periods of Falling and Rising/Steady Asset Prices

asset prices.¹³ Of these four states only Indiana 1 shows a difference or more than 10 percentage points between falling and rising asset prices; while the other three states, New York 2, Indiana 2 and Michigan show failure rates during falling asset prices exceeding failure rates during rising/steady asset prices by no more than five percentage points. Four other states show no failures at all, whether in falling or steady/rising asset price periods. Since one of the states showed much higher failure rates during rising/steady than falling and four of the states showed slightly higher failure rates during falling than rising/steady, no strong conclusion can be drawn about the effects of asset prices on the failure rate. Thus, in the case of the failure rate, the provisions appear to provide a better explanation for the states experiences than do the fluctuations in asset prices.

Below-Par Rate

When the second failure measure, the below-par rate is examined (see Figures 11-14) the general trend found under the specie reserve provision, Figure 11, remains the same as it was in the past two measures. As would be expected any specie reserve requirement above 12 1/2 percent showed no failures. All states under 12 1/2 percent experienced failures except New York 1.

The stock reserve evaluation, shown in Figure 12, as seen previously, shows no trend of its own. But as before when applied along with the specie reserve provision most discrepancies in the

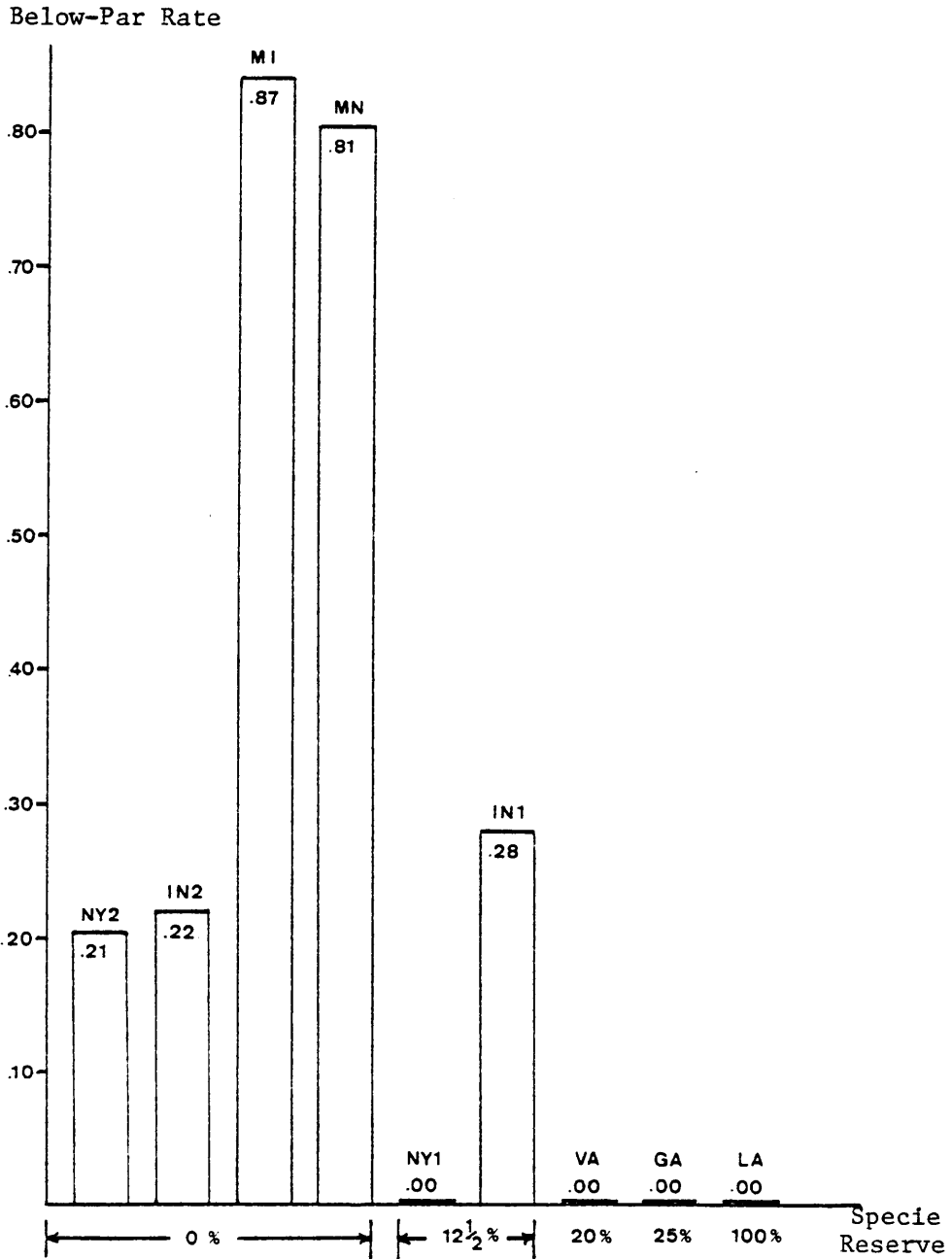


FIGURE 11

Specie Reserve Requirement and the Below Par Rate

Below-Par Rate

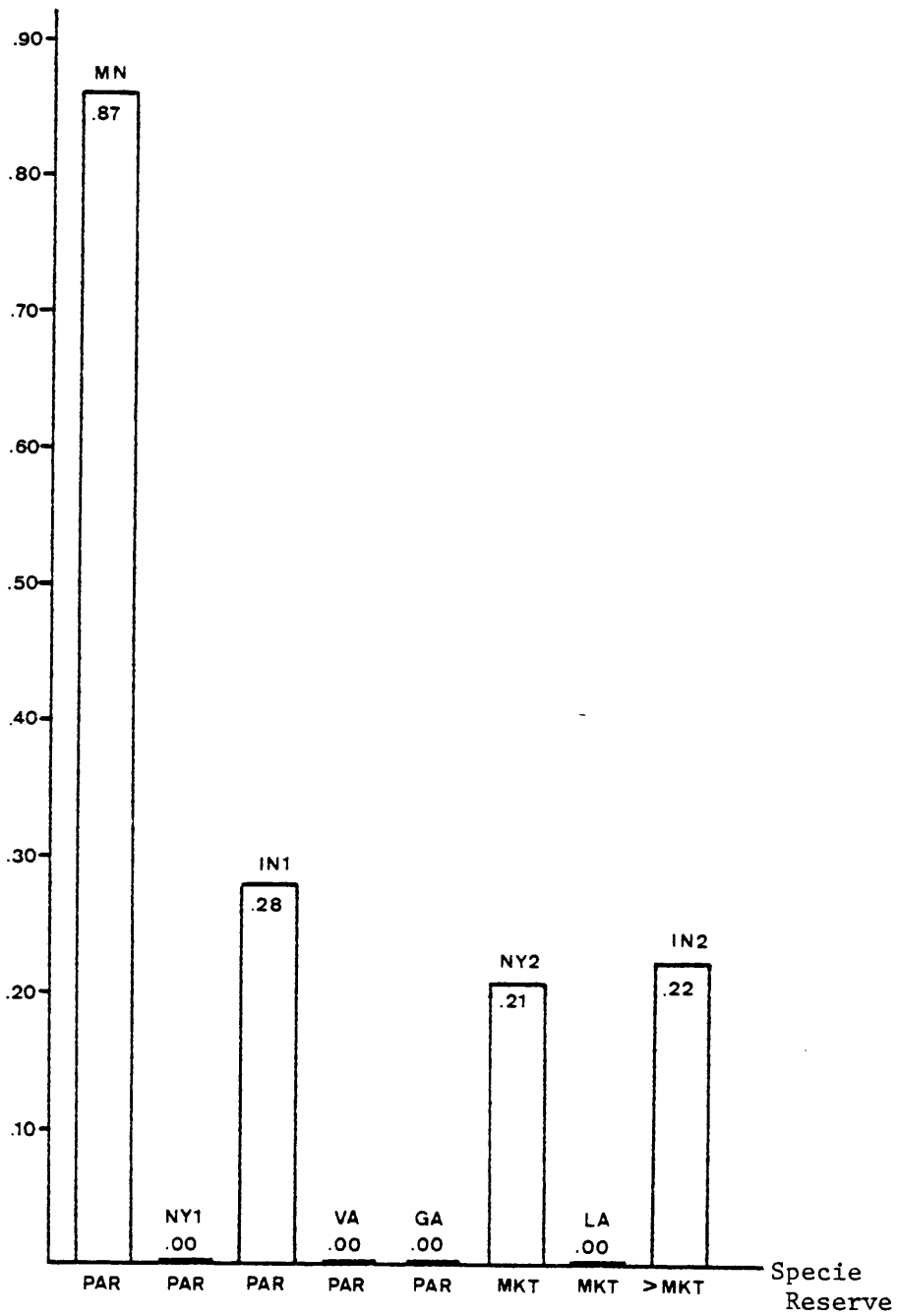


FIGURE 12

Stock Reserve Requirement and the Below-Par Rate

specie reserve provision experiences can be explained. Both Minnesota and Michigan show high failure rates and operated under both the zero specie reserve requirement and the par evaluation requirement. While New York 2 and Indiana 2 operated under the zero percent specie reserve requirement also, they show markedly lower failure rates than Michigan and Minnesota. This can be explained by the fact that both New York 2 and Indiana 2 operated at market or market greater than a hundred percent. Again, the experience under the 12 1/2 percent specie reserve requirement is split, with Indiana 1, which was also under par valuation, showing a higher failure rate than either New York 2 or Indiana 2 and a lower failure rate than Michigan or Minnesota. On the other hand, New York 1, the other state facing the 12 1/2 percent specie reserve requirement, showed no failures. As was seen in the preceding analysis, New York 1 is the only state whose experience cannot be explained by the specie reserve requirement acting in conjunction with the stock reserve requirement.

In this case the alternate explanation of asset price fluctuations (see Figures 13 and 14) seems to be a viable alternative for explaining these failure rates. In every state, but one, that experienced failures the failure rate was much larger under falling asset prices than rising/steady asset prices, with at least 16 percentage points separating the failure rates during falling asset prices from the failure rates during rising/steady asset prices. Thus asset price fluctuations may be as good an explanation of why exiting banks failed as either the specie reserve requirement or the stock reserve requirement.

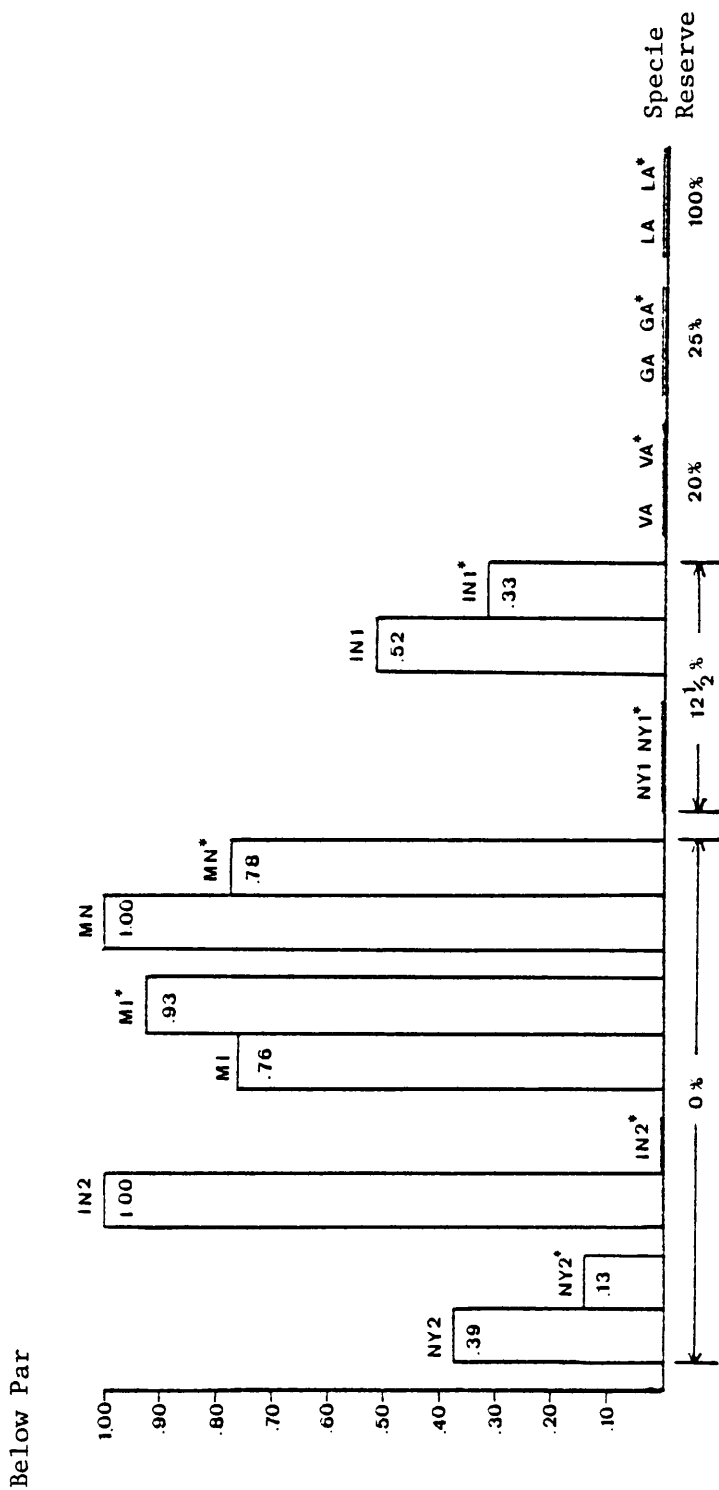


FIGURE 13
 Specie Reserve Requirements Effect and the Below Par Rate
 Divided by Asset Price Periods

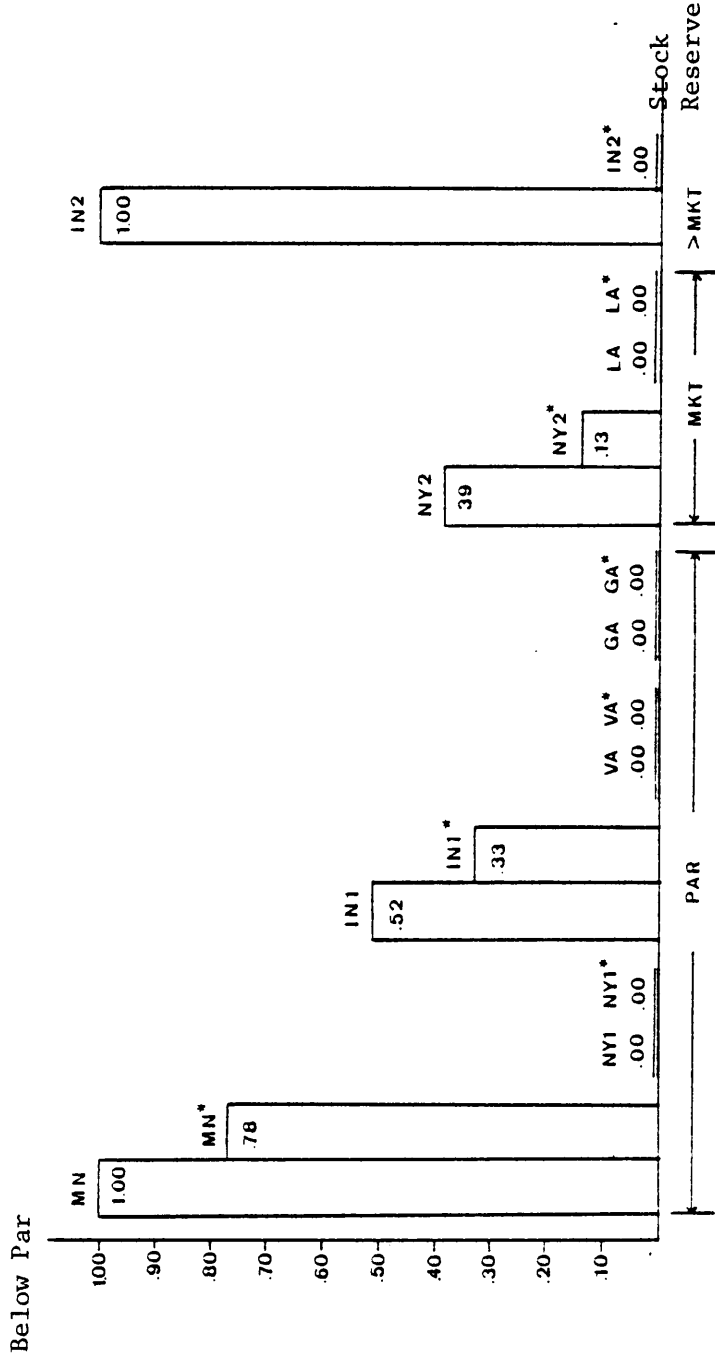


FIGURE 14

Stock Reserve Requirement and the Below-Par Rate; Divided by Falling and Rising/Steady Asset Prices

*Indicates period of falling asset prices

Average Loss Per Dollar

Finally, average loss per dollar is examined in Figures 15-18. The specie reserve requirement (see Figure 15) shows the same trend that has existed for the previous variables. Losses were highest when specie reserve requirements were the lowest and for specie reserve requirements greater than 12 1/2 percent no losses occurred.

The stock reserve evaluations (see Figure 16) shows no consistency of experience within the par or within the market valuation provisions, but when it is applied to the specie reserve provision it helps to explain the losses the states experienced. Both New York 2 and Indiana 2 which operated under the zero specie reserve requirement and market valuation, experienced relatively low losses when compared to Minnesota and Michigan which operated under par. Again the 12 1/2 percent reserve requirement shows a mixed experience with Indiana 1 operating under par and having some losses while New York 1 operated under par and had no losses. As before New York 1 proves to be the only exception to the trend of increasing losses as the specie reserve requirement is lowered.

The asset price fluctuations (see Figures 17 and 18) explanation does not serve as well here as it did in the previous analysis. In Michigan and Minnesota average loss per dollar was the greatest under rising/steady asset prices whereas New York 2 and Indiana 2 losses were greatest under falling asset prices.¹⁴ In Indiana 1 losses were the same under falling or rising/steady asset prices.

Average Loss per \$

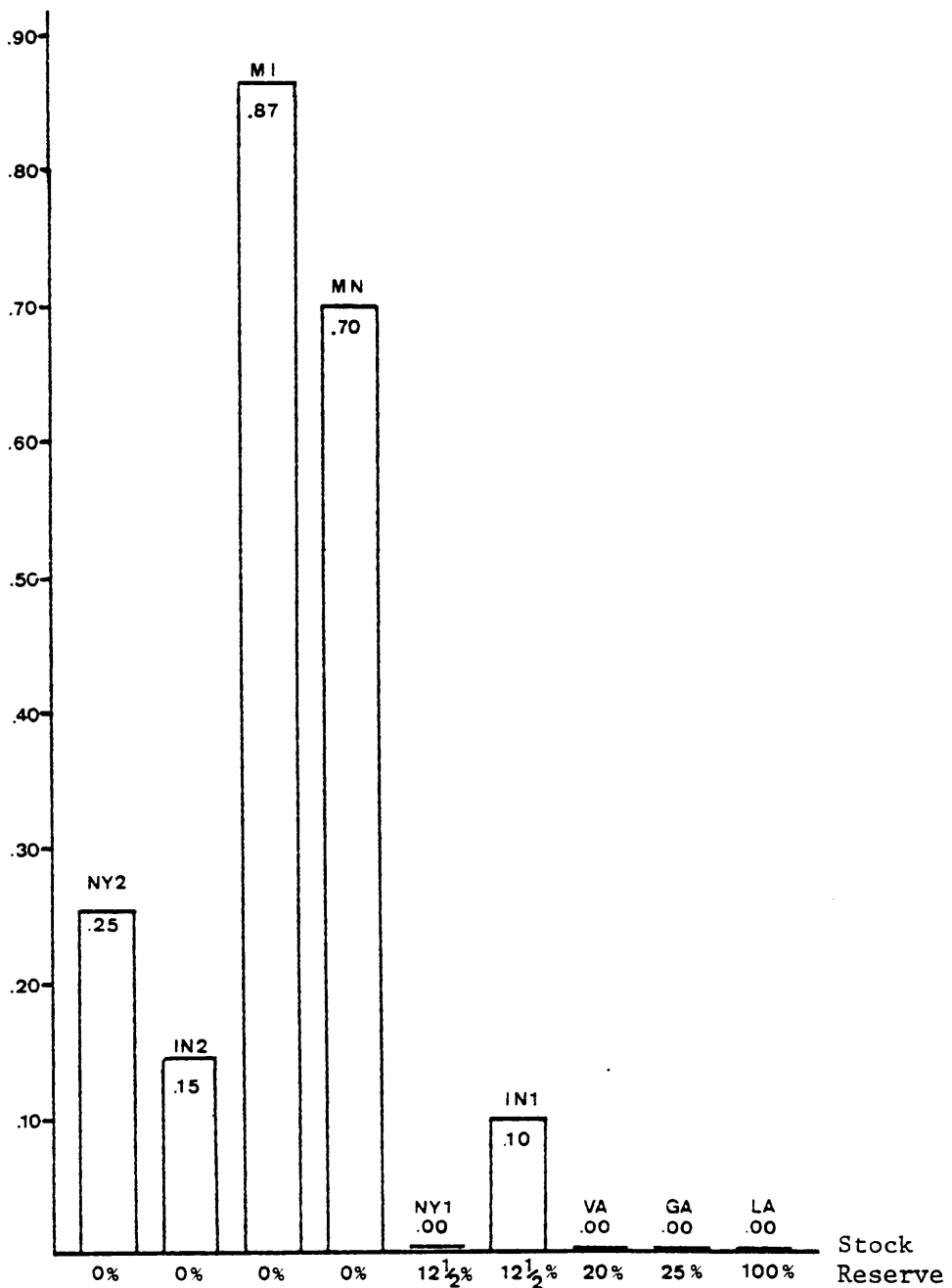


FIGURE 15

Specie Requirement and the Average Loss Per Dollar

Average Loss per \$

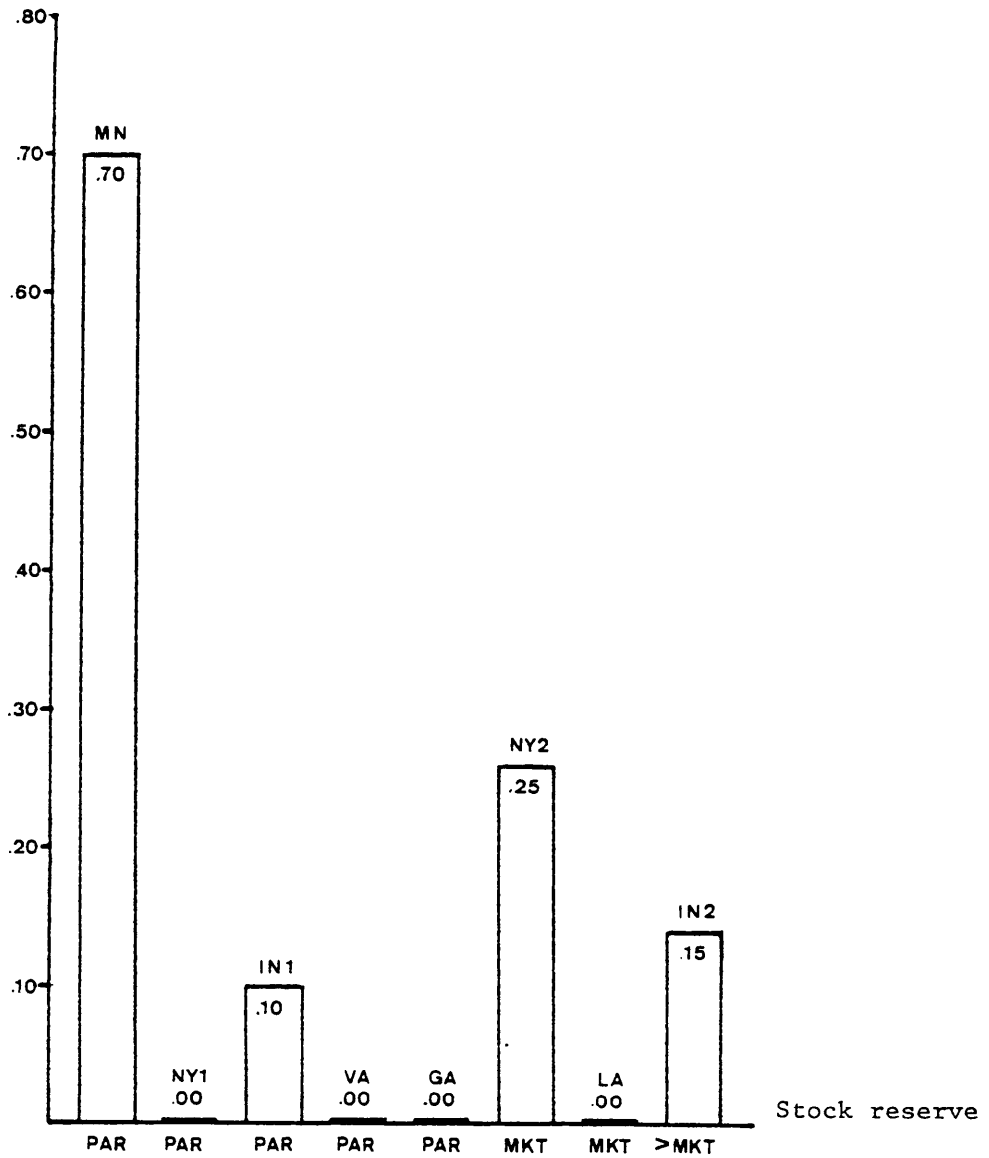


FIGURE 16

Stock Reserve Requirement and the Average Loss Per Dollar

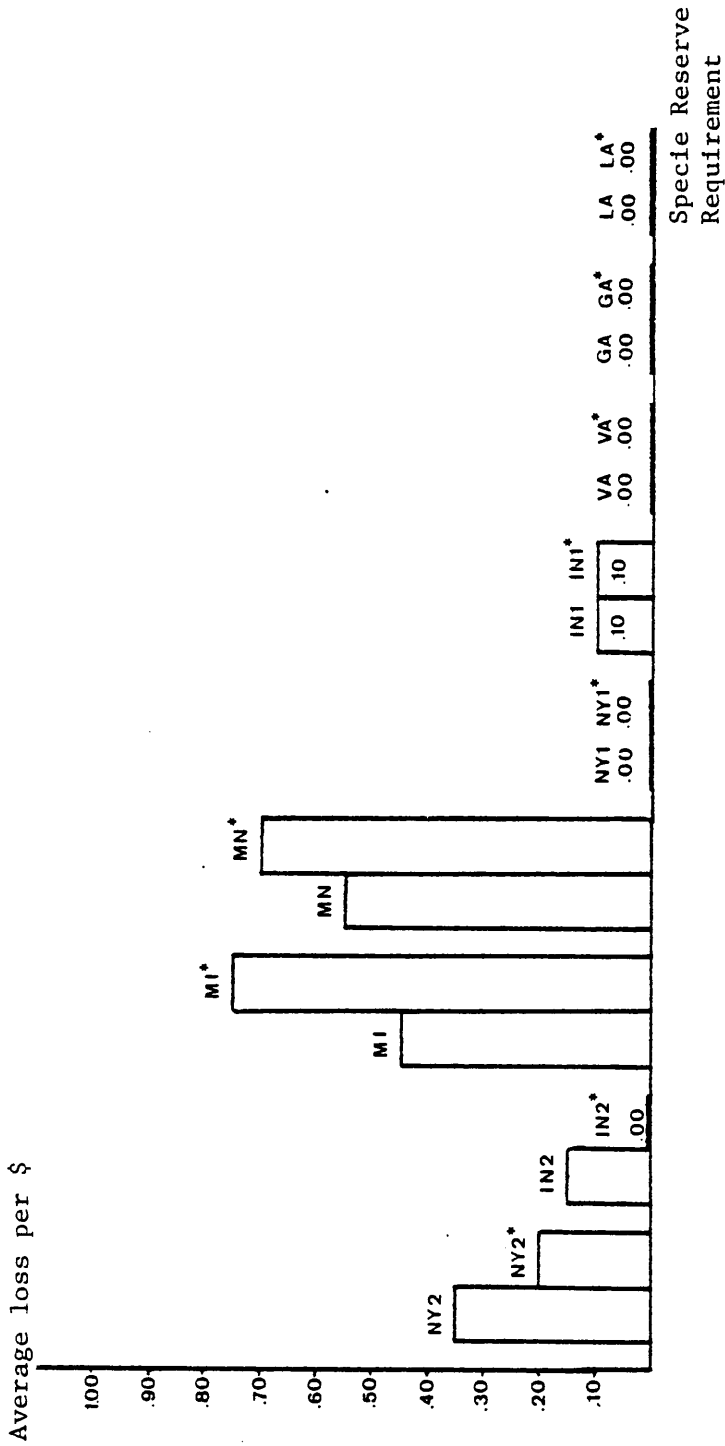


FIGURE 17

Specie Reserve Requirement and the Average Loss Per Dollar: Divided
by Falling and Rising/Steady Asset Prices

*Denotes period of rising and steady bond prices.

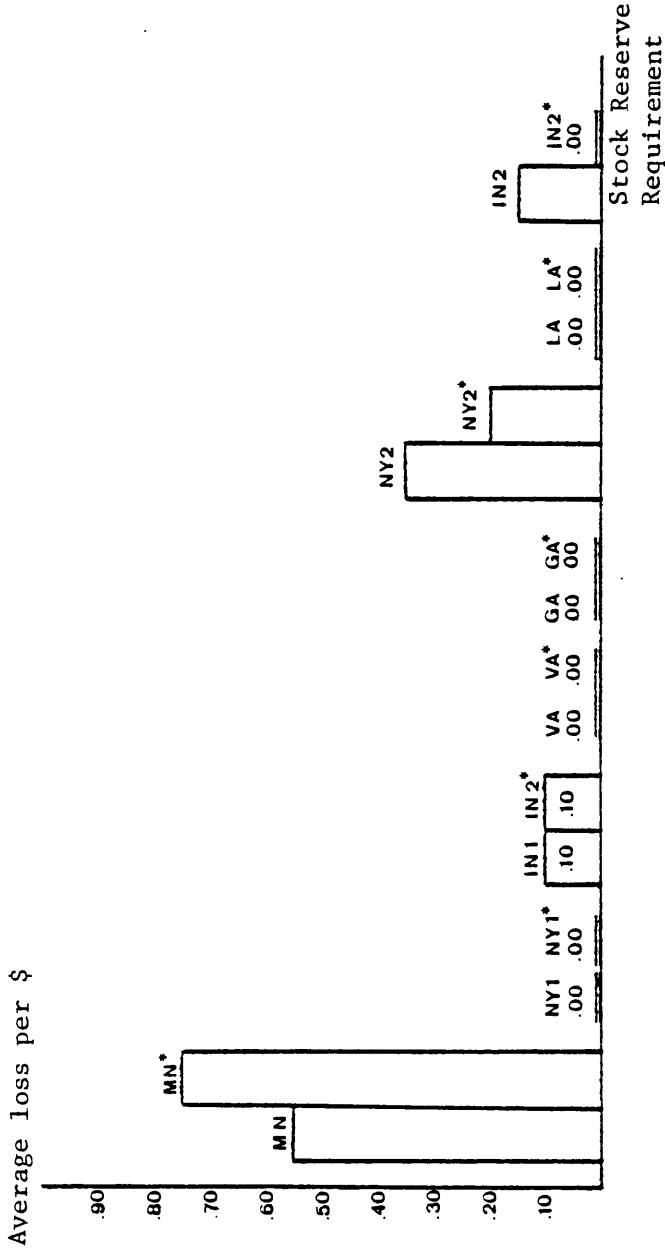


FIGURE 18

Stock Reserve Requirement and the Average Loss Per Dollar: Divided by Falling and Rising/Steady Asset Prices

*Denotes period of rising and steady bond prices.

In summary this analysis reveals that for the variables tested, the specie reserve requirement shows the most consistent pattern. In all cases a specie reserve greater than 12 1/2 percent dominated the effects of either the stock reserve evaluation or the fluctuation in asset prices. At specie reserves of 12 1/2 percent or less the specie reserve operating in conjunction with the stock reserve explained most of the experiences.

Section III.3: Conclusion

We have found that there is no conclusive pattern between the provisions and entry but the stock reserve evaluation provision does appear to give some explanation of entry rates with the par valuation encouraging entry. This result may appear to strengthen Rockoff's argument that individuals would enter the banking market under par in order to realize a quick profit. But if such profits were easily obtainable we would expect to see high entry rates in all states operating under par evaluation. However, this was not the case as was seen in the case of Minnesota, a state operating under par and under a zero reserve requirement which had low entry.

Asset price fluctuations did appear to have some effect on entry with rising/steady prices encouraging entry. But neither the provisions nor asset price fluctuations produced a completely accurate picture of the determinants of entry. Whereas entry cannot be fully explained by our analysis, our results concerning bank failures are much more conclusive.

These results have important implications for the theories proposed by Rockoff and Rolnick and Weber. Rockoff suggested that the par evaluation provision is the best explanation for bank failures.¹⁵ Our results suggest otherwise; the preceding analysis has shown that specie reserve requirements provide a better explanation of bank failures. In addition, an examination of the raw data, shown in Table 11, supports this finding. This data reveals that 76 of the 98 bank failures occurred under a zero specie reserve requirement, while only 62 of the failures occurred under par evaluation. This supports our general findings that specie reserves had a stronger influence than par evaluation on the failures experienced by the banks.

Our results also indicate that the Rolnick-Weber theory may not provide the best explanation of bank failures. They suggest that the fall in asset prices explains most of the bank failures. Our study, however, points to the differing restrictions of the laws as having the major influence on bank failures. From our analysis we found that the percentage of total banks that failed could be explained for every state but one by examining the restrictions of the laws; whereas asset price fluctuations could not produce a consistent explanation for these failures. Again by examining the raw data our result can be further supported. In Table 12 we find that only 53 of the 98 failures can be explained by falling asset prices, whereas 76 can be explained by the zero reserve requirement alone.¹⁶

While our study found that the provisions had the greatest effect on the percentage of all free banks that failed, we did find that asset

TABLE 11
FREE BANK FAILURES

	0%	12 1/2%	Total
Par	40	22	62
Market	34	NA*	34
Market > 100%	2	NA*	2
Total	76	22	98

*Not applicable.

TABLE 12

FREE BANK FAILURES DURING FALLING AND RISING BOND PRICES

Specie Reserve	Falling	Rising/Steady	Total*
0%	41	31	76
12 1/2%	12	1	22
Total Number of Failures	53	32	

*13 banks could not be identified as failing under falling or rising/steady bond prices; four banks operated under 0% specie reserves and nine banks under 12 1/2% specie reserves.

price fluctuations showed a consistent effect on the percentage of banks leaving the market that were failures. This result suggests that falling asset prices did not force banks out of the market but rather that banks were likely to fail when forced out of the market during periods of falling asset prices.

The losses that occurred from these failures are equally well explained by the provisions. Low specie reserves resulted in high losses while high specie reserves resulted in low losses. This implies that the specie reserve provision was instrumental in protecting noteholders from losses.

This study has not attempted to explain all the causes of bank failures but rather has examined two theories previously advanced. The results have revealed that neither the stock reserve provision nor the asset price fluctuation theory give complete answers to the failures that occurred during the Free Banking Era. However, the restrictions of the two provisions examined have contributed to our understanding of free bank failures.

FOOTNOTES

¹Bank failures need to be distinguished from bank closings. A bank that closes is defined as a bank that has ceased operations and has redeemed its notes at par value. A bank that failed is defined as a bank that ceased operations and has redeemed its notes below par.

²Chapter I contains the Rockoff argument in detail.

³Rolnick and Weber also contend that the laws do not cause bank failures. Free bankers could purchase perfectly safe assets with the bank notes, thereby being free from risk. However, if the free banker allows the bank notes to depreciate with the decline in assets prices, the par redemption of bank notes may contribute to the banker's decision to close the bank and to redeem below par.

⁴New York bonds were considered relatively safe compared to other state bonds. Financial theory states that the price elasticity of risky bonds is greater than safe bonds. Therefore, a substantial change in New York bond prices would imply a larger change in other state's bond prices. See Appendix II for the New York bond price information for this period.

⁵B.U. Ratchford, American State Debts, Durham, North Carolina: Duke University Press, 1941, pp. 96-100.

⁶For a complete documentation of Michigan's free banking experience see Appendix III.

⁷See Chapter II, Section 2.1, for the discussion on the profitability of bank notes.

⁸A.J. Rolnick, and W.E. Weber, "New Evidence on the Free Banking Era," American Economic Review, 1983, 73, p. 1087.

⁹See Appendices II and III for a complete listing of the data and sources.

¹⁰See Chapter II for the details on the enforcement of the restrictions.

¹¹Michigan allowed bankers to issue bank notes equal to the "true" market value of mortgages on unincumbered land held by the bank. Three state officials were required to assess the land's value. Reports claim that the land's value was generally overestimated by the panel (see Michigan, Appendix III). This implies that notes issued by the bank were not fully secured by the land and that the enforcement of this provision was the same as the par valuation provision.

¹²If we aggregate our results among the states for each restriction, we find 11% of the total banks operating failed under the par valuation provision and 7% of the total banks operating failed under both market valuation provisions. This supports our finding that banks were more likely to fail under par than under market.

¹³The Minnesota experience needs to be qualified. Minnesota's free banks held primarily Minnesota state bonds. The price fluctuations of Indiana bonds may not have had a direct impact on Minnesota banks. Our readings show that Minnesota bond prices were markedly different from the prices of other states (Patchin, 1917, pp. 151-152). Prices of these bonds ranged from \$30 to \$16.

¹⁴See Footnote 15.

¹⁵Rockoff asserts that the quick profit opportunities created by the par valuation provision were the major cause of bank failures. We do not support this motive. We suggest that the provision may have influenced banking activity but not necessarily because it provided quick profit opportunities.

¹⁶Thirteen banks could not be identified as falling under rising and steady or falling bond prices.

CHAPTER IV

THEORETICAL ANALYSIS OF THE LIABILITY PROVISION'S IMPACT ON THE BANKING MARKET

In the previous chapter the effect of two provisions on the banking market was analyzed. Both provisions were enacted in an attempt to reduce the riskiness of the bank, thereby potentially reducing losses to creditors. Another means of protecting the bank creditors from losses was to enact a provision which held the stockholders personally liable for the debts of the bank. The enactment of such a provision served as an insurance policy for the creditors, after the assets of the bank were liquidated, the stockholder's personal wealth was available to pay off the remaining debt.

Although the provision may have served as an insurance policy for the creditor, it may have also affected the portfolio decision of the investor of the free bank as well as the decision of the potential investor of the free bank. In this chapter a theoretical analysis of the portfolio allocation of a representative free bank shareholder will be presented and the effect of a change in the liability provision on the free banker's portfolio decision will be examined. The analysis will be done using the state-preference model.¹

In 1846 the New York populace approved a new constitution which contained a statute changing the liability of the stockholders of a free bank. Prior to this change, the stockholders of a free bank had limited liability, that is, a stockholder's losses could not exceed

The amount invested in the bank. The creditors would absorb the remainder of the loss when the value of the liabilities exceeded the value of the assets plus equity. Consequently, under this form of liability, the risk of loss potentially could be shared by both the stockholder and the creditor.

Under the new statute a stockholder was subject to double liability, that is, a stockholder's losses could not exceed twice the amount invested in the bank. This change in the liability statute enabled the courts to assess damages against the private estate of the stockholders if the bank's resources were insufficient to cover the liabilities. Consequently, one impact of the new law was to shift more of the risk from creditors to stockholders.

This increase in the maximum possible loss from ownership of bank stock may also have had an impact on the portfolio decisions of the free bank shareholders. In this chapter a theoretical analysis of the portfolio allocation of a representative free bank shareholder will be presented and the effect of a change in the liability provision on the free bank's portfolio decision will be examined. The analysis will be done using the state-preference model framework (SPM).

In Section IV.1 the general SPM will be presented, followed by a basic SPM in which a two asset world (Section IV.2) is examined. One of the available assets will be a risky asset, the other asset will be perfectly safe. The two asset world will be discussed in detail because it will be applied to the simplified model of a free bank. In Section IV.3 the two asset world model will be used to show the impact of a

change in the liability provision on the investor's and free bank's allocation of risky and safe assets.

SECTION IV.1 The General State Preference Model

In the SPM an investor has a two period planning horizon. In the current period he has an initial amount of nominal wealth, W^1 , which he desires to allocate among m alternative assets, some of which may be risky. In period two, any one of n mutually exclusive states of nature, indexed by $\theta = 1, 2, \dots, n$, can occur.² Associated with each state of nature is a rate of return for each of the assets. The investor possesses an information set that contains an exhaustive listing of all possible states of nature and the vector of returns associated with each state. He also has a set of subjective probabilities, $\pi(\theta)$, which he assigns to the occurrence of state θ . The only restrictions placed upon the investor in assigning the subjective probabilities are $0 < \pi(\theta) < 1$ and $\sum \pi(\theta) = 1$. The state of nature is revealed at the beginning of period two.

The investor's decision problem is how to allocate W^1 among the m assets which exist. Let X_i denote the number of units and P_i the price of the i^{th} asset. The budget constraint faced by the investor in period one is

$$(1) \quad W^1 = \sum_{i=1}^m P_i X_i,^3$$

Equation (1) states that the investor's wealth must equal the value of his asset purchases.

Each asset purchased will yield a return in period two contingent upon the revealed state of nature. Let $R_i(\theta)$ denote the gross (nominal) rate of return per unit of the i^{th} asset in state θ . The investor's wealth in period two contingent on state θ is:

$$(2) \quad W^2(\theta) = \sum_{i=1}^m R_i(\theta)X_i.{}^4$$

The investor is assumed to prefer more wealth in period two to less, and we further assume that these preferences can be represented by a von Neuman-Morganstern utility function of the form

$$(3) \quad U = U(W^2).{}^5$$

It is assumed that $U'(W) > 0$ and that $U''(W) < 0$, i.e., the investor is risk averse.

The investor's portfolio allocation problem is to choose X_1, \dots, X_m to maximize the expected utility of second period wealth,

$$(4) \quad Z = E[U(W^2(\theta))] = \sum_{\theta=1}^n \pi(\theta)U\left[\sum_{i=1}^m R_i(\theta)X_i\right],$$

subject to the budget constraint (1). The first order conditions for the individual to be maximizing expected utility of second period wealth are:

$$(5) \quad \frac{\partial Z}{\partial X_i} = \sum_{\theta=1}^n \pi(\theta)U'[W^2(\theta)]R_i(\theta) - \lambda P_i = 0, \quad i = 1, 2, \dots, m$$

where λ is the Lagrangian multiplier. Since the investor's utility function is strictly concave, the first order conditions are necessary and sufficient for a maximum.

The conditions (5) also imply

$$(6) \quad \frac{P_i}{P_j} = \frac{\sum_{\theta=1}^n \pi(\theta) U' [W^2(\theta)] R_i(\theta)}{\sum_{\theta=1}^n \pi(\theta) U' [W^2(\theta)] R_j(\theta)} \quad \begin{array}{l} i, j = 1, 2, \dots, m \\ \text{and } i \neq j. \end{array}$$

Equation (6) states that the investor will choose a portfolio such that the price ratio of each pair of assets equals the ratio of the expected marginal utilities of these assets. In other words, the investor will purchase a portfolio such that the expected marginal utility of the last dollar spent on each asset is the same.

This concludes the general analysis of the SPM. The next section will simplify the general SPM by assuming a two state-two asset world. This model will then be applied to a free bank.

SECTION IV.2 The Two State-Two Asset State Preference Model

In this section it is assumed that the investor faces only two possible states of nature, a good state ($\theta = 1$), and a bad state ($\theta = 2$) and two types of assets, a perfectly safe asset (X_1) and a risky asset (X_2). Since asset 1 is perfectly safe, $R_1(1) = R_1(2) = 1$. The risky asset will be assumed to have returns $R_2(1) > 1$ and $R_2(2) = 0$. For the present purpose, we will choose $P_1 = 1$, so that X_1 can be thought of as the amount of dollars held by the investor.

Under these simplifying assumptions, equation (6) derived in the previous section is now:

$$(6') \quad \frac{1}{P_2} = \frac{\pi(1)U'[W^2(1)] + \pi(2)U'[W^2(2)]}{\pi(1)U'[W^2(1)]R_2(1)} .$$

The investor will choose a portfolio of dollars and risky assets such that expression (6') will hold.

The investor's maximization problem is illustrated in Figure 19. The line AB represents the investor's budget constraint, equation (1), for the two asset case. Any portfolio of dollars and risky assets can be represented by a combination of $W^2(1)$ and $W^2(2)$ lying on line \overline{AB} . For example, if the investor purchased a portfolio which contained only X_1 , he would be located at point A. Since he would be holding all his wealth in dollars, he would be assured of having certain wealth in period two equal to his initial investment, regardless which state occurs. Conversely, if the investor holds a portfolio containing only X_2 , he would be located at point B. If state two occurred, he would receive no wealth in period two. However, if state one occurred, he would receive $R_2(1)W^1/P_2$. Other points on AB represent portfolios in which he holds positive amounts of X_1 and X_2 .⁶ The slope of AB is $-P_2/[R_2(1) - P_2]$.⁷ Area OAB in Figure 19 is the opportunity set for the investor.

Along lines of constant expected utility (indifference curves) we have

$$(7) \quad dZ = 0 = \pi(1)U'[W^2(1)]dW^2(1) + \pi(2)U'[W^2(2)]dW^2(2)$$

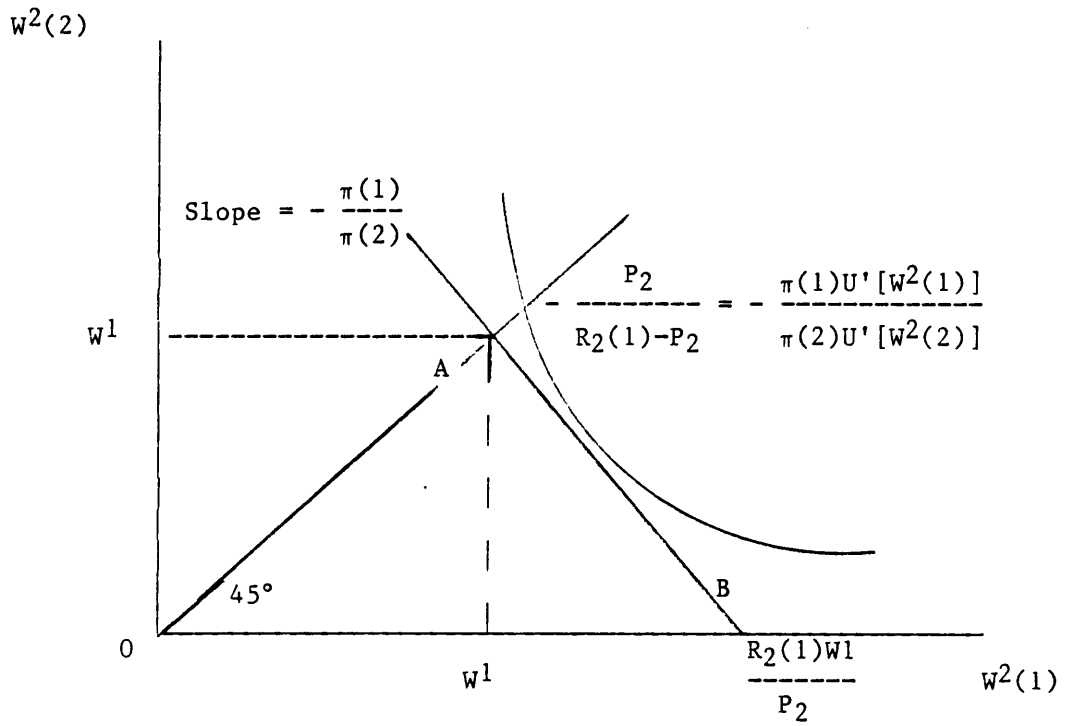


FIGURE 19

Expected Utility Maximization in a Two Security World

which implies that

$$(7') \quad \frac{dW^2(2)}{dW^2(1)} = - \frac{\pi(1)U'[W^2(1)]}{\pi(2)U'[W^2(2)]} .$$

Equation (7') gives the slope of the indifference curve.

The optimal portfolio will be located where the investor's indifference curve is tangent to line AB. This tangency is shown as point q in Figure 19, where

$$(8) \quad \frac{P_2}{R_2(1) - P_2} = \frac{\pi(1)U'[W^2(1)]}{\pi(2)U'[W^2(2)]}$$

Note that if we solve equation (8) for P_2 , we get the same result as equation (6).

Some risk averse investors, however, may hold optimal portfolios of only dollars, where $W^2(1) = W^2(2)$ (point A). This circumstance will arise if X_2 is a fair bet, that is

$$(9) \quad P_2 = \pi(1)R_2(1).$$

Equation (9) can be rearranged such that

$$(9') \quad \frac{P_2}{R_2(1) - P_2} = \frac{\pi(1)}{\pi(2)} .$$

However, if (9') and (8) are to hold simultaneously, $U'[W^2(1)] = U'[W^2(2)]$ which can only hold if $W^2(1) = W^2(2)$; that is this can only hold if there is no X_2 in the portfolio. Therefore, only if the slope

of the budget constraint at A is greater than the ratio of the probabilities,

$$\frac{P_2}{R_2(1)-P_2} > \frac{\pi(1)}{\pi(2)},$$

will the risk averse investors purchase some X_2 .⁸ This is the case shown in Figure 19.

We may also conclude from the general state preference model that the demand for X_2 by the risk averse investor will depend on the parameters of the model; that is, the demand for X_2 can be represented by:

$$X_2 = X_2^*(P_2; \pi(1), \pi(2), W^1, R_2(1)).$$

A change in one of the parameters, *ceteris paribus*, will influence the amount of X_2 purchased by the investor. From our assumptions on the investor's utility function, we can determine that $\frac{\partial X_2^*}{\partial \pi(1)} > 0$ and $\frac{\partial X_2^*}{\partial \pi(2)} < 0$. (The derivations of these signs and those to come can be found in Appendix VI.) In other words, the demand for the risky asset will increase (decrease) as the investor's assessment of the probability of the good state (state one) increases (decreases). The investor will react just the opposite for changes in $\pi(2)$.

However, the investor's change in demand for X_2 in response to a change in W^1 , P_2 , or $R_2(1)$ cannot be determined unless more information is provided about the investor's utility function.

Let

$$\delta(W) = - \frac{U''(W)}{U'(W)}$$

measure the investor's absolute risk aversion, where $\delta(W)$ indicates that the absolute risk aversion is a function of wealth.⁹ The investor's utility function is said to exhibit decreasing (increasing) absolute risk aversion when $\delta(W) < (>) \delta(W')$, where $W' > W$.

If we assume that the investor's utility function exhibits decreasing absolute risk aversion, it can be shown that the purchase of risky assets will increase with an increase in wealth:

$$\frac{\partial X_2^*}{\partial W^1} > 0.$$

Also, it can be shown that $\frac{\partial X_2^*}{\partial P_2} < 0$ if it is assumed that the investor's utility function exhibits decreasing absolute risk aversion. One can not determine mathematically the effect of a change in $R_2(1)$ on the purchase of the risky asset, unless strict assumptions are made about the investor's utility.

This concludes our analysis of the SPM in a two security world. We are now ready to use this approach to model an investor holding shares of a free bank with particular attention to the effect of the liability provision on the portfolio of the free bank investor.

Section IV:3 Extension of the State Preference Model: Free Bank Stock

In this section we will extend the state preference model by including a new asset, free bank stock, in the investor's allocation decision. The analysis will be divided into two parts. First, the general per unit return on free bank shares will be derived. Second, the effects of the liability provisions on both the general per unit return and on the free bank's portfolio will be examined.

Derivations of the Per Unit Return on Free Bank Shares

In the model the investor will be able to purchase free bank shares; let V denote one equity share outstanding. V also denotes the paid-in capital per shareholder. It is assumed that the investor views his shares as a pro rata claim on the bank's assets and that all the shareholders have the same utility functions.¹⁰ As a shareholder, the investor (from here on called the free banker when he purchases free bank shares) can purchase loans, state stocks, and specie with the paid-in capital. The free banker can also issue liabilities (bank notes) to purchase assets. N will represent the quantity of bank notes issued. It is assumed that the assets, which in the free bank model are loans and state stocks, have the same return and characteristics as the risky asset; X_2 will denote the quantity of risky assets purchased by the free banker. Similarly, specie has the same return and characteristics as the safe asset; X_1 will denote the quantity of specie purchased by the free banker. Hence, the free banker's allocation constraint is

$$(9) \quad V + N = P_2X_2 + X_1.$$

This constraint states that the free banker will allocate the sum of his capital and liabilities between the risky and safe assets.

In the current period the free banker selects his portfolio of risky and safe assets. When the state of nature is revealed, the free banker collects the payments on the assets and pays off the liabilities. The residual funds belong to the shareholder. If, however, the amount of liabilities exceed the returns of the assets, then either the creditors or the stockholders would suffer losses. This, of course, depends on the liability of the stockholders.

Let $R_3^t(\theta)$ denote the gross nominal return per share of V in state θ , given that the stockholders are subject to type t liability. The state contingent value of the free bank investment is

$$(10) \quad R_3^t(\theta)V = R_2(\theta)X_2 + X_1 - N.$$

This equation states that the gross nominal value of the free bank investment is equal to the value of the investment in the risky asset (X_2) plus the specie held by the bank less the liabilities (N) the bank must pay off.

In order to compare the return of a free bank share to the return of the other assets, it is necessary to derive the per unit return of a free bank share. The per unit return is derived by dividing equation (10) by V . From equation (9) V can be determined as:

$$V = P_2X_2 + X_1 - N.$$

Dividing equation (10) by V yields

$$(11) \quad R_3^t(\theta) = \frac{R_2(\theta)X_2 + X_1 - N}{P_2X_2 + X_1 - N}$$

Assuming that $X_2 > 0$ and recalling from the previous section that $R_2(1) > P_2$, if state one occurs

$$R_2(1)X_2 + X_1 - N > P_2X_2 + X_1 - N$$

which implies that $R_3^t(1) > 1$. Thus the free bank asset will have a greater return than the safe asset (specie).

The contingent per unit return of free bank shares in state 1 can also be viewed as a weighted average of the underlying securities. By multiplying $R_2(1)X_2$ by P_2/P_2 in equation (11) and rearranging the per unit return to the firm is

$$(12) \quad R_3^t(1) = \frac{R_2(1)}{P_2} \frac{P_2X_2}{V} + \frac{X_1}{V} - \frac{N}{V} > 1$$

To simplify notation, let $\hat{x}_2 = P_2X_2/V$, $\hat{x}_1 = X_1/V$ and $\hat{n} = N/V$. \hat{x}_2 , \hat{x}_1 and \hat{n} can be defined as the proportion of risky assets, safe assets, and liabilities to the investment in the bank. Equation (11') can be rewritten

$$(12') \quad R_3^t(1) = \frac{R_2(1)}{P_2} \hat{x}_2 + \hat{x}_1 - \hat{n} > 1.$$

Equation (12') states that the per unit contingent return of a bank share will depend on the combination of the risky asset, the safe

asset and the debt-capital ratios and that in state one the return will be greater than one.

In state two $R_2(2)$ was shown to be zero in the previous section, which implies that

$$(13) \quad R_3^t(2) = \hat{x}_1 - \hat{n}.$$

If the debt-capital ratio (\hat{n}) is greater than the specie-capital ratio (\hat{x}_1), $R_3^t(2)$ will be negative. Since $R_3^t(2)$ can only be negative under certain liability provision, the type of liability will influence the contingent returns in state two.

In summary, the general return of a free bank share depends on the free bank's portfolio and the stockholder's liability. The free bank's portfolio consists of risky and safe assets; the same assets that the investor could purchase outside the bank. This implies that the returns of the free bank could be duplicated by the investor if he were to purchase the same portfolio as the bank. However, the investor assumes unlimited liability for the portfolio. This may not be the case if the investor purchased the portfolio through the bank. As a stockholder, his liability may be limited by law. Therefore, there may be certain cases in which the investor can take advantage of the limited liability privilege. These cases arise when the amount of liabilities that can be issued by the free bank exceed the personal liability of the stockholders. It will be shown in the next section that the amount of liabilities issued by the bank and the type of liability of the stockholder will influence the per unit return on the bank shares and the portfolio of the free bank.

SECTION IV.1 Impact of the Liability Provision on the Per Unit Return of a Free Bank Share and on the Free Bank's Portfolio

In order to examine the impact of the liability provision on the per unit return of a bank share and on the free bank's portfolio, the bank shares were, in the previous section, introduced into the two security-two state model. Introducing free bank shares into the two security-two state model means that there are now three return vectors spanning two states of nature:

	Asset Returns		
	V_3	X_2	X_1
State One	$\begin{matrix} \bar{t} \\ R_3(1) \end{matrix}$	$R_2(1)/P_2$	$\begin{matrix} \bar{t} \\ 1 \end{matrix}$
State Two	$\begin{matrix} \bar{t} \\ R_3(2) \end{matrix}$	0	$\begin{matrix} \bar{t} \\ 1 \end{matrix}$

Since the returns associated with V are dependent on the free bank's purchase of X_2 and X_1 , the return vector of V may be a linear combination of the return vectors X_2 and X_1 :

$$(14) \quad \begin{bmatrix} \bar{t} \\ R_3(1) \\ \bar{t} \\ R_3(2) \end{bmatrix} = a \begin{bmatrix} R_2(1)/P_2 \\ 0 \end{bmatrix} + b \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

where $a > 0$ and where $a + b = 1$.¹¹ If the relationship in Equation (14) holds, V is said to be a redundant asset. This implies the returns associated with the free bank can be duplicated by the investor without purchasing a free bank share.

The return vector associated with V , however, may not be duplicated in all cases. Since the returns of V are also determined by the stockholder's liability, there may exist certain cases in which the return vector of V dominates the return vector of X_2 . The return vector of V is said to dominate return vector X_2 when:

$$(15) \quad R_3^t(\theta) > a[R_2(\theta)/P_2] + b$$

for all θ , with the strict inequality holding for at least one θ , and for at least one portfolio allocation (a,b) , where $a > 0$ and where $a + b = 1$.

Equation (15) states that the return vector of the free bank asset dominates the return vector of the risky asset and specie when the allocation of one dollar of wealth to the free bank asset yields a higher return than the allocation of one dollar of wealth between the risky asset and specie in one state, and at least the same return in the other state. If the return vector V is found to dominate the return vector of X_2 and X_1 , it implies that the investor cannot duplicate the returns of the free bank by his personal purchase of X_2 and X_1 .

The investor's personal purchases can be depicted graphically. Given that the investor has one dollar of wealth that must be divided between the risky and safe asset, his returns are depicted as

$$a[R_2(\theta)/P_2] + b$$

where $a + b = 1$.

If the investor were to place his entire dollar in the safe asset (i.e., $b = 1$), his return in both states would be one dollar. This result is shown in Figure 20, as point B. Thus B represents the returns in both states when the investor purchases only the safe asset (specie).

If the investor were to purchase only the risky asset (i.e., $a = 1$), his return in state two would be zero, since by definition $R_2(2) = 0$. But in state one we know that $R_2(1)/P_2$ is greater than one. Thus on Figure 20, point A represents the combination of returns in state one and state two when $a = 1$. The line segment connecting points A and B show the linear combination of returns that would occur when the values of a and b vary, while continuing to satisfy $a + b = 1$. This line segment represents all possible returns the investor can achieve given he invests one dollar. If the investor were allowed to borrow and invest an additional amount of money in the risky asset, i.e., $b < 0$, his possible returns would be represented by the extension of segment AB, below A.

We are now ready to discuss the impact of the stockholder's liability provision on the return of the free bank share, on the portfolio of the free bank and on the investor's portfolio. Unlimited, limited and double liability will be examined under separate headings.

A. Unlimited Liability

When the free banker faces unlimited liability, his returns will be exactly the same whether he invests in the free bank asset or whether he

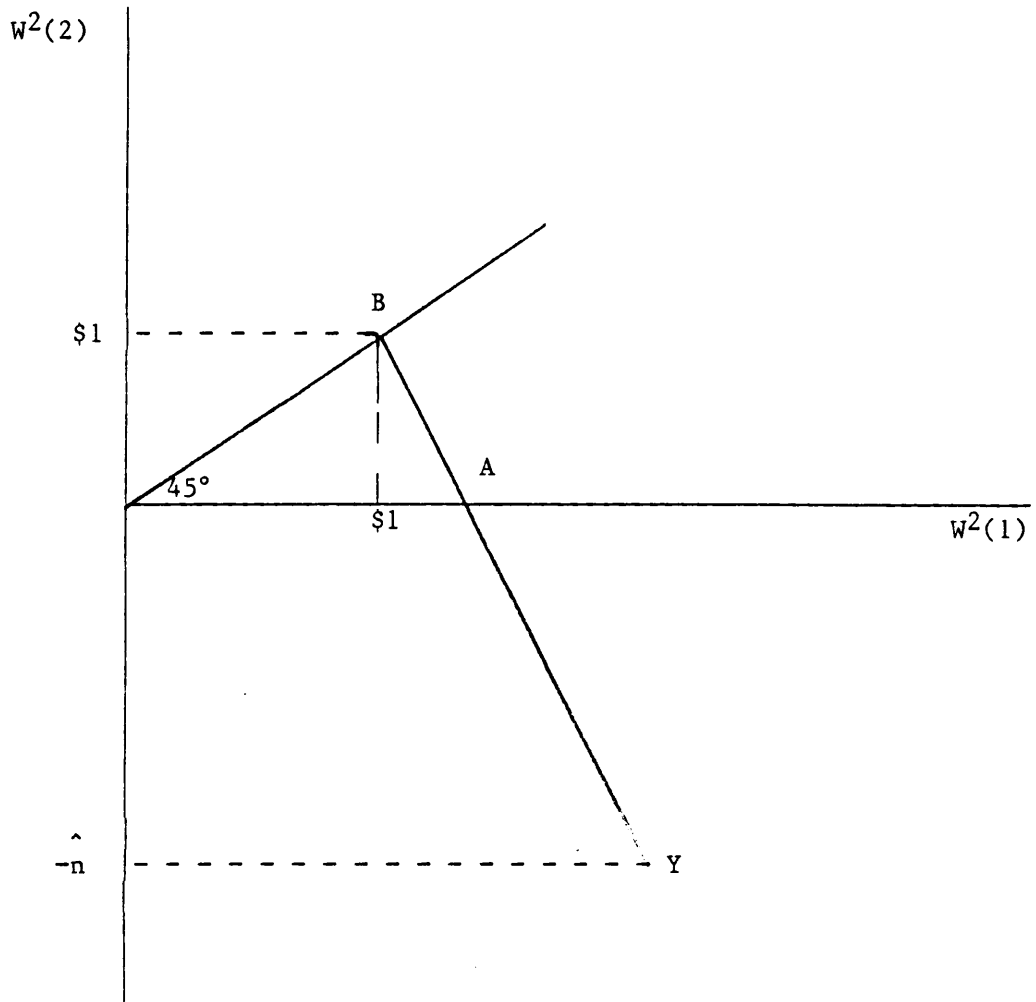


FIGURE 20

Contingent Returns of One Dollar of Wealth From Either the Free Bank Asset or the Investor's Portfolio; Given the Free Bank Investor is Subject to Unlimited Liability

invests personally in the risky asset and specie. Thus bank stock will be a redundant asset.

The redundancy of bank stock in the unlimited liability case is demonstrated as follows. When the investor faces unlimited liability, his returns can be expressed as:

$$(16.1) \quad R_3^u(1) = \frac{R_2(1)}{P_2} \hat{x}_2 + \hat{x}_1 - \hat{n},$$

in state one and

$$(16.2) \quad R_3^u(2) = \hat{x}_1 - \hat{n},$$

in state two.

The investor can duplicate the free banks return in state one by purchasing the same proportion of risky assets to capital as the free bank and by issuing the same proportion of net liabilities to capital as the free bank, where net liabilities is equal to the difference between liabilities and specie (i.e., $b = \hat{x}_1 - \hat{n}$). Therefore, the investor's state one return is equal to:

$$\frac{R_2(1)}{P_2} \hat{x}_2 + \hat{x}_1 - \hat{n}$$

and his state two return is equal to

$$\hat{x}_1 - \hat{n}.$$

This result can be shown graphically. In Figure 20 the free bank's returns are depicted by line segment BY, given that the free bank issues liabilities \hat{n} . If the free banker invests the entire \hat{n} plus the one

dollar of investor's capital in the risky asset, the returns the bank receives are represented by point Y. In state one the bank will receive a return greater than the return at point A, but in state two the bank will lose \hat{n} . Since the free banker is liable for the bank's losses the free banker will also suffer losses in an amount equal to \hat{n} .

Alternately, if the free banker invests the entire amount of \hat{n} plus the one dollar of investor's capital in specie, the returns the bank will receive are represented by point B. Thus, the free bank's return portfolio is represented by the line segment BY with the exact location of the return depending on the bank's allocation between risky and safe assets. This can be represented as

$$R_3^u(\theta) = \frac{aR_2(\theta)}{P_2} + b.$$

In state one this equation can be rewritten as

$$R_3^u(1) = \frac{aR_2(1)}{P_2} + b$$

since by definition $R_1(1)$ equals one. In state two the equation would become

$$R_3^u(2) = a(0) + b$$

since by definition $R_2(2)$ equals zero. Thus, under unlimited liability equation (14) is satisfied and the free bank asset is considered redundant.

B. Limited Liability

Under the limited liability provision, the investor's returns from his personal investment in the safe and risky assets will be compared to his returns from his investment in the free bank asset, recalling that under limited liability the investor is only liable for the amount he has invested in the bank. His personal investment returns are depicted in Figure 20 and his vector of returns from an investment in the free bank asset can be determined in a similar manner. If he invests his dollar in the bank and the free banker divides the dollar between the safe asset (specie) and the risky asset, his returns would be represented by:

$$(17.1) \quad R_3(1) = \frac{R_2(1)}{P_2} \hat{x}_2 + \hat{x}_1 - \hat{n}$$

in state one and

$$(17.2) \quad R_3(2) = \hat{x}_1 - \hat{n}$$

in state two.

The return in state one (Equation 17.1) is identical to the return he would receive if he were under unlimited liability, or if he purchased the same portfolio himself. The return in state two could vary, depending upon the amount of specie held by the bank. If the free banker purchases specie such that \hat{x}_1 is greater than \hat{n} (i.e., when net liabilities are positive) the return in state two will be positive and can be duplicated by the investor. Point S in Figure 21 represents such a case. If, however, the free banker purchases specie such that \hat{x}_1 is

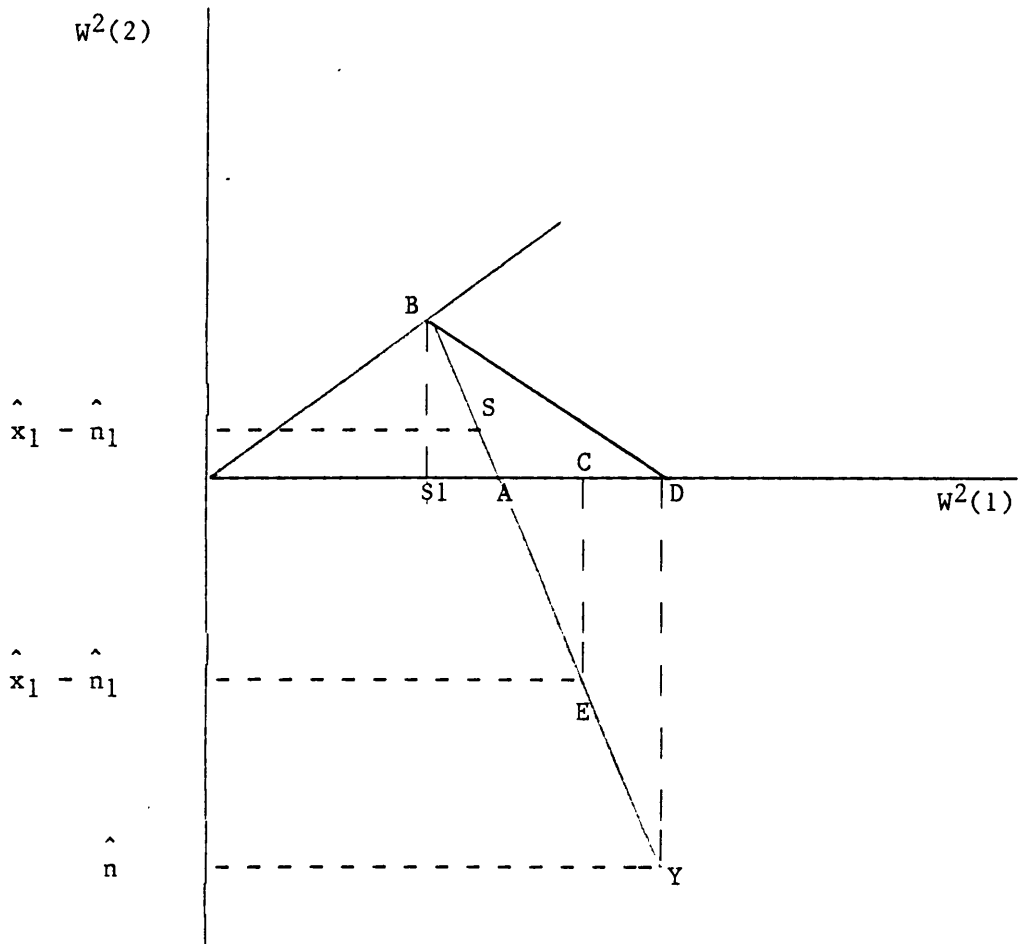


Figure 21

Contingent Returns of the Free Bank Asset; Given the Free Bank Investor is Subject to Limited Liability

less than \hat{n} (i.e., when net liabilities are negative), the return in state two will be negative. Point E in Figure 21 represents such a case. But since the free banker faces limited liability (i.e., he is not liable for the bank's losses) his return in state two will be zero. Thus point C represents the returns of the free bank investor.

Therefore, whenever \hat{x}_1 is less than \hat{n} , the returns of the free bank share are represented by line segment AD. Point A represents the returns when $\hat{x}_1 = \hat{n}$, while point D represents the returns when $\hat{x}_1 = 0$.

Whenever \hat{x}_1 is less than \hat{n} , the investor cannot duplicate the free bank's returns in state two by issuing his own liabilities. If the investor were to issue liabilities equal to the net liabilities of the bank ($\hat{x}_1 - \hat{n}$), he would be personally liable for the losses, that is, the investor would be restricted to line segment AY, whereas the free banker can attain line segment AD. This means that whenever the free bank's return in state one equals the investor's return, i.e., when:

$$R_3^L(1) = \frac{aR_2(1)}{P_2} + b$$

the free bank's return in state two will exceed the investor's return in state two, i.e.,

$$R_3^L(2) > \frac{aR_2(2)}{P_2} + b.$$

Points D and Y represent such a case where D represents the free banker's return and Y represents the investor's return. Thus, when the investor assumes liabilities in order to equal the state one returns of the free

bank, equation (15) is satisfied and the free bank asset strictly dominates the returns of the investor.

Three points should be noted concerning the preceding discussion. First, as long as $\hat{n} > 0$, $\hat{x}_1 = 0$ will yield the highest possible return of the free bank asset in state one. This states that the highest return in state one occurs when the free bank fully levers its position (i.e., when the bank purchases risky assets equal to its capital and notes issued). In this example, the greatest return in state one is represented at point D.

Secondly, the investor can divide his portfolio between specie and the free bank asset, in which case his returns would be

$$(18) \quad aR_3^L(\theta; \hat{x}_1 = 0) + bR_1(\theta),$$

where $R_3^L(\theta; \hat{x}_1 = 0)$ is the per unit return of a free bank share, given $x_1 = 0$ and where $a + b = 1$. Equation (18) states that the investor can allocate his dollar of wealth between specie and the free bank asset, where the free bank portfolio contains strictly risky assets. Equation (18) can also be represented graphically. In Figure 21, the linear combination of specie and free bank asset is represented as line segment BD.

Lastly, the investor will only purchase the risky asset through the free bank. The limited liability of the bank stockholder protects the investor from personal liability. The free banker can lever the bank's position without any repercussion if state two is revealed. This means

that the investor will receive a higher return in state two from the free bank asset than from the risky asset, given that the returns in state one are the same for both assets. Therefore the returns of the free bank asset dominate the returns of the risky asset.

C. Double Liability

The results for double liability are much the same as the results for limited liability. In state one the return of the free bank asset is identical to $R_3^1(1)$:

$$R_3^d(1) = \frac{R_2(1)}{P_2} \hat{x}_2 + \hat{x}_1 - \hat{n}.$$

Again the investor can duplicate this return if he issues the same amount of net liabilities $(\hat{x}_1 - \hat{n})$.

However, in state two the returns of the free bank asset and the returns of the investor's purchase of risky and safe assets may differ under certain cases. The returns will not differ when the net liabilities are less than the personal liability of the investor (i.e., when $\hat{x}_1 - \hat{n} > -1$). Since the free banker purchased one dollar of capital, he is personally liable for one dollar (-1). This is illustrated in Figure 22. Given that $\hat{n} > 1$ and that the bank is holding specie \hat{x}_1 such that $\hat{x}_1 - \hat{n} > 1$, the return on the free bank share will lie on line segment BP. Point E represents such a point and is obtainable by the investor through his personal investment in the risky asset. Thus, when $\hat{x}_1 - \hat{n} > 1$, the returns can be duplicated by the investor.

However, when $\hat{x}_1 - \hat{n} < -1$, the investor cannot duplicate the returns of the free bank asset. Since the free banker's loss is limited to his investment in the bank (i.e., the one dollar of capital) the maximum loss in state two is limited to -1 . Therefore, any portfolio combination of the free bank for which $\hat{x}_1 - \hat{n} < -1$ will yield a loss in state two equal to -1 and can be represented by line segment PD in Figure 22. Whereas the free banker's loss cannot exceed -1 , the investor on his own can incur losses in state two up to the amount that he borrows. Point S and point T in Figure 22 represent such a case, where S represents the free banker's return and T represents the investor's return. As in the case of limited liability, equation (15) is satisfied. At point S the return for state one is the same as at point T. But in state two, the return at S exceeds the return at T. Thus, the free bank asset dominates the investor's personal purchases of the risky asset.

It should be noted that in this case there is a greater restriction on \hat{n} than in the previous case of limited liability. Under limited liability \hat{n} had to exceed \hat{x}_1 for dominance to exist. In this case \hat{n} must exceed \hat{x}_1 plus the value of the investor's capital. If \hat{n} is less than this value, say \hat{n}^1 , then the return on the free bank asset will be the same as the return on the risky asset. Point E represents such a point and illustrates that when \hat{n} is less than the amount of the investor's capital, the free bank asset will be redundant. Also it should be noted that as long as $\hat{n} > 1$, $\hat{x}_1 = 0$ will yield the highest possible return of the free bank asset in state one. Point D in Figure 22 represents this point.

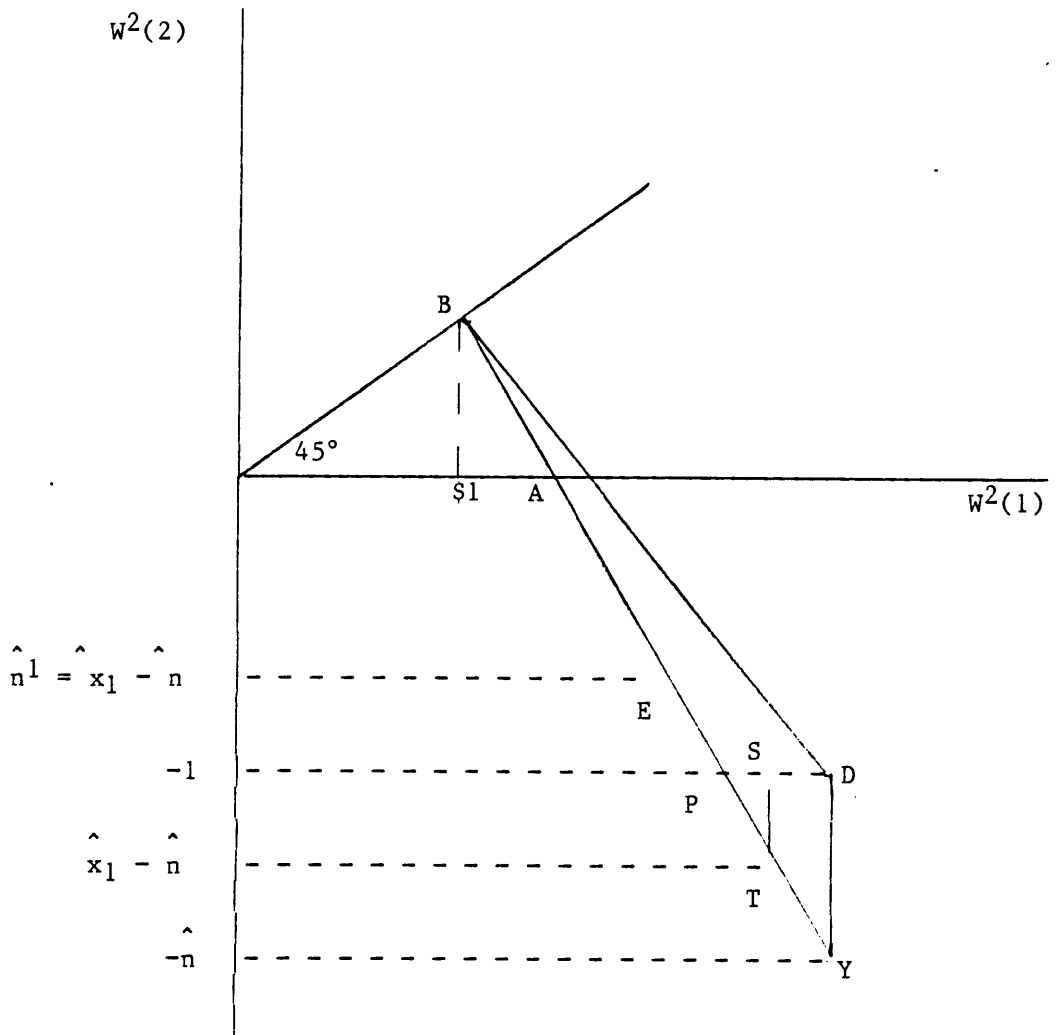


FIGURE 22

Contingent Returns of One Dollar of Wealth Given The Free Bank
 Investor is Subject to Double Liability

In summary, we find that the free bank's portfolio would be altered considerably when the amount of net liabilities issued by the bank could exceed the amount of personal liability of the stockholders. If the bank was not restricted to holding a proportion of specie to the amount of notes issued, the maximum return in state one would occur when $\hat{x}_1 = 0$. Under such conditions the bank's portfolio would contain strictly risky assets. Therefore, when the amount of liabilities exceeds the amount of personal liability, the bank's portfolio would contain strictly risky assets and the free bank share would dominate the risky asset. When the amount of liabilities is less than the amount of personal liability, the bank's portfolio could be duplicated by the investor without purchasing the free bank shares. These results are summarized in Table 13.

D. Summary

The theory presented above suggests that changes in the liability provision will affect the opportunity set of the investor. Under certain assumptions about the investor's utility function and under strict assumptions about the elasticities of the supply of bank capital and the supply of risky assets, the effect of the change of the liability provision on the decision to purchase free banks shares and on the portfolio of the free bank may then be determined.

Any such conclusions must be tempered with the understanding that the theory is a partial equilibrium analysis, however the theory only analyzes the effect of the liability provision on the supply of free bank capital and the purchase of risky assets when prices on the bank capital and on the risky assets are assumed to be exogenous. It is likely that

TABLE 13

FREE BANK SHARES EFFECT ON THE MARKET GIVEN THE AMOUNT OF LIABILITIES

Liability	$\hat{n} < 1^*$	$\hat{n} > 1^*$
Limited	Dominant	Redundant
Double	Redundant	Dominant
Unlimited	Redundant	Redundant

*Assume investor purchases one share of free bank stock.

the change in the liability provision would affect the demand for bank capital and would result in a change in the value of the bank's equity shares. In addition, it is likely that the change in the liability provision would also affect the bank's ability to purchase risky assets and issue bank notes, and would result in a change in the price of risky assets and bank notes. Therefore, it is difficult to draw any definitive implications from this partial equilibrium analysis. A general equilibrium model may provide additional insight into the effect of the liability provision on the purchase of free bank shares, but such an understanding is beyond the scope of this dissertation.

FOOTNOTES

¹The analysis will follow the work by Arrow [1964], later to be extended by Hirshleifer [1965]. Others have applied this work to security valuation and bank operations; Sharp [1978], Myers [1968], and Kareken & Wallace [1978].

²Each state of nature is interpreted as a bundle of events. For example, one possible state could include a war in the Middle East, a flood in Kansas, and a drought in Ethiopia. Another state would be price increases of 5%, money stock decline of 10%, and the stock market was unchanged.

³There is no restriction on the value of x_i . x_i could be negative in which case the investor is selling short x_i .

⁴The gross nominal contingent rate of return is equal to one plus the contingent rate of return: $R_i(\theta) = 1 + r_i(\theta)$.

⁵The construction of the expected utility function is subject to some restrictions as outlined in Luce and Raiffa [1957].

⁶Line AB can be extended beyond points A and B if the investor sells short x_2 or x_1 , respectively.

⁷Line AN represents the linear combination of the purchases of X_1 and X_2 . A change in the combination of X_1 and X_2 is shown by a movement along line AB; this can be shown by differentiating the budget constraint in period one (assuming W^1 and P_2 are constant):

$$(A) \quad 0 = P_2 dX_2 + dX_1.$$

The change in portfolio will result in a change in the wealth contingent claims in period 2 or

$$(B) \quad dW^2(1) = R_2(1)dX_2 + dX_1$$

and

$$(C) \quad dW^2(2) = dX_1,$$

From equation (A)

$$(D) \quad dX_2 = -\frac{dX_1}{P_2}$$

Substituting (D) into (B) will yield

$$(B') \quad dW^2(1) = -R_2(1) \frac{dX_1}{P_2} = dX_1.$$

Substituting (C) into (B') and rearranging will yield:

$$\frac{dW^2(2)}{dW^2(1)} = \frac{P_2}{R_2(1) - P_2}.$$

⁸A fair bet is when the price of a gamble equals the expected payoff. The expected payoff of one share of the risky asset is equal to $\pi(1)R_2(1) + \pi(2)R_2(2)$. Since $R_2(2) = 0$, the expected payoff is equal to $\pi(1)R_2(1)$. Therefore, a fair bet would be when $P_2 = \pi(1)R_2(1)$. Multiplying the left hand side by $(\pi_1 + \pi_2)$ and collecting terms yields

$$(A) \quad P_2(\pi_2) = \pi(1)(R_2(1) - P_2).$$

Dividing equation (A) by $\pi(2)$ and $(R_2(1) - P_2)$ yields

$$\frac{P_2}{R_2(1) - P_2} = \frac{\pi(1)}{\pi(2)}.$$

⁹K.J. Arrow, "The Theory of Risk Aversion," pp. 90-120.

¹⁰This implies that the investor perceives the bank as an alternative means of purchasing assets. A change in any of the factors discussed in the previous section will cause a change in the bank's portfolio.

¹¹When b is negative, the investor is selling specie short.

CHAPTER V

TESTING THE IMPACT OF THE LIABILITY PROVISION ON THE BANKING MARKET: THE NEW YORK EXPERIENCE

The theory presented in the previous section suggests that the effects of the liability provision on the banking market cannot be isolated. Although the impact of the liability provision is uncertain, our intuition suggests that an increase in stockholders liability will reduce the incentive of investors to purchase free bank shares and will reduce the incentive of free banks to purchase risky assets. Both of these conjectures will be tested in this chapter using the New York free banking experience data.

New York's banking experience was selected for two reasons. First, the New York experience provided the most complete data with which to test the hypotheses. New York's free banking experience lasted for 25 years with data available for all but two years. Second, New York changed its liability provision from limited to double midway through its free banking period. Since the theory in Chapter IV did not yield conclusions about the purchase of free bank shares and the portfolio of a free bank under limited and double liability provisions, the test of the New York free banking market in this chapter will be used to gain insight into the possible effects of the liability provision on the banking market.

The test of the liability provision's impact on the number of banks in the market will be presented in Section V.1. Section V.2 will present the test of the liability provision's impact on the portfolio of

the bank. In both sections a discussion on the testing procedure and the data will be presented.

Section V.1 Testing the Impact of the Liability Provision on Entry in the New York Banking Market

The hypothesis that will be tested in this section is that the change in the liability provision from limited to double will reduce the number of free bank shares purchased. The theory in Chapter IV suggests that other factors, such as wealth, expectations, and interest rates, will influence the amount of free bank shares purchased.¹ In order to filter out the effects of these variables, so as to isolate the liability provision's impact on the banking market, the application of ordinary least squares regression analysis is necessary. The regression model will be presented first, followed by the empirical results.

The Model

The general regression model will take on the following form:

$$FBS_t = B_0 + B_1 WLTH_t + B_2 EXPECT_t + B_3 INTRT + B_4 DUML_t + e_t,$$

where: FBS_t is the change in the amount of free bank shares purchased in time period t ,

$WLTH_t$ is the wealth in time period t ,

$EXPECT_t$ is the expectations of the banking market in time period t ,

$INTRT$ is the average interest rate in time period t ,

$DUML_t$ is the dummy variable representing the liability provision in time period t , and

e_t is the error term.

The dependent variable (the amount of free bank shares purchased) can be represented by two variables: the number of free banks in the market (i.e., total banks operating) or the amount of paid-in capital.² A regression will be run on each of these possible empirical counterparts of the dependent variable. The first regression equation will use total banks operating as the dependent variable (denoted as $TBOP_t$) and the second regression equation will use paid in capital as the dependent variable (denoted as $AGGCAP_t$).

An adjustment was made to the number of banks operating and the aggregate capital in the banking market. During the free banking period, charter banks--banks that were allowed to operate prior to the enactment of the free banking laws--could operate under the free banking law as long as they met the requirements of a free bank. Many charter banks switched over to the free banking market when their charters expired. Therefore, the charter banks that switched over to the free banking market were deducted from the total free banks and the aggregate free banking capital. Including these banks in the totals would overestimate the total number of banks operating and the aggregate banking capital.

As noted above the model has four independent variables: wealth, expectations, asset prices, and the dummy variable. The data for each variable will be discussed under separate subheadings.

Wealth: Net exports will be used as a proxy variable for wealth.³ The reason for using net exports is that there is a lack of data for the period. GNP figures were not reported on a yearly basis; those that were reported accounted for only two observations. Net exports, on the

other hand, were recorded on a yearly basis by the federal government.⁴ Open economy macroeconomic theory suggests a strong relationship between net exports and real income growth.⁵ The theory suggests that a country that is growing rapidly tends to increase its imports relative to its exports, resulting in a current account deficit. Therefore, a trade deficit is associated with an increase in real wealth and a trade surplus is associated with a decrease in real wealth.

The theory from Chapter IV shows that an increase in wealth will increase the number of free bank shares purchased. Since an increase in net exports is associated with a decrease in real wealth, an increase in net exports will be associated with a reduction in the number of free bank shares purchased and a decrease in net exports will be associated with an increase in free bank shares purchased. Thus, the sign of the net export coefficient is expected to be negative. In the model net exports will be denoted as $NEXPT_t$.

Expectations: The proxy variable for the expected state of nature is the population of New York State in time period $t-1$. POP_{t-1} denotes the population in time period $t-1$. This variable indicates the likelihood of growth in the banking market in time period t . The larger the population in $t-1$, the greater would be the expectation of banking profits in time period t . Therefore, the sign of the coefficient is expected to be positive.

Interest Rates: The interest rates of commercial paper from the Boston market will be used as a proxy for the general interest rate

level.⁷ INTRST_t will denote the interest rate of the commercial paper.⁸ The commercial paper interest rate series is used as a proxy for asset prices because of the completeness of the series; commercial paper interest rates from Boston are available from 1838 to 1863 on a monthly basis. Since monthly observations are available for most periods, the average interest rate of the commercial paper during time period t will be used.

The effect of interest rates on the amount of free bank shares purchased is uncertain, unless certain assumptions are made about the investors' preferences. The theory in Chapter IV states that a decrease in risky asset prices should increase the number of free bank shares purchased, assuming that the investor exhibits decreasing absolute risk aversion. Since there exists an inverse relationship between interest rates and asset prices, an increase in the interest rate of a risky asset should increase the amount of free bank shares purchased. Therefore, under this assumption, the sign of the interest rate coefficient is expected to be positive.

Liability Provision: The liability provision will be represented by a dummy variable. The dummy variable, denoted as DUML_t , will take on the value of zero for the years that the free bank operated under the limited liability provision and will take on the value of one for the years that the free bank operated under the double liability provision. Since double liability discourages the purchase of free bank shares, the coefficient is expected to be negative.

In summary, two regression equations will be estimated:

$$(1) \quad TBOP_t = E_0 + E_1NEXPT_t + E_2POP_{t-1} + E_3INTRST_t \\ + E_4DUML_t + v_t,$$

and

$$(2) \quad AGGCAP_t = D_0 + D_1NEXPT_t + D_2POP_{t-1} + D_3INTRST_t \\ + D_4DUML_t + u_t$$

where v_t and u_t are the error terms of the regression equations.

The data used in regression equation (1) and (2) will be for the years 1843 to 1860. Although data on the independent variables data are available prior to 1843, aggregate capital figures are not available prior to this date. The years after 1860 have been deleted because the data show large distortions due to the Civil War. The data for the dependent variables are not reported on a yearly basis. The time period between each observation varies from three months to twenty-one months. Table 14 shows the breakdown of the periods. Since the data for the independent variables are not reported for the same interval as the dependent variables, the data for the independent variables must be adjusted to these intervals. Net exports which are reported on a yearly basis are divided into monthly data. The monthly data are then adjusted to such that the net export figure represents the flow of net exports

TABLE 14

Dates of the Observations for the Dependent Variables

Observations	Date
1	11/1843
2	11/1844
3	11/1845
4	11/1846
5	2/1847
6	3/1848
7	12/1849
8	12/1850
9	6/1852
10	12/1853
11	9/1854
12	9/1855
13	9/1856
14	9/1857
15	12/1858
16	12/1859
17	12/1860

for the year prior to the date reported. Population data are only available once every five years. The observations for the intervening years are calculated by interpolating the available data on a straight line basis. Once the yearly data are obtained, the observations are divided in the same manner as net exports. Since interest rates are available on a monthly basis, the average interest rate in the interval is used.

The next section will present the empirical estimates of the model. The concern of this study is the coefficient of the dummy variable. From the theory the coefficient of the dummy variable is expected to be negative.

The Empirical Results

The hypothesis that will be tested is that the number of free banks and the amount of free bank capital will decrease under the double liability provision relative to the number of free banks and the amount of free bank capital under the limited liability. This hypothesis can be tested by examining the coefficient of the dummy variable. Specifically, the null hypothesis states that the coefficients of the dummy variable (D_4 and E_4) are greater than or equal to zero. The alternative hypothesis states that the coefficients of the dummy variables (D_4 and E_4) are less than zero.

The results of the regression are

$$(3) \quad \text{TBOP}_t = -285 - .388 \text{NEXPT}_t + 131 \text{POP}_{t-1} + 6.68 \text{INTRST}_t \\ \quad \quad \quad (-6.87) \quad (-1.56) \quad \quad (8.41) \quad \quad (0.861) \\ \quad \quad \quad + 11.9 \text{DUML}_t + u_t. \\ \quad \quad \quad (0.681)$$

$$R_2 = .976, F_{4,11} = 125, \text{ and } DW = .964;$$

and

$$(4) \text{ AGGCAP}_t = -173 + 0.54 \text{ NEXPT}_t + 73.5 \text{ POP}_{t-1} - 1.31 \text{ INTRST}_t \\ (-7.79) \quad (-0.132) \quad (8.81) \quad (-1.04) \\ - 7.07 \text{ DUML}_t + v_t \\ (-1.04)$$

$$R^2 = .956, F_{4,11} = 65.8, \text{ and } DW = .947,$$

where the () are the t statistics of the coefficients.

The results of equation (3) show that there exists a statistically significant relationship between the dependent variable and independent variables. The F statistic tests the null hypothesis that all the coefficients of the regression equation are equal to zero against the alternative hypothesis that at least one coefficient is not equal to zero. Rejecting the null hypothesis implies that the independent variables significantly explain the variation in the dependent variable. The F-statistic of equation (3) indicated that the null hypothesis can be rejected at better than the 5 percent significant level. Although 98 percent of the total variation is explained by the independent variables, only variable is statistically significant at the 10 percent level: POP.⁸ The Durbin-Watson test indicates that serial correlation may be present in the error terms.⁹

The coefficient of the liability provision (DUML) in Equation (3) shows that at the 90 percent confidence level the value is not significantly different from zero. This results rejects the hypothesis that the change in the liability provision from limited to double

reduced the total number of banks operating in the free bank market. It also implies that there is no significant difference between total banks operating under the limited liability and total banks operating under the double liability.

The results of regression equation (4) reinforce the previous findings. Although 98 percent of the variation of the regression equation can be explained by the dependent variables, only one variable is significant at the 10 percent level: POP.¹⁰ The null hypothesis that the estimated coefficient of the dummy variable is equal to zero cannot be rejected, implying that the change in the liability provision had no significant effect on bank capital accumulation.¹¹ Therefore, the results of both equations present evidence against the hypothesis that an increase in the personal liability of the stockholders would reduce the purchase of free bank shares.

Another way to test the hypothesis is to use the total number of free banks per capita (denoted as TBCAP) and the amount of banking capital (denoted as BCPCAP) as the dependent variables.¹² The results of the second run of the regression model using total banks per capita and bank capital per capita as the dependent variables are given below:

$$(5) \quad \begin{aligned} \text{TBCAP}_t &= 16.04 - .0961 \text{NEXPT}_t + 1.30 \text{INTRST}_t \\ &\quad (2.02) \quad (-.772) \quad (-1.43) \\ &+ 26.25 \text{DVML} + u_t \\ &\quad (4.32) \end{aligned}$$

$$R^2 = .882, F_{3,11} = 32.7 \text{ and } DW = .769.$$

and

$$\begin{aligned}
 (6) \quad BCPCAP_t &= 3.15 + .037 NEXPT_t + .108 INTRST_t \\
 &\quad (.588) \quad (.447) \quad (.163) \\
 &\quad + 13.54 DUML + v_t \\
 &\quad (3.31)
 \end{aligned}$$

$$R^2 = .698, F_{3,11} = 10.1, \text{ and } DW = .769.$$

The results of Equations (5) and (6) indicate that the joint hypothesis specifying that the coefficients of the independent variables are equal to zero can be rejected. In both equations, the dummy variable is statistically significant at the 10 percent level. However, the sign of the coefficient is contrary to what is expected. Since the dummy variable does not have the anticipated sign, a more general test will be employed. The preceding regression did not allow for differences in the error structures and differences in the coefficients of the independent variables. The general test will allow the whole structure to change, that is allowing the coefficients and the error term to differ. This test can be performed by dividing the data set into prelaw and postlaw periods, and running separate regression for each period. The general regressions that will be run are:

$$\text{Dependent Variable} = F_0 + F_1 NEXPT + F_2 INTRST + z_t$$

for prelaw data and

$$\text{Dependent Variable} = G_0 + G_1 NEXPT + G_2 INTRST + r_t$$

for post law data, where z_t and r_t are the error terms of the prelaw and postlaw periods respectively. A Chow test will be employed in order to determine whether the intercept and the coefficients of the regression

equations are significantly different from each other.¹³ The null hypothesis states that (jointly)

$$F_0 = G, F_1 = G_1, \text{ and } F_2 = G_2.$$

The alternative hypothesis states that at least one of the coefficients differs. The appropriate distribution to test the hypothesis is the F distribution. If the F-statistic is greater than the critical value, the null hypothesis can be rejected. This implies that the error structures of the two regression equations are significantly different and that the data should not be pooled.

The results of the regressions are given in Table 15. In each case, the null hypothesis that the coefficients and the intercept of the regression equations are equal can be rejected at the 5 percent level. Therefore, it may be inferred from these results that a structural change occurred.

One possible cause of the structural change could be the change in the liability provision. If the liability provision is the cause of the structural change, then the postlaw data examined under the prelaw structure should result in a higher amount of banks per capita and bank capital per capita than actually occurred. In other words, the change in the liability provision would have caused fewer banks per capita to be in operation and less banking capital per capita than would be expected from the prelaw structure.

TABLE 15
REGRESSION RESULTS ON PRE- and POSTLAW DATA

PRELAW						
Dependent Variable	Intercept	NEXPT	INTRST	R ²	D.W.	F _{2,4}
BCPCAP	3.99 (18.6)	-0.012 (-2.66)	0.032 (1.21)	.793	1.48	7.68
BKPCAP	16.6 (8.85)	-0.133 (-3.52)	1.35 (5.87)	.957	1.71	44.1

POSTLAW							
Dependent Variable	Intercept	NEXPT	INTRST	R ²	D.W.	F _{2,6}	F _{3,11} [*]
BCPCAP	19.4 (1.24)	0.076 (-4.95)	-0.054 (-0.027)	0.038	.314	.139	3.27
BKPCAP	44.4 (1.89)	-0.069 (-0.301)	1.26 (-0.301)	0.052	.052	.194	4.89

() t-statistic

F* Chow test statistic

When the postlaw data is inserted into the prelaw regression equation, the predicted per capita rate all are lower than the actual (see Table 16). This result reinforces our previous finding that the liability provision did not influence the amount of free bank shares purchased. Thus, it is possible that some other change in the market overcame the effect of the change in the liability provision.

In summary, the results of the regression analysis indicate that the liability provision did not deter purchases of free bank shares. The results did show that there was a structural change in the banking market after 1850 and that there was an upward shift in the free bank shares demand schedule.

Section V.2 Testing the Impact of the Liability Provision on the Portfolio of the Bank

New York's experience also provides us with an opportunity to examine the effect of a change in stockholder's liability on the bank's portfolio. Although the theory does not predict the impact of change in the liability provision from limited to double, it is hypothesized that an increase in the liability provision would reduce the incentive to purchase risky assets. Therefore, in this section an examination of the risky asset-capital ratios of the free bank under two different liability provisions will be presented.¹⁴ A means test will be used to see if there is any significant difference between the ratios of the two different periods. First, the data used in the test will be discussed, followed by the results of the empirical test.

TABLE 16

PREDICTED POSTLAW BCPCAP AND TBPCAP GIVEN PRELAW STRUCTURE

BCPCAP		
Year	Predicted	Actual
1850	4.55	5.91
1852	4.75	8.76
1853	4.00	14.1
1854	4.95	15.1
1855	4.72	15.7
1856	4.70	18.4
1857	4.68	21.1
1858	4.42	21.3
1859	4.56	20.7
1860	4.75	20.1

BKPCAP		
Year	Predicted	Actual
1850	30.2	39.4
1852	33.2	45.8
1853	36.3	59.0
1854	36.4	61.1
1855	33.6	58.8
1856	33.1	63.9
1857	34.1	62.7
1858	28.8	61.2
1859	29.5	61.0
1860	31.9	60.7

The Data

Fifty-one New York free banks were selected for the test. Two criteria were used in the selection of the banks. First, the banks had to operate continuously between 1846 and 1854, and second, the banks had to submit condition reports during this period.¹⁵ The period was chosen because the liability provision was changed in 1850 and because it was a period of stable or rising asset prices; thus, the influence of economic activity on the amount of risky assets purchased by the free bank would be minimized.¹⁶

The risky asset-capital ratios were computed from the condition reports of the free banks. The condition reports classified 14 different types of assets. Four of the assets--loan and discounts, state stocks, specie, and cash items--accounted for approximately 85 percent of the total asset portfolio. Specie and cash items were highly liquid assets and could be considered as safe assets. State stocks held by the free bank were primarily made up of New York and U.S. stocks. These stocks were some of the highest quality stocks in the market and were considered among the safest issued. Loans and discounts, however, were more speculative and thus will represent the risky assets of the free bank.¹⁷

One limitation of using loans and discounts as the risky asset is that the riskiness of the loan and discount portfolio depends on the composition of the portfolio; each loan and discount in the portfolio has a certain degree of risk. The bank can mitigate the risk of the loan and discount portfolio by diversifying. Therefore, the riskiness of the

loan and discount portfolio is not uniform among the banks and may not necessarily be the riskiest classified asset in the bank's portfolio of assets. For this study, however, it will be assumed that the loan and discount portfolio is more risky than the other assets.

In this section a means test will be utilized because the information on individual banks that would be needed for a regression analysis is not available. For each bank the mean loan and discount-capital ratio (from hereon denoted as ld-capital ratio), is calculated for the period prior to the law change (1846-1849) and for the period after the law change (1850-1854). This will yield two samples with 51 observations in each sample. The mean and variance of these samples will be compared in the next section.

Examining the Effects of the Liability Provision on the Free Bank's Portfolio

The hypothesis that will be tested is that the mean of the free banks ld-capital ratio prior to the law change is significantly different from the mean of the free bank ld-capital ratio after the law change:

$$(7) H_1: q_1 - q_2 < 0,$$

where q_1 is the prelaw sample mean and q_2 is the postlaw sample mean. Alternately, the null hypothesis states that there is no difference between the means of the two samples:

$$(8) H_0: q_1 - q_2 = 0.18$$

The testing procedure of the means of the two samples is based on the assumption that the population variances of the two periods are not equal. The t-statistic is estimated by using the separate estimates of the variances and is corrected for the degrees of freedom according to the method described by Brownlee.¹⁹

The t statistic, assuming that the population variances of the samples are not equal, is presented in Table 17. Given a significance level of 1 percent (critical value of 2.358), the t statistic of -2.67 indicates that the null hypothesis can be rejected. This implies that the mean of the ld-capital ratio after the change in the liability provision (1.8116) is significantly different from the mean of the ld-capital ratio prior to the change in the liability provision (1.3470). This finding suggests that the stockholders were more willing to accept risk under double liability than under limited liability. However, it cannot be asserted that the change in the liability provision induced the change in the portfolio. Other factors, such as market conditions or expectations, may have influenced the risky asset-capital ratio. Determining the cause of the change in the free bank's portfolio will be left up to future research.

Conclusion

The evidence indicates that investors were not deterred from purchasing free bank stock when the personal liability of the stockholders increased to double liability. This result is contrary to

TABLE 17

THE TEST OF THE EFFECTS OF THE LIABILITY PROVISION ON THE
LD-CAPITAL RATIO

LD-Capital Ratio	1846-1849	1850-1954
Mean	1.3470	1.8116
Standard Deviation	0.8275	0.9296
Sample Size	51	51
T-Statistic	-2.67	

what was expected. The evidence also indicates that the free banks increased the holdings of risky assets in proportion to the capital of the free bank under the double liability provision. This suggests that the stockholder of a free bank was willing to increase his return through the purchase of risky assets under a system that required additional liability of the stockholder. Although this results is counterintuitive, it may be understood if the additional return of the portfolio was required by the stockholder in compensation for the additional risk of the investment. However, since the regression analysis in Section V.1 suggests that there was a structural shift in the banking market after 1850, other factors not included in the theory may have induced the stockholders to hold riskier portfolios.

FOOTNOTES

¹The theory present in Chapter IV also included liabilities as a factor in the decision of purchasing free bank shares. However, the decision to purchase free bank shares is based on the amount of liabilities issued. Therefore, inclusion of the liabilities variables would present a simultaneity problem in the regression equation.

²The use of total banks operating as a measure of the amount of free bank shares purchased has some limitations. The expected decrease in the amount of free bank shares purchased can be realized by a decrease in bank capital formation or a decrease in the amount of paid-in capital of existing banks. Therefore the total number of banks operating may not account for the full effect of the liability provision.

³W.C. Ford, One Hundred Years of American Commerce 1875-1895, Vol. 1, C.D. De Pew (Ed.) (New York: D.O. Haynes and Co., 1895), p. 23.

⁴A major source of revenue for the federal government during this period was tariffs. Hence, accurate records of the imports and exports are available on an annual basis.

⁵R. Dornbusch and R. Fischer, Macroeconomics (New York: McGraw-Hill Book Co., 1984), p. 634.

⁶See Appendix II for the data source.

⁷Boston commercial paper rates were used because of the scarcity of N.Y. commercial paper rates. The data that is available for N.Y. commercial paper rates indicates that the rates between the two cities were similar. Source of the data was in Frederick R. Maccauly, "Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields, and Stock Prices in the United States since 1856," (New York: National Bureau of Economic Research, 1938).

⁸The t-statistic of the coefficient is also better than the 5 percent significance level.

⁹The equations were corrected for serial correlation and the results showed that the t-statistic of the dummy variable's coefficient was not significantly different from zero at the 10 percent significance level.

¹⁰The t-statistic of the coefficient is also better than the 5 percent significance level.

¹¹The equations were corrected for serial correlation and the results showed that the t-statistic of the dummy variable's coefficient was not significantly different from zero at the 10 percent significance level.

¹²Since the dummy variable of the aggregate dependent variable regressions were not significant, the general test was not performed on them.

¹³Gregory C. Chow, "Test of Equality Between Sets of Coefficients in Two Linear Regressions," Econometrica, Vol. 28, No. 3 (July 1960), pp. 591-605.

¹⁴The theory states that the amount of liabilities would increase and that the additional liabilities would be used to purchase risky assets; the bank would hold no safe assets. In reality, this is not the case; banks hold some portion of the portfolio in safe assets. Therefore, total liabilities may not necessarily have to increase in order to maintain dominance; an increase in the amount of risky assets (or an increase in the amount of net liabilities) would be the appropriate test.

¹⁵Only 7 banks did not meet this requirement. Thirty-one out of the 51 banks operated for at least 20 years.

¹⁶The composition of the case items entry is uncertain. For this study it is assumed that it is a liquid (and therefore a safe) asset.

¹⁷H.E. Miller, Banking Theories in the United States Before 1860 (Cambridge: Harvard University Press, 1927), p. 27.

¹⁸Since the theory contends that the difference between the means is negative, a one tail test is appropriate.

¹⁹The t-statistic given that the variances are different is

$$t = (p_1 - p_2) / \left(\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2} \right)^{1/2}$$

where s_i is the standard deviation of the i th sample and where N_i is the number of observations of the i th sample. The degrees of freedom are approximated by (Brownlee, 1965)

$$F = \left[\frac{c^2}{N_1 - 1} + \frac{(1 - c)^2}{N_2 - 1} \right]$$

where

$$c = \frac{\text{var}(p_1)}{\text{Var}(p_1 + p_2)}$$

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APPENDIX I

SUMMARY OF THE MAJOR FREE BANKING PROVISIONS
IN SEVEN FREE BANKING STATES

LIABILITY PROVISION	VIRGINIA	INDIANA	LOUISIANA	MINNESOTA
Failure to Redeem Grace Period	1851 10 days	1852 30 days	1853 3 days	1858 A&B 40 days
Interest on Notes	1851 12%	1855 10%	1853 12%	1858 A&B Assessed by Authority
Penalty to Bank	1/2% on capital stock per month	None	None	None
EQUITY RESTRICTIONS				
Minimum Capital	Depends on Charter	1852 \$50,000	1853 \$100,000	1858 A&B \$25,000
Maximum Capital	Depends on Charter	Open	Open	A&B Open
Liability	1851 Double	1852 Double	1853 Double or unlimited	1858 A&B Triple
Liability: After Sale or Transfer	None	One Year	None	A&B One Year

The first law required stockholders to submit personal bonds equaling one-fourth of the circulation for additional security. The amended version gave the option of depositing 10% additional stock on notes circulating or persona bond equaling one-fourth of circulation.

ASSET RESTRICTION	NEW YORK (1838)	GEORGIA (1838)	MICHIGAN (1837)
(1) Security of Banknotes			
(A) Stocks:			
Acceptable	<p><u>1838</u> U.S. New York Approved¹</p> <p><u>1840</u> N.Y.</p> <p><u>1844</u> U.S. N.Y.</p>	<p><u>1838</u> U.S. Georgia approved</p>	<p>None</p>
Value	<p><u>1838</u> Official par</p> <p><u>1840</u> Official Par² or market value (which ever lower)</p> <p><u>1848</u></p>	<p><u>1838</u> Official Par</p>	<p>None</p>
Standard (own stock bearing)	<p><u>1838</u> 5%</p> <p><u>1848</u> 6%</p>	<p><u>1838</u> 5%</p>	<p>None</p>
Restrictions	<p><u>1844</u> At least 1/2 of stock security must be New York Stock</p>	<p>None</p>	<p>None</p>
(B) Mortgages/			
Real Estate Value	<p>Mkt. Value = 2</p> <p>Mort. value <u>1838</u> <u>1848</u> 2 1/2</p>	<p><u>1838</u> <u>1838</u> Market Value = 2 Mort. Value</p>	<p><u>1838</u> "True" Market Value</p>
Bearing at least	<p><u>1838</u> <u>1848</u> 6% 7%</p>	<p><u>1838</u> 6%</p>	<p>None</p>

ASSET RESTRICTION	NEW YORK (1838)	GEORGIA (1838)	MICHIGAN (1837)
Restriction	<u>1848</u> Maximum Mortgage: \$5,000 Total amount of mortgage submitted for security less than 1/2 of total amount of security	None	None
(2) Margin Call	<u>1838</u> When insufficient backing	<u>1838</u> When insufficient backing	<u>1838</u> When insufficient backing
(3) Reserve Requirement Kind: Grace Period	<u>1838</u> 12 1/2% Specie Any Time	<u>1838</u> 25% Specie 30 Days	None
(4) Loan restriction Maximum Loan: Per Person Other Maximum Interest	None None None	None None None	<u>1837</u> 2 1/2 X's paid in capital 1/6 of total allowable 7% annually

ASSET RESTRICTION	VIRGINIA (1851)	INDIANA (1852)	LOUISIANA (1838)	MINNESOTA ¹ (1858)
(1) Security of Banknotes	1851 Virginia	1852 U.S. Indiana Approved	1853 U.S. Louisiana New Orleans	1858 A&B U.S. B, Minnesota A&B, Approved
(A) Stocks: Acceptable	1851 Par value	1852 Official par or market value (which ever lowest)	1838 Official par or market value (which ever lowest)	1858 A&B Official Par or adjusted market value (lower of the two) B. except Minn. and U.S. of current market
Value	1851 Par value	1852 Indiana--5% All others--6%	1838 6%	1858 A&B 6%
Standard (own stock bearing)	1851 6%	1855 All stock--6%	1838 6%	1858 A&B None Allowed
(B) Mortgages/Real Estate	None	None Allowed	None Allowed	A&B None Allowed
(2) Margin Call	None	1852 Insufficient backing	1853 Insufficient backing	1858 Insufficient banking and B depreciation of 10% of portfolio
(3) Reserve Requirement	1840 20% Specie Any time	1852 12 1/2% Specie 20 Notes	1853 33% Specie 100% At once C.P., At once Deposits Remainder	A&B None
Kind:	Specie	Specie and Notes	Specie	
Grace Period:	Any time	Upon notice	At once	
To Back:		Notes	Deposits Remainder	
(4) Loan Restriction	1851 2 X's Capital \$50,000 Director: \$5,000	1852 Director: 2 x's Stock	None	None
Maximum Loan: per person	\$50,000 Director: \$5,000	None	6% Annually	1858 A 12% B 15%
Max. Interest	6% annually	None	6% Annually	1858 A 12% B 15%

¹Minnesota passed two free banking laws in 1858. "A" will be designated as the law enacted 3-28-1858 and "B" will be designated as the law passed 7-26-1858. Where one letter is indicated, the provision was either repealed or amended. It should be noted that Minnesota was admitted to the Union on May 11, 1858.

LIABILITY PROVISION	NEW YORK	GEORGIA	MICHIGAN
(1) Circulation Limits on: Stock to Mortgage to Bank	<p><u>1838</u> Accepted Value 1/2 of Accepted Value None</p>	<p><u>1838</u> Accepted Value 1/2 of accepted value except human property 1/4 of accepted value None</p>	<p><u>1837</u> Accepted Value Full amount of accepted value 1837 2 1/2 times paid-in capital</p>
(2) Denomination Minimum	<p><u>1838</u> Any Size</p>	<p><u>1838</u> Any Size</p>	<p><u>1837</u> At place of issue</p>
(3) Convertibility Place:	<p>1839 At place of issue for notes \$1000 and up</p>	<p>1838 At place of issue for notes \$1000 and up</p>	<p>1837 At place of issue</p>
Maximum Discount by Agent:	<p><u>1860</u> <u>17/2%</u></p>	<p>None</p>	<p>None</p>
Failure to Redeem: Grace Period	<p>1838 <u>10 days</u></p>	<p>1838 <u>60 days</u></p>	<p>1837 <u>30 days</u> 1838 <u>60 days</u></p>
Interest on Notes	<p>1838 <u>14%</u></p>	<p>1838 <u>18%</u></p>	<p>1837 <u>20%</u> and 1838 <u>10%</u> cost</p>
Penalty Against Bank	<p>None</p>	<p>None</p>	<p>None</p>

EQUITY RESTRICTIONS	NEW YORK	GEORGIA	MICHIGAN
Minimum Capital	\$100,000	\$100,000	\$50,000
Maximum Capital	Open	Open	\$300,000
Liability	<u>1838</u> Limited	<u>1838</u> Unlimited	<u>1837</u> Limited Liability <u>1838</u> Unlimited Liability
Restrictions	None	None	<u>1837</u> <u>1/3</u> Ownership by residents of county where banks transact business <u>1837</u> Maximum share of ownership 1/4 of allowable capital stock

LIABILITY PROVISION	VIRGINIA	INDIANA	LOUISIANA	MINNESOTA
	(1) Circulation Limits on: Stock to	1851 Accepted Value	1852 Accepted Value 1855 90% of Accepted Value 1861 95% of Accepted Value	1853 Accepted Value
Mortgage to Bank	Did not apply None	Did not apply 1855 \$200,000	Did not apply None	Did not apply None
(2) Denomination	1851 \$5	1852 \$1	1853 \$5	1858 A \$1 B \$1
(3) Convertibility Place	1851 At place of issue	1852 At place of issue of \$500 or more	1853 At place of issue	1858 A At place of issue B At place of issue
Maximum Discount by Agent	1857 1/4%	1855 Agency at Richmond and Indianapolis 1855 1% or current exchange rate set in New York City	None Did not apply	None Did not apply

APPENDIX II

DATA ON FREE BANKING STATES: LOUISIANA, VIRGINIA, NEW YORK
INDIANA, MINNESOTA, AND GEORGIA

DATA ON FREE BANKING STATES

I. Louisiana

Louisiana's free banking system was considered one of the safest systems during the free banking era. Not one bank failed from its start on January 1853 to its last report on December 1959. Seven banks entered during the seven year period:

Bank	Year Entered ¹	Period of Economic Actity
Bank of America	a 10/57 ²	Rising/Stable
Bank of James Robb	1857	Falling
Bank of New Orleans	p 12/1853 ³	Rising/Stable
Cresent City Bank	a 10/1857	Rising/Stable
Merchant and Traders Bank	p 12/1853	Rising/Stable
Southern Bank	p 12/1853	Rising/Stable
Union Bank	1854	Falling

¹No banks exited Louisiana.

²a - after

³p - prior to

II. Virginia

Virginia did not formally enact a free banking law, but did enact a bond-secured banking system. The major difference between the systems was that Virginia's "independent" banks were required to receive legislative approval. As noted in Chapter II, the chartering of Virginia independent banks by the legislature was a mere formality; the legislature set up a standard charter for all independent banks and approved them as they were submitted. The only differences among the charters were the capital requirements. Table A lists all the banks that received approval by the legislature to operate a free bank. Only 21 banks entered the market out of a total of 65 approved charters. Four out of the 21 banks left the market.

TABLE A
 VIRGINIA INDEPENDENT BANKS¹

	Capital Requirement ² (in thousands)
Incorporated 1851	
Bank of Old Dominion (Alexandria)	150 - 300*
Bank of Commerce (Fredericksburg)	150 - 300*
Mechanics and Traders Bank (Norfolk)	150 - 300
Manufacturers and Farmers Bank (Wheeling)	150 - 300*
Incorporated 1852	
Bank of Rockbridge (Lexington)	50 - 200*
Farmers and Mechanics Bank of Hampton (Hampton)	100 - 200
Independent Bank of Portsmouth	100 - 200
Bank of Scottsville	50 - 200*
Mechanics Bank of Parkersburg	50 - 150
Merchants Bank of Virginia (Lynchburg)	100 - 900*
Manufacturers Bank of Kanawha ³ (Malden)	100 - 300*
Bank of Wytheville ⁴	100 - 500*
Bank of Marion (Marion)	50 - 300

¹These banks were approved by the Legislator to establish an office of deposit and circulation.

²These are initial capital requirements. Some charters were adjusted later on.

³Bank of Kanawha moved to Charleston and changed the name to Bank of Charleston (1853).

⁴Name was changed to Southwestern Bank of Virginia (1853).

*Banks that went into operation between 1851-1860.

Capital Requirement

Incorporated 1852 (Continued)

Merchant and Farmers Bank of Clarksburg (Harrison)	50 - 300
Farmers Bank of Culpepper (Fairfax)	50 - 300
Farmers Bank of Fincastle	50 - 300*

Incorporated 1853

Central Bank (Staunton)	150 - 300*
Fairmont Bank (Fairmont)	50 - 200*
Bank of Winchester (Fredrick)	100 - 250*
Bank of Manassas (Front Royal)	50 - 300
Citizens Bank of Virginia (Harrisonburg) ¹	100 - 500*
Monticello Bank (Charlottesville)	75 - 300*
Planters Bank (Richmond)	100 - 500
Bank of Berkeley (Martinsburg)	100*
Bank of Wheeling	100 - 500*
Rappahannock Bank (Tappahannock)	100 - 300
Mineral Bank (Richmond) ²	100 - 500*
Trans-Alleghany Bank (Jeffersonville)	100 - 1000*
Merchant and Mechanics Bank of Petersburg	100 - 500
Bank of Roanoke (Salem)	50 - 200
Virginia State Stock Bank (Richmond)	100 - 500

¹Citizens Bank of Virginia name changed to the Bank of Rockingham (1854).

²Mineral Bank of Virginia changed to the Bank of the Commonwealth, (1858).

*Banks that went into operation between 1851-1860.

Capital Requirement

Incorporated 1853 (Continued)

Bank of Giles (Pearisburg)	100 - 250
Independent Bank of Liberty (Bedford)	50 - 300

Incorporated 1854

Bank of Guyandotle (Guyandotte)	100 - 300
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Incorporated 1856

Northern Bank of Virginia (Wellsburg)	100 - 1000
Planters Bank of Virginia (New Market)	50 - 500
Bank of Howardsville (Howardsville)	75 - 300*
Bank of Danville (Danville)	100 - 300*
Bank of Philippi (Philippi)	50 - 200*
Bank of Old Dominion (Pearisburg) ¹	75 - 100*

Incorporated 1858

Citizens Deposit Bank (Wheeling)	0 - 100
Merchants Bank of Virginia (Richmond) ¹	100 - 1000
Bank of Williamstown (Williamstown)	100 - 300
Preston Bank of Virginia (Kingwood)	100 - 500
The Bank of Weston (Weston)	100 - 400
Palmyra Bank (Palmyra)	100 - 300
Bank of Powell Valley (Jonesville)	100 - 500
Seaboard Bank of Virginia (Portsmouth/Norfolk)	300 - 750

¹Bank of Old Dominion was allowed a branch in Pearisburg.

*Banks that went into operation between 1851-1860.

Capital Requirements

Incorporated 1860

Bank of Hillsville (Hillsville)	100 - 500
The Bank of Clarkesville (Clarkesville)	100 - 200
The Manufacturers and Miners Bank of Mason	100 - 200
The Bank of Mecklenberg at Boydton	100 - 200
The Marysville Bank (Charlotte)	100 - 200
Monticello Bank (Palmyra) ²	100 - 200
Traders Bank of the City of Richmond	100 - 1000*
Bank of Richmond	100 - 2000
Monongalia Bank of Morgantown (Morgantown)	100 - 200
Bank of Grafton (Grafton)	75 - 200
Bank of Ravenswood (Ravenswood)	100 - 200
Northern Neck Bank of Virginia (Montross)	100 - 300
Bank of Pittsylvania (Chatam)	100 - 300
Planters Bank of Farmville	100 - 500
Hampshire County Bank (Romney)	100 - 300
Bank of the City of Petersburg	150 - 1000
Bank of Lynchburg	100 - 500

¹Merchants Bank of Virginia was allowed a branch in Richmond.

²Monticello Bank was allowed a branch in Palmyra.

⁸Banks that went into operation between 1852-1861.

The following banks enter the market:

Bank	Year Entered () ¹	Year Exited () ¹	Redemption Rate
Bank of Berkeley	11/1858 (R)	-	-
Bank of Charleston	1859 (R)	-	-
Bank of Commonwealth	1859 (R)	-	-
Bank of Commerce	7/1854 (R) ²	-	-
Bank of Howardsville	1857 (R)	-	-
Bank of Kanawha	p 10/1854 (U)	1857 (U)	Par
Bank of Monticello	7/1853 (R)	-	-
Bank of Philippi	1857 (R)	-	-
Bank of Rockbridge	1857 (F)	-	-
Bank of Rockingham	p 7/1859 (R)	-	-
Bank of Scottville	1859 (R)	-	-
Bank of the Old Dominion	10/1851 (R)	-	-
Bank of Wheeling	12/1853 (R)	p 12/1857 (F) ²	Par
Bank of Winchester	7/1853 (R)	-	-
Central Bank	1/1853 (R)	-	-
Danville Bank	1859 (R)	-	-
Fairmont Bank	9/1853 (R)	-	-
Farmer's Bank	1857 (R)	-	-
Manufacturer's & Farmers Bank	10/1851 (R)	-	Par
Merchant Bank	3/1853 (R)	-	-

Bank	Year Entered () ¹	Year Exited () ¹	Redemption Rate
Southwestern Bank	1857 (F)	-	-
Trader's Bank	1860 (U)	-	-
Trans-Allegany Bank	11/1853 (R)	a 10/1854 (F) ³	Par

¹()Denotes the period of economic activity, where F denotes falling bond prices; R denotes steady or rising bond prices; and U denotes that it was undetermined.

²p--prior to

³a--after

III. New York

New York had the largest banking system among the states examined. Over 440 free banks operated at some point during the 25 year period (1838-1863). For a detailed listing of the exit and entry information of the individual banks for the period between 1843-1863, see the Rolnick and Weber study (1982). A summary on entry and exit for the whole period is given in Table B. One hundred and sixty banks exited the market; 34 of the 160 banks that exited failed. Table C lists the banks that failed. This table provides information on the year the bank closed, the amount of circulation last reported, and the redemption rate.

We were able to identify most of the banks that entered and exited during periods of rising and steady, and falling bond prices. Our findings are summarized in Table D.

Bond prices for the period January 1841 to December 1862 are available in the Ronlick and Weber study (1984). Bond prices prior to 1841 are not readily available, except for a series of New York bond prices between January 1838 and March 1839. These prices are listed in Table E.

TABLE B
DATA ON FREE BANKING STATES

Entry and Exit Information ¹				
State	Year	Numbered of Banks Entered ²	Number of Banks Exit	Total Number of Free Banks
New York	1838	23	-	23
	1839	55	1	77
	1840	4	4	77
	1841	2	12	67
	1842	4	14	57
	1843	9	3	63
	1844	16	8	71
	1845	4	-	75
	1846	3	2	76
	1847	18	-	94
	1848	12	-	106
	1849	11	3	114
	1850	24	3	135
	1852	57	17	175
	1853	80	22	233
	1854	16	13	236
	1855	17	12	241
	1856	32	7	266
	1857	13	12	267
	1858	4	3	268
1859	7	3	272	
1860	11	6	277	
1861	8	11	274	
1862	16	1	289	

¹This listing includes banks that did not report to state banking authorities.

²Entry was determined from the sources below. They are based on condition reports of the banking authorities and Dillistin's Historical Directory.

SOURCE: Congressional Serial Set, House Documents and House Executive Documents. Rolnick, A.J. & W.E. Weber, The Free Banking Era: New Evidence on Laissez-Faire Banking, Federal Reserve Bank of Minneapolis, Staff Report 80. Dillistin, W.H., Historical Directory of the Banks of the State of New York. New York State Bankers Association, New York, 1946.

TABLE C

Failed Banks in New York

Bank	Year Closed () ⁵	Circulation ¹	Redemption Rate ²
Allegany County Bank	3/1842 (F)	NA ³	.36
Atlas Bank of New York	1847 (R)	\$178,205	.75
Bank of America	p10/1841 ⁴ (F)	19,002	.76
Bank of Brockport	1844 (U)	24,812	.80
Bank of Commerce, Buffalo	p10/1841 (F)	134,382	.76
Bank of Lodi	p10/1841 (F)	9,444	.83
Bank of New Rochelle	1851 (R)	85,113	.84
Bank of Olean	1842 (F)	NA	.74
Bank of Tonawanda	1840 (U)	19,000	.68
Bank of Western New York	p10/1841 (F)	86,209	.75
Binghamton Bank	p10/1841 (F)	65,377	.74
Cataract Bank	1861 (F)	51,156	.93
Cattaraugus County Bank	p10/1841 (F)	NA	.77
Chelsea Bank	1843 (R)	745	.25
Clinton Bank	1844 (U)	22,662	.60
Eighth Avenue Bank	10/1854 (F)	92,662	.94
Erie County Bank	p10/1841 (F)	205,288	.60
Farmer's Bank of Onondaga	1853 (R)	NA	.85
Farmer's Bank of Seneca County	1840 (U)	43,575	.74
Hamilton Exchange Bank	1857 (U)	46,114	.84
James Bank	1851 (R)	76,743	.91
Mechanic's Bank of Buffalo	p10/1841 (F)	59,990	.63
Merchant's Exchange Bank of Buffalo	p10/1841 (F)	129,855	.65
Merchant's & Mechanics Bank of Oswego	1/1854 (R)	NA	.77
Millers Bank of New York	1840 (U)	164,230	.94
New York Banking Company	10/1842 (R)	46,240	.42
Phoenix Bank of Buffalo	p10/1841 (F)	NA	.73
Pratt Bank	1858 (R)	31,008	.94
St. Lawrence Bank	3/1842 (F)	123,491	.32
State Bank of New York at Buffalo	3/1842 (F)	5,690	.30
Staten Island Bank	3/1842 (F)	29,234	.56
Tenth Ward Bank	1843 (R)	9,537	.94
Union Bank of Buffalo	p10/1841 (F)	62,400	.81
U.S. Bank of Buffalo	p10/1841 (F)	72,133	.77

¹Circulation figures are those that were reported on the last condition report of each bank.

²Certain banks issued notes based on mortgages and/or state stock. Those banks that issued notes based on both would have two redemption rates: one based on the mortgages and the other based on the stock. The figure represented is the lower of the two rates.

³Circulation figures were not available.

⁴Closed prior to 10/1841

⁵Denotes the period of economic activity in which the bank failed; F denotes the falling bond price; R denotes rising and steady bond prices; and U denotes undetermined.

SOURCE: Congressional Serial Set, House Documents and House Executive Documents. Rolnick, A.J. & W.E. Weber, The Free Banking Era: New Evidence on Laissez-Faire Banking, Federal Reserve Bank of Minneapolis, Staff Report 80. Dillistin, W.H., Historical Directory of the Banks of the State of New York. New York State Bankers Association, New York, 1946.

TABLE D

Raw Data on Entry and Exit of New York Free Banks

ENTRY

	Total Exit	3/38-5/40	6/40-12/62	3/38-12/49	1/50-12/62
Falling	13	0	13	0	8
Rising/Steady	352	71	281	71	228
Undetermined	84				

EXIT

	Total Exit	3/38-5/40	6/40-12/62	3/38-12/49	1/50-12/62
Falling	52	0	52	24	28
Rising/Steady	72	1	71	12	60
Undetermined	36				

TABLE E

New York Bond Prices From January 1838 to March 1939^A

Year	January	February	March	April	May	June	July
1838	95 3/4	95 3/4	95 3/4	95 3/4	95 3/4	95 3/4	100
1839	100	100					
Year	August	September	October	November	December		
1838	100	--	106	100	100		
1839							

^ABond denominations were \$100.

SOURCE: Hunt's Merchant's Magazine and Commercial Review, Banker's Magazine.

IV. Indiana

Indiana, like New York, experienced a large number of free banks that entered and exited the market. During Indiana's ten year period 143 free banks entered the market, while 87 of the 104 banks exited before the period came to a close. The entry and exit data is summarized in Table F.

We were able to identify most of the banks that entered during periods of falling and rising and steady bond prices. For banks that exited the market, we were only able to identify 40 banks that either closed or failed during periods of falling and rising or steady bond prices. Table G summarizes the raw data on entry and exit during periods of falling and rising or steady bond prices.

For a listing of banks that failed in Indiana see Table H. Table H also gives the circulation figures and the redemption rates of the failed banks.

TABLE F
Indiana Free Banking

Entry and Exit Information			
Year (Month Recorded)	Numbered of Banks Entered	Number of Banks Exit	Total Number of Free Banks
1853	60	28	32
1854	33	34	31
1855	1	-	32
1856	3	3	32
1857	-	17	20
1858	-	3	17
1859	-	-	17
1860	1	1	16
1861	1	-	17
1862	-	-	17
1863	-	-	1

SOURCES: Congressional Serial Set, House Documents and House Executive Documents. Rolnick, A.J. and W.E. Weber, The Free Banking Era: New Evidence on Laissez-Faire Banking, Federal Reserve Bank of Minneapolis, Staff Report 80.

TABLE G

Entry and Exit of Indiana Free Banks During Periods of
Falling and Rising and Steady Bond Prices

EXIT

	Total Exit	Indiana (1) ¹			Indiana (2) ²		
		Closed	Failed	NA ⁴	Closed	Failed	NA
Falling	33	11	12	10	0	0	0
Rising/Steady	9	2	1	2	3	1	0
Undetermined	45 ³						

ENTRY

	Total Entered	Indiana 1	Indiana 2
Falling	18	13	5
Rising/Steady	55	46	9
Undetermined	31		

¹Period 5/52-3/55.

²Period 4/55-12/63.

³All of these banks exited the market prior to the amended law.

⁴Redemption information was not available.

TABLE H
Failed Banks in Indiana¹

Bank	Year Closed	Circulation ²	Redemption Rate
Atlantic Bank	1855 ³ (U)	19,806	.80
Bank of Albany	1/1854-1/1855 (F)	86,000	.90
Bank of America	1855 ³ (U)	49,998	.87
Bank of Attica	7/1854-1/1855 (F)	144,466	.89
Bank of Bridgeport	1855 ³ (U)	23,998	.88
Bank of Connersville	7/1854-1/1855 (F)	618,000	.87
Bank of North America	1/1856-6/1856 (R)	15,720	.90
Bank of T. Wadsworth	1855 ³ (U)	49,998	.91
Bloomington Bank	7/1860-12/1860 (F)	77,830	.85
Elkhart County Bank	7/1854-1/1855 (F)	320,000	.97
Farmers Bank	1855 ³ (U)	53,000	.91
Government Stock Bank	1/1854-1/1855 (F)	50,000	.80
Green County Bank	1855 ³ (U)	81,105	.81
Kalamazoo Bank	7/1854-1855 (F)	49,998	.90
Laurel Bank	7/1854-1/1855 (F)	49,998	.82
Merchants Bank, S	12/1854-1/1855 (R)	6,103	.90
Merchants Bank, L	1/1854-6/1854 (R)	50,000	.90
North Indiana Bank	1855 ³ (U)	99,000	.83
Public Stock Bank	7/1854-1/1855 (F)	101,998	.89
Savings Bank	1/1856-6/1856 (F)	7,000	.69
State Stock Bank, M	7/1854-1/1855 (F)	50,000	.90
State Stock Bank, I	7/1854-1/1855 (U)	193,301	.85
Traders Bank	1855 ³ (U)	75,400	.92
Wabash Valley Bank	1/1854-1/1855 (F)	210,754	.92

¹Redemption rates on thirty banks that failed were not available and are not listed.

²Circulation figures on the last condition report.

³Banks closing prior to the 1855 amendment. These banks did not submit a condition report and may be assumed that they closed in 1853.

SOURCE: Rolnick, A.J. and W.E. Weber, The Free Banking Era: New Evidence on Laissez-Faire Banking.

V. Minnesota

Minnesota's free banking law was enacted in July, 1958. Sixteen banks entered the market during its five year period, eleven of which left the market before the close of the period. The entry and exit information is presented in Table I.

VI. Georgia

Georgia's free banking experience differs considerably from the other free bank states. In 1839 Georgia enacted free banking legislation that was modeled after the New York free banking law. Only two banks entered the market during the era; both banks left the market within four years of starting:

Bank	Entered () ¹	Exit () ¹	Redemption
Exchange Bank	10/1840-p4/42 ² (F)	a 10/1842 ³ (R)	
Ruckersville Bank	p10/40 (F)	a 10/43 - 4/44 (R)	

¹() denotes the period of economic activity in which the bank entered or exited.

²p = prior to.

³a = after.

TABLE I
Minnesota Free Banking Experience
Exit and Entry Information

Bank	Year Entered () ¹	Year Closed () ¹
Bank of Chatfield	7/10/59 (R)	
Bank of Owatonna	3/7/59 (R)	7/9/59 (R)
Bank of Red Wing	7/1/59 (R)	10/59-1/60 (R)
Bank of Rochester ³	4/20/58 (R)	5/59-6/59 (R)
Bank of St. Paul	1/15/59 (R)	6/22/61 (F)
Bank of State of Minnesota	11/11/58 (R)	10/12/59 (R)
Central Bank, New Ulm	6/9/59 (R)	6/28/61 (F)
Chicago City Bank, TE	3/9/59 (R)	7/9/59 (R)
Exchange Bank, Glencoe	11/12/58 (R)	7/9/59 (R)
Farmers Bank, Garden City	1/4/59 (R)	10/59-1/60 (R)
Fillmore City Bank, St. Peter	5/28/59 (R)	1/9/59 (R)
La Cross & La Crescent Bank, Hokan	4/7/59 (R)	
Nicollet City Bank, St. Peter	2/4/59 (R)	10/21/59 (R)
Peoples Bank, St. Peter	4/7/59 (R)	
State Bank, Minnesota, Austin	4/7/59 (R)	
Winona City Bank	4/7/59 (R)	

Bank	Redemption Rate	Circulation ²
Bank of Chatfield ⁴		
Bank of Owatonna	.21	\$35,000
Bank of Red Wing	Par	
Bank of Rochester ³	.16	\$22,680
Bank of St. Paul	.98	\$ 1,456
Bank of State of Minnesota	.70	\$25,000
Central Bank, New Ulm	.30	\$ 5,911
Chicago City Bank, TE	.19	\$32,286
Exchange Bank, Glencoe	.21	\$49,096
Farmers Bank, Garden City	Par	
Fillmore City Bank, St. Peter	.20	\$25,000
La Cross & La Crescent Bank, Hokan ⁴		
Nicollet City Bank, St. Peter	.35	\$30,00
Peoples Bank, St. Peter ⁴		
State Bank, Minnesota, Austin ⁴		
Winona City Bank		

¹() Denotes the period of economic activity in which the bank entered or exited. (R) denotes rising and steady bond prices; (F) denotes falling bond prices.

²Circulation figures taken from last condition report.

³Bank of Rochester never submitted a condition report. Circulation figures taken from Auditor's Report of 1859.

⁴Were operating until the National Banking Act.

APPENDIX III
MICHIGAN FREE BANKING EXPERIENCE

In this Appendix we will present a detailed description of the Michigan free banking experience. This presentation is to support the data used in this study. Our study has shown that Michigan's experience was among the worst, but it also presents the Michigan experience as being much different from the typical historical view. The historians claim that Michigan's free banking period was a period of financial chaos. This appendix presents the facts given by the state documents and historical accounts.

This discussion is in two parts. First, we will present the free banking experience from the enactment of the law to the closing of the last bank. Second, we will present a discussion of the economic activity during the free banking period. In particular, we will determine the general trend in land prices from 1837 to 1841.

Michigan Free Banking Experience

Michigan was the first state to enact a free banking law; it was also recorded as having the most dismal banking experience. On March 15, 1837, the Michigan legislature passed a banking law which allowed 12 landholders of the state to set up and operate a bank. The bankers could print and issue notes as long as the notes were backed by mortgages on unincumbered land and the amount of notes issued did not exceed two and a half times the paid-in capital.

Landholders did not immediately take the opportunity to invest their capital in the banking institutions. It was not until after the legislature passed an amendment temporarily suspending par redemption of

bank notes into specie (June 22, 1837) that a bank entered under the free banking law. The suspension was in effect until May 16, 1938.

T.H. Hinchman in Banks and Banking in Michigan lists the banks that filed their notice of organization with the Secretary of State and the dates on which they were filed. These dates were used as the approximate date of entry. According to this list, the first bank entered August 19, 1837. Within the space of 8 months 40 banks entered the market and 28 banks were in process of organizing. The legislature put a halt to the influx of free banks by passing a law on April 3, 1838 prohibiting the establishment of any new free bank, including those banks in the process of organization.

Table J gives the list of banks that have operated in Michigan. This list includes all banks that were reported by the Bank Commissioners and the Attorney General as operating during the free banking period. Table K list those banks that were reported by the Commissioner, but never operated; and Table L lists those banks that were reported by the Secretary of State as filing for operations but never operated.

By January 18, 1839, fourteen banks were operating in the market; 37 banks had left the market. Nine months later only 4 banks remained. The exit dates of the banks are given in Table J. These dates are based on the last bank condition report recorded by the bank commissioners. Carter Golembe, State Banks and Economic Development of the West, 1830-1844, lists the bank condition reports and the date of the report. The accuracy of the condition reports is questionable (see Receiver's Reports, Figure A), but the report indicates the last record of the bank operating.

TABLE J
FREE BANKS OF MICHIGAN

Banks that Operated	Estimated Date of Commencement () ^h	Exited ^g () ^h
Bank of Adrian ^a	2/1/38 (R)	3/39-1/41 (F)
Bank of Allegan [*]	1/8/38 (R)	9/38 (R)
Bank of Battle Creek [*]	2/12/38 (R)	12/38-1/39 (F)
Bank of Brest [*]	9/18/37 (R)	8/38 (R)
Bank of Coldwater [*]	12/13/37 (R)	7/38 (R)
Bank of Kensington [*]	1/19/38 (R)	7/38 (R)
Bank of Lapeer [*]	b	b
Bank of Manchester [*]	12/1/37 (R)	12/38-11/39 (F)
Bank of Marshal ^a	10/26/37 (R)	9/39-2/42 (F)
Bank of Niles [*]	1/3/38 (R)	11/38-1/39 (U)
Bank of Oakland [*]	8/31/37 (R)	2/38-1/39 (U)
Bank of Saline [*]	12/1/37 (R)	8/38 (R)
Bank of Singapore [*]	1/8/38 (R)	1/39-11/39 (F)
Bank of Superior [*]	1/17/38 (R)	1/39-11/39 (F)
Bank of Utica [*]	9/2/37 (R)	3/38-1/39 (U)
Berrien County Bank [*]	2/2/38 (R)	6/38 (R)
Clinton Canal Bank [*]	12/9/37 (R)	2/38-1/39 (U)
Commercial Bank at St. Joseph [*]	1/3/38 (R)	11/38-1/39 (F)
Detroit City Bank [*]	12/26/37 (R)	1/39 (F)
Detroit & St. Joseph RR Bank ^a	1/29/38 (R)	9/39-2/42 (F)
Exchange Bank at Shiawassee [*]	1/17/38 (R)	2/38-12/38 (U)
Farmer's Bank at Genesee [*]	b	2/38-1/39 (U)

TABLE J (Continued)

Banks that Operated	Estimated Date of Commencement	Exited
Farmer's Bank at Homer*	8/19/37 (R)	12/38-11/39 (F)
Farmer's Bank at Oakland*	12/30/37 (R)	7/38 (R)
Farmer's Banks at Sandstone*	b	
Farmer's Bank at Sharon*	12/28/37 (R)	4/39 (R)
Farmer's & Mechanic's Bank of Pontiac*	11/23/37 (R)	9/38 (R)
Farmer's & Merchant's Bank of St. Joseph	b	7/39 (R)
Genesee County Bank ^c	12/30/37 (R)	12/38-2/42 (F)
Gibraltar Bank*	1/2/38 (R)	2/38-11/39 (U)
Goodrich Bank*	1/15/38 (R)	3/38-1/39 (U)
Gran River Bank*	12/18/37 (R)	12/38-11/39 (F)
Huron River Bank*	1/17/38 (R)	12/38-11/39 (F)
Jackson Ccounty Bank*	b	1/38 (R)
Lenawee Bank*	12/30/38 (R)	6/38 (R)
Merchant Bank of Jackson County ^a	1/29/38 (R)	9/39-2/42 (F)
Merchant & Mechanics Bank of Monroe*	10/25/37 (R)	12/38-11/39 (F)
Millers' Bank ^d	11/23/37 (R)	2/38-1/39 (U)
Saginaw City Bank*	12/16/37 (R)	p 1/39 (U)
St. Joseph County Bank*	12/37/37 (R)	9/38 (R)
Wayne County Bank*	b	7/38 (R)

*Indicates injunction against banking operations.

^aWere still in operations in December, 1839.

^bNo date available.

^cGenesee County Bank was not listed in the Attorney General's report but is mentioned by the Bank Commissioner's as being under injunction.

^dMiller's Bank closed voluntarily and Bank Commissioners reported that it was not necessary to issue an injunction

^eThe report of Bank Commissioner (3/5/38) states that the bank commenced operations after January 10, 1838.

^fBanks that operated was determined by T.H. Hinchman's list of banks that filed certificates of operation with the state authority, the Bank Commissioner Report of 1839, and the Attorney General Report of 1839.

^gExited is based on the last condition report, the Bank Commissioner report and the attorney general reports. A one date exit indicates that the bank commissioner placed an injunction on that date or prior to that date. On a two date exit, the first date is the last condition report recorded by the bank commissioner and the second date is the report date of either the bank commissioner or the attorney general regarding the status of the bank. (This indicates that the banks were under injunction.)

^h() denotes the period of economic activity in which the bank entered or exited. (F) denotes falling land price, (R) denotes rising and steady bond prices and (U) denotes undetermine.

TABLE K

Banks that Never Went into Operation but were Mentioned by Bank Commissioners	Comment
Bank of Auburn	Never went into operation
Bank of Shiawassee	Never went into operation
Citizens Bank	Submitted securities, but did not issue
Commonwealth Bank	Submitted securities, but did not issue
Michigan Centre Bank	Submitted securities, but did not issue
People's Bank	Did not comply with law but redeemed at par

TABLE L

Banks that Filed Certificate but Never Went into Operation

Bank of Ann Arbor
Branch County Bank
Bank of Chippeway
Chippeway County Bank
Clinton River Bank
Commercial Bank, Gratiot
Commercial Bank, Havre
Commercial Bank, Portsmouth
Exchange Bank, Ann Arbor
Farmer Bank of Hudson
Farmer Bank of Prairie Roads
Farmer Bank of Romeo
Farmer's and Merchants of Centerville
Kalamazoo River Bank
Bank of Lake St. Clair
Lapeer County Bank
Mechants Bank of St. Joseph
Bank of Owasso
Bank of Saginaw County
Shiawassee County Bank
VanBueren County Bank
White Pigeon Bank

SOURCE: Michigan, Bank Commissioner Report, 1837, 1838, 1839; T.H. Hinelman, Banks and Banking in Michigan and Detroit; C. Golembe, State Banking and the Economic Development of the West 1830-1844; Michigan, Attorney General's Report, 1839; Michigan, Legislature 1839; Senate Documents, No. 35.

Many historians have estimated that noteholders of the Michigan free banks loans as much as \$1.5 million dollars. Their estimates come primarily from the Bank Commissioner's Report of 1839. The Attorney General's Report of 1839 also reports that the total amount of liabilities issued by the free banks is estimated at \$1.5 million dollars (See Table M, Column 3). This estimate may be considered as the upper limit on noteholder losses and this limit may actually be lower because of the following two reasons. First, the assets of the bank may have offset some of the liabilities, and secondly, the stockholders were personally liable for any excess debt. There is evidence from the Attorney General's report that there was a substantial amount of assets characterized by the receivers as being of good quality. These assets may be considered reliable and collectable. Receivers of some of the insolvent banks placed judgments against the asset holders (See Table M, Column 8). This amount of judgment is small but may represent the initial movement to collect on the assets.

The second factor may also play a role in reducing the estimated losses to noteholders. The personal liability provision, however, was challenged shortly after the first closing. A lengthy litigation process continued until 1844 when the Supreme Court of Michigan ruled that the free banking law was unconstitutional, thereby releasing any personal liability of the stockholders. Prior to the Supreme Court decision, the lower courts decided in favor of the creditors. Whether some of the litigation cases were settled prior to the Supreme Court decision is unknown, but we may suspect that some of the cases may have been settled.

TABLE M
AGGREGATE TOTALS OF SELECTED ITEMS ON RECEIVER'S REPORTS
OF FREE BANKS

Receiver's Reports	(1) Amount of Notes on Exchange ^a	(2) Amount of Notes for Discount ^b	(3) Amount of Liabilities-Receiver ^c		
Estimated	\$301,238	\$434,212	\$667,581		
Not Stated			1		
Uncertain			1		
No. of Banks That Reported the Item	8	13	16		
Attorney General's Estimate on Those Not Reporting, Given Information (15 Banks)			\$739,000		
Receiver's Reports	(4) Good	(5) Character of Asset Doubtful	(6) Bad	(7) Total Assets	(8) Amount Judged
Estimated	\$184,781	\$209,294	\$204,341	\$867,930 ^d	\$ 47,891
No. of Banks That Reported the Item	16	16	16	19	
Attorney General's Estimate on Those Not Reporting, Given Information (15 Banks)				\$742,647	

^aThis is the estimate of notes issue for "exchange purposes," that is, notes in circulation that did not arise from loans and discounts.

^bThis is the amount of notes issue on discounts.

^cThis is the amount of liabilities that is outstanding. If the total amount is not stated for an individual bank, the the amount of liabilities in his possession was added in the computer.

^dThree receivers did not make estimates of the assets worthiness.

SOURCE: Michigan Senate Documents, Attorney General's Report 1839.

Since the litigation settlements are not known, the estimate of noteholder losses must come from the information provided by the Attorney General's Report (see Table M). This report shows 19 banks under injunction and shows the conditions of the 19 banks as reported by the receivers. From this report an estimate of the redemption rate to noteholders can be derived. Assuming that all good character assets, Column (4) of Table M, are collectable, the redemption is estimated by dividing the amount of good character assets by the total amount of liabilities, Column (3) of Table M. This rate is equal to .2768. In other words, noteholders received an average of \$0.28 on the dollar.

It is also possible from this information to estimate the number of banks that closed at par. Since we assume that the good character assets are collectable, any bank that shows the amount of good assets equal to the amount of liabilities will be considered as a bank redeeming its bank notes at par. Table N gives the individual condition reports and shows only one bank meeting this requirement, Bank of Niles.

We have also included the four banks that were left in the market on September 1839 in our total of banks redeeming their notes at par. They were included for two reasons. First, the amount of notes circulating was small in relationship to the total; only \$10, \$40 worth of notes were issued. Second, these banks were required by law to cease operations by February 16, 1842. Given this restraint and the amount of notes circulating, it is assumed that they were able to redeem all their notes at par. Therefore, 5 out of 41 free banks were able to redeem their notes at par.

TABLE N

ABSTRACT

Of the Reports of the Several Receivers Showing the Situation
of the Banks Under Injunction

Name of Bank	Amount out for Exchange	Amount of Discount	Amount of Liabilities in Hands of Receiver
Jackson Country Bank	\$50,000.00 and over	\$27,393.00	\$69,371.00
Farmer's Bank of Sandstone	Unknown	Uncertain	38,270.00
Bank of Allegan	Unknown	Uncertain	8,266.40
Bank of Brest	19,815.00	68,813.68	85,543.00
Farmers' and Mechanics' Bank of Pontiac	None	9,005.00	9,673.75
Bank of Kensington	52,513.00	3,212.00	17,331.00
Lenawee County Bank	Unknown	Not stated	
Bank of Niles		30,000.00	5,000.00
Berrien County Bank	Not stated	38,534.38	19,617.25
Bank of Coldwater	42,000.00	42,000.00	25,000.00
Farmers' Bank of Sharon	5,000.00	19,000.00	10,000.00
Bank of Saline	30,000.00	Uncertain	30,000.00
Farmers' Bank of Homer	Not stated	No stated	4,154.25
Clinton Canal Bank	Unknown	22,293.05	69,284.41
Shiawassee Exchange Bank	Not stated	Unknown	5,288.00
Bank of Gibraltar		51,043.49	
Bank of Manchester	84,000.00 ^a	34,000.00	893.00

TABLE N (Continued)

Name of Bank	Total Liabilities outstanding Exclusive of Capital Stock	Character of Assets		
		Good	Doubtful	Bad
Jackson Country Bank	Uncertain	\$ 5,000.00		\$38,000.00
Farmer's Bank of Sandstone	Uncertain	None	None	None
Bank of Allegan	\$ 35,000.00	14,830.00	\$29,794.00	None
Bank of Brest	118,911.00	Uncertain	Uncertain	Uncertain
Farmers' and Mechanics' Bank of Pontiac	24,916.78	6,304.98	19,095.00	None
Bank of Kensington	55,725.00	3,212.00		65,767.81
Lenawee County Bank	23,868.00	None	None	33,700.00
Bank of Niles	27,000.00	30,000.00	None	None
Berrien County Bank	29,000.00	8,000.00	8,000.00	19,000.00
Bank of Coldwater	58,000.00	22,162.51	61,897.44	
Farmers' Bank of Sharon	19,000.00	8,000.00	22,728.00	None
Bank of Saline	Not Stated	30,000.00	54,000.00	
Farmers' Bank of Homer	33,673.01	13,175.78	10,294.00	1,434.00
Clinton Canal Bank	b	None	None	40,000.00
Shiawassee Exchange Bank	22,261.00	1,671.00		5,540.00
Bank of Gibraltar	21,043.49			
Bank of Manchester	27,971.61	38,141.71	19,626.00	

TABLE N (Continued)

Name of Bank	Total Assets	Amount in Judgment
Jackson Country Bank	\$ 43,900.00	
Farmer's Bank of Sandstone	None	
Bank of Allegan	44,624.00	None
Bank of Brest	140,657.86	
Farmers' and Mechanics'		
Bank of Pontiac	25,459.95	\$ 2,613.53
Bank of Kensington	68,979.80	14,000.00
Lenawee County Bank	33,700.00	
Bank of Niles	30,000.00	
Berrien County Bank	35,000.00	6,000.00
Bank of Coldwater	84,000.00	Not Stated
Farmers' Bank of Sharon	30,729.06	18,000.00
Bank of Saline	84,000.00	Not Stated
Farmers' Bank of Homer	24,903.05	None
Clinton Canal Bank	70,917.28	131.20
Shiawassee Exchange Bank	7,216.00	
Bank of Gibraltar	51,043.49	
Bank of Manchester	57,767.71	

^aThis was cut, and not even a memorandum in bank as to the fact.

^bBooks show \$67,711.35.

Land Prices in Michigan

Land was the primary security for note issue in Michigan. Consequently, according to the Rolnick and Weber, a sharp decline in land prices would lead to depreciated currency and possible lead to bank failures. Therefore, it is necessary to determine land prices during the Michigan free banking period (1837 to 1842).

Primary sources on land prices was not obtainable for this period; two secondary sources were used to determine land prices. T.H.

Hinchman, Banks and Banking in Michigan, states that:

"Following the failures of banks and banking associations the speculative price of real estate collapsed, and much of it proved to be unsalable at any price...."

He further states that in Detroit "the decline equaled 80 or 90 percent of previous prices."¹

Arthur M. Woodford in Detroit and Its Banks supports Hinchman's claims by giving examples of the sharp decline in prices. He states that "flour....which had been selling in Detroit for \$16,000 a barrel fell to \$8.00 in 1839 and \$2.25 in 1842."²

Both accounts suggest that the general decline in prices, including land prices, started to fall in the beginning of 1839. For this study, however, it be will assumed that land prices started to fall in October 1838. Our reason for starting in October 1838 is to compensate for any inaccuracy in the information.

¹T.H. Hinchman, Banks and Banking in Michigan, Detroit, Wm. Graham, 1887, p. 44.

²Arthur M. Woodford, Detroit and Its Banks, Detroit, Savoyard, 1940, p. 59.

FIGURE A

Receiver's Report of a Michigan Free Bank

Berrien County Bank
Niles, Dec. 9, 1839

Hon. P. Morey, Attorney General:

Dear Sir:

I have just received you printed circular, post marked at Detroit, Dec. 5, and hasten to give it the earliest reply in my power.

1. I have not data in my possession, as receiver of the Berrien county bank, which will enable me to inform you as to the amount of notes obtained from the engraver, and by whom ordered.

2. The books of the bank afford no satisfactory information [Sen. Doc.] as to the largest amount of notes ever in circulation at one time. So far as I can learn from a book called the statement book, the circulation of the bank was on the 1st of March, 1838, \$20,500; and on the first of May, A.D. 1838, \$14,568. There are no other statements recorded since that period. The ledger of the bank shows in the account with office notes on the credit side of that account, a balance on the 18th of May, A.D. 1838, of \$23,650. Whether that whole amount was in actual circulation at that period I cannot positively determine. H. Beach, Esq., the then cashier of the bank, died some time before I was appointed receiver. There are no entries in that account after that period, May 18th, 1838. Nothing further appears of a definite nature on the books of the bank in regard to the amount of its circulation; but I have reason to believe from what I have heard, that the greatest circulation of bills may have been at one time near \$25,000.

It appears from the statement book, that there was out on exchange, March 1st, 1838, \$1,750; on the first day of May A.D. 1838, \$1,685; and from the exchange account on the ledger of the bank, that on the 24th day of June, 1838 at the time the operations of the bank were suspended by honorable Thomas Fitzgerald, bank commissioner, that the sum of \$9,616 was out on exchange.

The amount of bills discounted appears to have been on the first day of March, 1838, \$21,577.69; on the first day of May, 1838, \$31,826.83; on the first day of June, 1838, \$37,629.96; and about the time the bank was closed by the bank commissioner, as before stated, \$38,534.38.

3. The books and papers of the bank have been so imperfectly kept and are in such disorder, owing to its sudden suspension, the death of its cashier and other causes but imperfectly known to me at present, that I am at this time unable to state accurately the whole amount of its outstanding liabilities; but I suppose them to be exclusive of what it owes for its capital stock stated as paid in, \$15,000, somewhere about \$29,000.

There have been deposited in my hands as receiver, up to this date, claims to the amount of nineteen thousand six hundred and seventeen dollars and twenty-five cents, with the interest thereon.

4. The nominal assets of the bank, so far as can be judged from the imperfect state of its books and papers are about \$35,000. Of these, I deem that not above eight thousand dollars can be considered good and available at some future day. About eight thousand dollars are considered very doubtful. The rest are deemed in all probability bad, although I cannot owing to the disturbed state of the pecuniary affairs of the country, positively determine. I do not embrace in this estimate the real estate securities of the bank, whose value I cannot judge of.

5. I have no means of ascertaining what amount of the capital stock of the bank was paid in, bona fide, in specie as required by law. I am not informed whether the bank was started upon a basis of specie certificates, in whole or in part, or not. Among the papers of the bank I find the certificate of hon. E.N. Bridges, bank commissioner, dated January 27, 1838, stating "that the bank had exhibited to him, as the property of such association, the amount of specie required by law."

Among the discounted paper of the bank, I find notes to the amount of \$7,570 payable on demand, which I have reason to believe, are what are commonly termed stock notes.

⁶The amount of the assets of the bank that have been prosecuted are about \$30,000, of which nearly six thousand dollars have been already reduced into judgment.

I have neither been able to collect or arrange a single dollar as yet; but have in every instance been compelled to put nearly all of the notes and demands in suit.

I regret that it is out of my power to furnish you at present with precise replies to your queries; but I find it a slow difficult and laborious work, which I have not yet accomplished, to bring the accounts of the bank into order, and to extricate them from the perplexed and somewhat confused state in which I found them, when I assumed the receivership in May last.

Yours, very respectfully,

VINCENT L. BRADFORD
Receiver of the Berrien County Bank

APPENDIX IV

COMPARATIVE STATICS OF THE STATE PREFERENCE MMODEL

COMPARATIVE STATICS

In our model we assume $P_1 = R_1(1) = R_1(2) = 1$; $R_2(1) > 1$ and $R_2(2) = 0$. The expected utility function is:

$$Z = E[U(W^2(\theta))] = \pi(1)U[W^2(1)] + \pi(2)U[W^2(2)] \quad (1)$$

subject to

$$W^1 = P_2X_2 + X_1. \quad (2)$$

Substituting $W^2(1) = R_2(1)X_2 + X_1$ and $W^2(2) = X_1$ into (1) we have

$$Z = \pi(1)U[R_2(1)X_2 + X_1] + \pi(2)U[X_1]. \quad (3)$$

Solving (2) for X_1 and substituting our findings into (3) we have

$$Z = \pi(1)U[(R_2(1) - P_2)X_2 + W^1] + \pi(2)U[W^1 - P_2X_2] \quad (3')$$

Equation (3') states that the decision of the investor is to choose X_2 , the amount purchased of the risk asset, to maximize his expected utility.

The first and second derivatives of (3') with respect to X_2 are

$$\frac{\partial Z}{\partial X_2} = (R_2(1) - P_2)\pi(1)U'[W^2(1)] - P_2\pi(2)U'[W^2(2)] = 0 \quad (4)$$

$$\psi = \frac{\partial^2 Z}{\partial X_2^2} = \underbrace{(R_2(1) - P_2)^2}_{(+)} \underbrace{\pi(1)}_{(+)} \underbrace{U''[W^2(1)]}_{(-)} + \underbrace{P_2^2}_{(+)} \underbrace{\pi(2)}_{(+)} \underbrace{U''[W^2(2)]}_{(-)} < 0 \quad (5)$$

where the () denotes the sign of each term.

In our model we are interested in the change of one variable $(\pi(1), \pi(2), R_2(1), W^1, P_2)$ on our purchase of the risky asset X_2 . To show this, we totally differentiate our first order condition--equation (4).

$$d\left(\frac{\partial Z}{\partial X_2}\right) = \{R_2^2(1) - P_2\}^2 \pi(1) U''[W^2(1)] + P_2 \pi(2) U''[W^2(2)] dX_2 + \\ \{R_2(1) - P_2\} U'[W^2(1)] d\pi(1) - P_2 U'[W^2(2)] d\pi(2) + \\ \{(R_2(1) - P_2) X_2 \pi(1) U''[W^2(1)] + \pi(1) U'[W^2(1)]\} dR_2(1) + \\ \{\pi(1)(R_2(1) - P_2) U''[W^2(1)] - \pi(2) P_2 U''[W^2(2)]\} dW^1 + \\ \{-\pi(1)(R_2(1) - P_2) U''[W^2(1)] X_2 + \pi(2) P_2 U''[W^2(1)] X_2 - \\ \pi(1) U'[W^2(1)] - \pi(2) U'[W^2(2)]\} dP_2.$$

The comparative statistics that we are interested in are

$$\frac{\frac{\partial X_2}{\partial W^1}}{\frac{\partial X_2}{\partial W^1}}, \frac{\frac{\partial X_2}{\partial \pi(1)}}{\frac{\partial X_2}{\partial \pi(1)}}, \frac{\frac{\partial X_2}{\partial \pi(2)}}{\frac{\partial X_2}{\partial \pi(2)}}, \frac{\frac{\partial X_2}{\partial R_2(1)}}{\frac{\partial X_2}{\partial R_2(1)}}, \text{ and } \frac{\frac{\partial X_2}{\partial P_2}}{\frac{\partial X_2}{\partial P_2}}$$

where * denotes the optimal purchase of X_2 .

$$a. \quad \frac{\frac{\partial X_2}{\partial W^1}}{\frac{\partial X_2}{\partial W^1}} = - \frac{\pi(1)(R_2(1) - P_2) U''[W^2(1)] - \pi(2) P_2 U''[W^2(2)]}{(R_2(1) - P_2)^2 \pi(1) U''[W^2(1)] + P_2 \pi(2) U''[W^2(2)]} \quad (6)$$

We know our denominator is equal to $\frac{\partial^2 Z}{\partial X^2} < 0$. However, the sign of the numerator is indeterminate unless more information is available. If

$$\pi(1)(R_2(1) - P_2) U''[W^2(1)] \gtrless \pi(2) P_2 U''[W^2(2)]$$

$$\text{than } \frac{\frac{\partial X_2}{\partial W^1}}{\frac{\partial X_2}{\partial W^1}} \gtrless 0. \quad (7)$$

Arrow and Pratt have shown that the sign of equation (6) depends on the degree of absolute risk aversion; defined as

$$\delta = - \frac{U''[W^2]}{U'[W^2]} .$$

Decreasing absolute risk aversion is denoted as $\delta' < 0$ and increasing absolute risk aversion is denoted as $\delta' > 0$. Let $\delta(1)$ denote the absolute risk aversion measure for state one and let $\delta(2)$ denote the absolute aversion for state two, where $W^2(1) > W^2(2)$.

We will use the Arrow-Pratt measure to determine the sign of (6). Working with equation (7) we will multiple the LHS by $-\frac{U'[W^2(1)]}{U'[W^2(1)]}$ and the RHS by $-\frac{U'[W^2(2)]}{U'[W^2(2)]}$:

$$\pi(1)(R_2(1) - P_2)\delta(1)U'[W^2(1)] \lesssim \pi(2)P_2U'[W^2(2)]\delta(2). \quad (8)$$

Rearranging (8),

$$\frac{U'[W^2(1)]\pi(1)}{U'[W^2(2)]\pi(2)} \lesssim \frac{P_2\delta(2)}{(R_2(1) - P_2)\delta(1)} \quad (8')$$

From our first order condition we know that the RHS of (8') is equal to $\frac{P_2}{R_2(1) - P_2}$. Therefore,

$$\delta(1) \lesssim \delta(2) \text{ and } \frac{\partial X_2}{\partial W^1} \stackrel{*}{\gtrsim} 0$$

In other words, the RHS of (8) will be greater (less) than the LHS when the investor exhibits increasing (decreasing) absolute risk aversion.

And $\frac{\partial X_2}{\partial W^1}$ will be positive (negative) when the investor exhibits decreasing (increasing) absolute risk aversion.

$$b. \quad \frac{\partial X_2}{\partial R_2(1)} = - \frac{1}{\psi} \{ (R_2(1) - P_2) X_2 \pi(1) U''[W^2(1)] + \pi(1) U'[W^2(1)] \} \quad (9)$$

$\begin{matrix} (-) & (+) & (+)(+) & (-) & (+) & (+) \end{matrix}$

This sign of equation (9) is indeterminate, unless certain assumptions are made about the nature of the utility function.

$$c. \quad \frac{\partial X_2}{\partial \pi(1)} = - \frac{1}{\psi} \{ (R_2(1) - P_2) U'[W^2(1)] \} > 0 \quad (10)$$

$\begin{matrix} (-) & (+) & (+) \end{matrix}$

$$d. \quad \frac{\partial X_2}{\partial \pi(2)} = \frac{1}{\psi} P_2 U'[W^2(2)] < 0 \quad (11)$$

$\begin{matrix} (-) & (+) & (+) \end{matrix}$

$$e. \quad \frac{\partial X_2}{\partial P_2} = - \frac{1}{\psi} [-\pi(1)(R_2(1) - P_2) U''[W^2(1)] + \pi(2) P_2 U''[W^2(2)]] X_2$$

$(-)$ | ----- (I) ----- |
 $- \pi(1) U'[W^2(1)] U'[W^2(2)]$ (12)
 | ----- (II) ----- |

The sign of equation (12) is indeterminate. This is not surprising since it represents the Slutsky equation, where term (I) is the income effect (see equation 6) and term (II) is the substitution effect. The

sign of Term II is negative (consistent with the substitution effect).

If we assume that the investor exhibits decreasing absolute risk

aversion, then term (I) would be negative and $\frac{\partial X_2^*}{\partial P_2} < 0$.

APPENDIX V
DATA SET USED IN REGRESSION ANALYSIS

TABLE 0

DATA USED IN REGRESSION EQUATIONS

YEAR	TROP	AGGCAP (in Mill)	NEXPT (in Mill)	INTEREST	DUML	POP (in Mill)
1843/11	47	9.897	32.725	4.477	0	2.499
1844/11	62	10.910	-1.144	4.625	0	2.534
1845/11	63	10.735	-7.638	5.563	0	2.569
1846/11	66	11.166	9.43	8.167	0	2.604
1847/2	66	10.940	20.101	7.333	0	2.703
1848/3	88	12.050	.743	10.154	0	2.727
1849/12	103	13.977	-14.994	11.476	0	2.826
1850/12	122	18.298	-25.494	7.625	1	2.999
1852/12	147	28.096	-40.456	8.306	1	3.097
1853/12	199	46.686	-60.524	8.639	1	3.207
1854/9	206	51.041	-55.294	9.222	1	3.317
1855/9	203	54.347	-36.477	8.958	1	3.373
1856/9	226	65.217	-35.560	8.708	1	3.453
1857/9	227	76.446	-30.785	9.958	1	3.536
1858/12	228	79.197	-14.879	7.600	1	3.619
1859/12	232	80.530	-29.235	6.604	1	3.723
1860/12	232	78.272	-44.898	6.896	1	3.806

TABLE O (Continued)

SOURCE:

A. Rolnick and W.E. Weber, "The Free Banking Era: New Evidence on Laissez Faire Bnking," Federal Reserve Bank of Minneapolis, Staff Report 80.

F.R. MacCauly, "Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields, and Stock Price in the United States Since 1856," (New York: National Bureau of Economic Research, 1939), pp. A243-A251.

W. H. Dillistin, Historical Directory of the Banks of the State of New York. New York State Bankers Association, New York, 1946.

A.J. Rolnick and W.E. Weber, "The Causes of Free Bank Failures: A Detailed Examination," Journal of Monetary Economics, Vol. 14, 1984.

Congressional Serial Set, House Documents and House Executive Documents.

APPENDIX VI

T-TEST OF SELECTIVE VARIABLES REPRESENTED IN CHAPTER III

The evidence presented in Chapter III suggests that certain laws influenced banking behavior. A test of the statistical significance between the specifications of the provisions for each variable would give added support to our findings. Such a test was not included in Chapter III because the availability of data did not allow a complete statistical analysis of all the variables as well as a complete statistical analysis of the variables under different periods of economic activity.

The three variables that are tested in this Appendix are the entry rate, the failure rate and the below-par rate. These variables are not tested under different periods of economic activity; the number of banks that could not be identified as entering, exiting or failing during the periods of falling and rising or steady bond prices are numerous. A statistic under these categories would, therefore, not be representative of the period.

The test includes a data set for each variable. The data set is derived by gathering yearly observations from each state. The observations for the failure rate and below-par rate are calculated in the same manner as defined in Chapter III. The entry rate variable is redefined for this test; the entry rate will equal the number of entrants divided by the number of banks operating at the end of each period. It is necessary to redefine entry because the measure in Chapter III does not account for the total banking market. When observations are taken on a yearly basis, certain states, such as New York and Indiana, are given greater weights because of the size of the

market. Therefore, to correct for the market size, the number of entrants each year will be weighed by the number of banks in operation.

The observations of each variable are categorized according to specifications. The mean and variance of each specification is calculated and tested to see whether there is any statistical difference between the specifications. The mean and variance analysis follows the same approach as in Chapter V; the variances are tested first, then the t statistics are derived based on the assumed variance. All tests are based on a 10 percent significance level; each variable will be analyzed under a separate heading.

Entry Rate

The results of the findings are presented in Table P. Under the specie reserve requirement, the mean entry rates of the zero percent reserve and 12 1/2 percent reserves are statistically different at the 10 percent level. However, this difference indicates that there is a higher entry rate under 12 1/2 percent than under zero. Comparing the means of the entry rates of the zero percent reserve and the 12 1/2 percent reserves with the mean of the entry rate of the specie reserves of 20 percent and above indicates that the mean entry rates of zero and 12 1/2 percent are significantly higher than the mean entry rate of 20 percent and above. Although these results show an inconsistency between the zero and the 12 1/2 reserve requirements, they support the findings in Chapter III that the lower specie reserve

TABLE P

T-Test of Means of Entry Rates

Specie Reserve

Specification Variable	Zero Percent	12 1/2 Percent	20 percent and above
Entry Rate			
Mean	.1476	.4072	.0603
Standard Deviation	.3044	.4843	.1060

T-Test of Means	T-Statistic ¹	F-Statistic
Zero and 12 1/2 percent	-1.79**	1.52
Zero and 20 percent and above	1.63*	4.75
12 1/2 percent and 20 percent and above	1.74	11.73

Stock Reserve

Specification Variable	Par	Market	> Market
Entry Rate			
Mean	.2202	.0795	.0392
Standard Deviation	.3954	.0989	.0475

Test of Means	T-Statistic ¹	F-Statistic
Par and Market	1.95**	16.27
Par and > Market	2.52**	6.41
Market and > Market	1.60	1.60

*Ten percent significant

**Five percent significant.

¹One tail test. Statistic derivation based on the variance assumption.

rates encourage entry while the high specie reserve rates discourage entry.

The high entry rate under the 12 1/2 percent specie reserve may be explainable by examining the stock reserve requirement. The results in Table L indicate that there is a significant difference between the mean entry rate under the par valuation and the market valuation, with the par valuation showing significantly higher entry rates. The par valuation also shows a significantly higher entry rate than does the greater than market valuation. As was discussed in Chapter III the stock evaluation provision can be used to explain the high entry rate under the 12 1/2 percent specie reserve provision. When the states that fell under both par valuation and the 12 1/2 percent specie reserve requirement are compared with states falling under par valuation and zero percent specie reserves there is no significant difference in the mean entry rates (see Table Q). This implies that the stock evaluation provision has the greater effect on entry. This is further supported when states falling under par and zero percent are compared with states falling under market and zero percent. The par/zero states show a significantly higher mean entry rate than do the market/zero states. Thus it appears that the stock reserve provision has an impact on entry. Since both states that operated under the 12 1/2 percent specie reserve provision also operated under the par valuation provision, the high entry rates under the 12 1/2 percent provision can be explained by the stock reserve

TABLE Q

T-Test of Means of Entry Rates Under Combination of Specifications

Specification Pair	Par Zero	Par 12 1/2 Percent	Market Zero
Entry Rate			
Mean	.4043	.4072	.0666
Standard Deviation	.5313	.4843	.0610

T-Test of Means	T-Statistic ¹	F-Statistic
Par Zero and Par 12 1/2	2.00**	a
Par Zero and Market Zero	-0.01	1.90

**Five percent significant.

¹One tail test. Statistic derivation based on the variance assumption.

^aF statistic indicates that there is zero percent probability that the variances are equal.

evaluation provision. Thus the statistical tests of the mean entry rates support the findings of Chapter III.

Failure Rate

The number of banks in operation that failed were found in Chapter III to be strongly influenced by the specie reserve provision. A statistical examination of the mean failure rate (see Table R) shows a significant difference in the mean failure rate of banks operating under a zero percent specie reserve requirement and those operating under an above 12 1/2 percent specie reserve requirement with those operating above 12 1/2 percent showing fewer failures. These results imply that a high specie reserve requirement limits failures while a low specie reserve requirement encourages failures. There is not significant difference in the mean failure rate between banks operating under the zero specie reserve requirement and the 12 1/2 percent specie reserve requirement. Again, this can be explained through an examination of the stock reserve provision. The mean failure rate of banks operating under the par valuation is significantly greater than the mean failure rate of banks operating under market or greater than market. Since all the banks operating under the 12 1/2 percent specie reserve requirement were also operating under the par valuation requirement, they would be expected to have relatively high failure rates, as did the banks operating under the zero percent specie reserve requirement. Thus the stock evaluation provision is instrumental in explaining the results found under the specie reserve provision. Thus far both the specie reserve

TABLE R

T-Test of Means of Failure Rates

Specie Reserve

Specification Variable	Zero Percent	12 1/2 Percent	20 percent and above
Entry Rate			
Mean	.0580	.0390	.0000
Standard Deviation	.1638	.0949	.0000

T-Test of Means	T-Statistic ¹	F-Statistic
Zero and 12 1/2 percent	.31	.56
Zero and 20 percent and above	2.18**	11.62
12 1/2 percent and 20 percent and above	1.16	16.47

Stock Reserve

Specification Variable	Par	Market	> Market
Entry Rate			
Mean	.0685	.0058	.0038
Standard Deviation	.1765	.0154	.0099

Test of Means	T-Statistic ¹	F-Statistic
Par and Market	2.06**	17.71
Par and > Market	2.12**	4.53
Market and > Market	.42	0.12

**Five percent significant.

¹One tail test. Statistic derivation based on the variance assumption.

provision and the stock reserve provision appear to have an impact on the operations of the banking market. These findings agree with the discussion in Chapter III.

The last measure that will be examined is the number of failures per existing bank (i.e., the below par rate). A comparison from Table S of the 12 1/2 percent specie reserve requirement and the zero percent reserve requirement with the above 12 1/2 percent specie reserve requirement shows a significant difference in the means, implying that the specie reserve provision has some effect on below par failures. But an examination of Table O shows there is no significant difference in the below par rate between the zero percent specie reserve requirement and the 12 1/2 percent specie reserve requirement. In this case, the high below par failure rate of the 12 1/2 percent specie reserve requirement cannot be explained by the stock reserve provision. The stock reserve results showed no significant difference in the means of the below par failure rates between the par requirement and the market requirement. Thus, it appears that the stock reserve requirement had no significant effect on the below par failure rate. Therefore, while the specie reserve requirements give some explanation of the below par failure rates, a complete explanation is not possible by merely examining these laws.

In summary, the statistical results give additional support to the results found in Chapter III. All three measures are affected by the specie reserve provision. As was hypothesized in the chapter, high specie reserve requirements discourage entry, failures, and

TABLE S

T-Test of Means of Entry Rates

Specie Reserve

Specification Variable	Zero Percent	12 1/2 Percent	20 percent and above
Entry Rate			
Mean	.1989	.2212	.0000
Standard Deviation	.3589	.3252	.0000

T-Test of Means	T-Statistic	F-Statistic
Zero and 12 1/2 percent	-.17	.002
Zero and 20 percent and above	3.42**	35.82
12 1/2 percent and 20 percent and above	1.92*	a

Stock Reserve

Specification Variable	Par	Market	> Market
Entry Rate			
Mean	.1323	.1367	.1429
Standard Deviation	.3039	.2877	.3780

Test of Means	T-Statistic	F-Statistic
Par and Market	-.06	.21
Par and > Market	-.07	.09
Market and > Market	-.04	.30

*Ten percent significant

**Five percent significant.

^aF statistic indicates that there is a zero percent probability that the variances are equal.

par closings. The stock reserve requirement also has an effect on entry and failures but does not appear to affect below par closings.

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the scanned document**