Federal Reserve Bank of Minneapolis
Research Department Staff Report 344

August 2004

Were U.S. State Banknotes Priced as Securities?

Warren E. Weber*

Federal Reserve Bank of Minneapolis

ABSTRACT

This study examines the pricing of U.S. state banknotes before 1860 using data on the discounts on these notes as quoted in banknote reporters in New York, Philadelphia, Cincinnati, and Cleveland. The study attempts to determine whether these banknotes were priced consistent with their expected net redemption value—that is, as securities are. It finds that they are not. A bank's notes did have higher prices when the bank was redeeming its notes for specie than when it was not, and banknote prices generally reflected the distances necessary to travel in order to redeem the notes, with larger discounts generally required for longer distances. However, those relationships were not tight, and persistent asymmetries existed between locations.

*I am indebted to participants at seminars at the Federal Reserve Bank of Minneapolis, the Federal Reserve Bank of Chicago, the Central Bank Institute of the Federal Reserve Bank of Cleveland, the University of Indiana, the University of Kentucky, Northwestern University, and the Ohio State University for helpful comments on an earlier version of this paper. The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

When it won independence from Great Britain in 1783, the United States had only one bank, the Bank of North America in Philadelphia. This did not remain true for long, however. The number of banks grew rapidly, and by 1840, the country had about 600 banks. In 1860, just before the start of the Civil War, the country had almost 1400 banks.

Virtually all of these banks issued banknotes—dollar-denominated promises to pay specie to the bearer on demand—that were distinguishable by the issuing bank.[1] Banknotes circulated hand-to-hand and were the largest component of currency in circulation during the period. Consequently, there were large numbers of distinct currencies in circulation in the country throughout the antebellum period, and, as is known from contemporary sources, these notes circulated at exchange rates that fluctuated over time.[2]

The existence of a large number of currencies circulating at floating exchange rates led some contemporary observers to conclude that these banking arrangements should be changed. For example, the following excerpt from the *London Times* was used by Senator John Sherman of Ohio in a speech on February 10, 1863, advocating passage of the National Currency Act:

> By the want of a paper currency that would be taken in every State of the Union at its nominal value the Americans have suffered severely. The different States were,

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[1] During this period, a dollar was defined to be governmentally minted coin containing 371.25 grains of silver. Large denomination coins were made of gold. The gold content of the dollar was changed in 1834 and 1837.

Banknotes were almost always at least $1 in denomination, and in many cases banks were restricted to issuing notes no smaller than $5. To give these denominations some perspective, some wholesale prices in Philadelphia in 1850 were flour between $0.02 and $0.03 per pound, coffee between $0.08 and $0.13 per pound, and rye whisky between $0.22 and $0.28 per gallon (Cole, 1938, pp 314–15). Overall, consumer prices were roughly 23 times higher in 2002 than they were in 1850 based on the "Composite Consumer Price Index (1860) in McCusker (1992).

[2] Specialized publications at the time listed the rates of discount or premium on the notes of banks throughout the country in terms of notes of banks of some city, usually the location of the publication. These "Bank Note Reporters and Counterfeit Detectors"—they also usually contained lists of known counterfeits—were published by or in collaboration with a banknote broker in the particular city. For an excellent discussion of banknote reporters and counterfeit detectors see Dillistin (1949). In addition, many newspapers published tables containing similar information on banknote prices.

> as to their bank notes, so many foreign countries, each refusing the paper of the others, except at continually varying rates of discount.... Through [a national currency] the people will ... gain that deliverance from the previous confusion of their currency which to Europeans appeared a barbarism. (Krooss, 1969, pp 1361-62)

In other words, the replacement of notes issued by state banks with a uniform currency would be a welfare improvement.[3]

Notes issued by state banks, however, gave the bearer the option to exchange them for gold or silver, which was valued in and of itself. As Wallace (2003, p 256) points out, if state banknotes are considered to be "payable-to-the-bearer securities [because of this redemption option], then we might be ... reluctant to accept the conclusion that they should trade at par," and, as a consequence, to question the presumption that a uniform banknote currency that replaced state banknotes was necessarily a welfare improvement.[4]

My purpose here is to determine the extent to which the behavior of the prices of banknotes during the antebellum period is consistent with the view that the public treated them as bearer securities. Under the assumption of risk neutrality, the price of a security should equal the expected discounted value of its payment stream. For banknotes, the expected payment stream was, to a first approximation, the expected amount of specie for which the notes could be redeemed net of the cost of redeeming notes at the issuing bank. Thus, if banknotes were treated as securities and it took only a relatively short time to redeem them,

[3] By a *uniform currency*, I mean that units of distinct currencies with the same numerical designation always trade at par with each other and buy the same quantity of goods at a given location at a given time. Theoretical support for a uniform currency can be found in models like that of Ravikumar and Wallace (2001). In such models, currencies are *fiat* (intrinsically useless) objects used to overcome transactions frictions. Nonuniformity of currencies is undesirable because it limits the potential trades that can occur.

[4] National bank notes, which were essentially a uniform currency, came into existence with the passage of the National Currency Act (later called the National Banking Act) in 1863. State banknotes continued to circulate until the passage of a 10 percent tax on them levied in 1866 effectively drove them out of circulation.

then their prices should have been equal to their expected net redemption value.

This proposition has at least two implications that can be taken to the data. One comes from the fact that although banks generally redeemed their notes in specie on demand, there were times when many banks suspended specie payments. Such suspensions of payment presumably lowered expectations about the amount of specie for which the notes could be redeemed. If banknotes were treated as securities, then their prices should have fallen when banks issuing them suspended payments. A second testable implication is that redemption costs should have affected banknote prices. If banknotes were treated as securities, then banknotes that had higher redemption costs should have had lower prices.

I find some evidence consistent with the view that banknotes were considered to be securities. First, banknote prices generally responded to changes in expectations concerning the amount of specie for which they could be redeemed as the proposition predicts. When banks had temporarily suspended specie payments, the prices of their notes were lower than when they were redeeming their notes in specie on demand. Further, banknote prices tended to track movements in banknote-specie exchange rates. Second, banknote prices were negatively related to redemption costs, as measured by the transportation cost of getting to the issuing bank from the location of the banknote price quote.

However, I also find evidence not consistent with the proposition. First, the relationship between banknotes prices and transportation costs was not tight. Sometimes the discounts on notes of banks from different locations were the same even though the cost of travel varied greatly, and sometimes the discounts on the notes of banks in different locations varied greatly even though the travel cost to these locations was the same. Second, changes in the discount on the notes of banks in a location did not vary systematically with changes in the cost of travel to that location. Third, banknote prices were not symmetric. Prices quoted in one location for notes of banks in another location generally did not equal the prices quoted in the other location for notes of banks in the first location. Based on this empirical evidence, I conclude that banknotes were not treated as securities.[5]

I proceed as follows. The next section presents an explicit formulation of the proposition that if banknotes were treated as securities, their prices should have equalled their expected net redemption value. Section 2 compares banknote prices in periods when specie payments were suspended with periods when banks were redeeming notes for specie. I show that prices changed during bank suspensions as would be predicted if banknotes were treated as securities. Section 3 examines the relationship between banknote prices and redemption costs as measured by travel costs. I show that although banknote prices and travel costs were generally negatively correlated, as should be the case if banknotes were treated as securities, the relationship was not tight and did not vary systematically with changes in costs. I also show that banknote prices were not symmetric. I also discuss some problems in using travel costs to proxy redemption costs. Section 4 concludes. The data on banknote prices used in this study are described in the Appendix.

1. Banknotes as securities

Under the assumption of risk neutrality, the price of a security should equal the expected discounted value of its payment stream. If banknote prices were quoted in terms of specie, then the expected payment stream would have been the expected amount of specie

[5] Gorton (1999) also examines the question of whether banknotes were treated like securities. Although the actual pricing equation developed here differs from the Black-Scholes banknote pricing equation he used, the testable implications of the analyses are similar. Gorton's evidence supports the proposition that banknotes were viewed as securities, in contrast to my conclusion.

for which the notes could be redeemed less the cost of redeeming notes at the issuing bank.

However, in actuality, banknote prices were quoted in terms of notes of local banks (banks where the price was quoted), not in terms of specie. This makes determining the payment stream from a banknote slightly more complicated as can be seen by considering what a note broker in location j would have earned by exchanging notes of a local (location j) bank for the notes of bank n in location i. (It is convenient to think of location i as different from location j, but it could be the same.)

After the exchange, the broker would have shipped the notes to bank n and received $q_{t'}(n)$ dollars of gold for each dollar of bank n notes presented for redemption. (The time subscript on this redemption rate is t' not t to account for the fact that what mattered was the redemption rate when the note was presented in the future, not the redemption rate when the broker bought the note.) If bank n was redeeming its notes in gold (the bank was not suspended) at t', then $q_{t'}(n) = 1$. If it was suspended, then $q_{t'}(n) \leq 1$. The broker then would have brought the gold back to location j and exchanged it for local banknotes at the rate of $1/q_{t''}(j)$ notes per dollar of gold. (The time subscript here is t'' to account for the fact that what mattered was the local redemption rate when the broker got the gold back to location j). Letting E_t be the expectation operator conditional on information at t, then $E_t[q_{t'}(n)/q_{t''}(j)]$ is the gross payment in terms of local banknotes that the broker expected to receive from the purchase of a dollar of bank n notes.[6]

Note redemption also may have involved costs, such as getting the notes back to the issuing bank and returning with specie, that the broker also would have had to pay. I assume

[6] I leave open the very interesting question of how $E_t[q_{t'}(n)]$ was determined when banks have suspended payments.

that the cost of redeeming notes depends upon a bank's location, not on its identity. Letting $\delta_t(i,j)$ be the cost of redeeming notes of banks in location i and assuming that this cost was proportional to the size of the transaction and was known at t, then the expected net payment stream from the purchase of a dollar of notes of bank n in location i was

$$(1) \qquad E_t\left[\frac{q_{t'}(n)}{q_{t''}(j)}\right][1-\delta_t(i,j)] = p_t(n,j)$$

where $p_t(n,j)$ denotes the price of a dollar of the notes of bank n in terms of the notes of banks in location j at time t. Banknote quotations were in terms of discounts from or premiums over par. The discount quoted in location j on the notes of bank n is $d_t(n,j) = 1 - p_t(n,j)$.

2. Banknote discounts and bank suspensions

One implication of the theory presented above is that whether or not a bank was redeeming its notes should have affected their price. In this section, I develop that implication more fully and compare the resulting predictions with the data. I find that the data are consistent with this prediction of the view that banknotes were viewed as securities.

A. Theory

When bank n and local banks were expected to be redeeming their notes from t through t'', $E_t[q_{t'}(n)] = E_t[q_{t''}(j)] = 1$. Then, (1) and the definition of the discount on a note imply

$$(2) \qquad d_t(n,j) = 1 - \delta_t(i,j) = \tilde{d}_t(n,j).$$

In other words, when bank n and banks in location j were both redeeming, the discount on the notes of bank n should have been equal to the cost of redeeming notes in location i, where bank n was located. I will denote this discount as $\tilde{d}_t(n,j)$ and refer to it as the normal discount on bank n's notes. There is no presumption that this normal discount was constant over time as redemption costs could have varied over time.

However, when either bank n or local banks were suspended, the expectation term in (1) was not necessarily equal to 1. In this case, the discount on a bank's notes could have differed from the normal discount.

Two cases are of interest. The first is when bank n was expected to be suspended at t', but local banks were expected to continue to redeem their notes through t''. In this case $E_t[q_{t'}(n)/q_{t''}(j)] \leq 1$, because $E_t[q_{t'}(n)] \leq 1$ while $E_t[q_{t''}(j)] = 1$. Then, from (1) and (2)

$$d_t(n, j) \geq \tilde{d}_t(n, j).$$

The implication is that if banknotes were treated as securities, then during times when local banks were redeeming their notes, the discounts on suspended banks' notes should have been at least as large as when they were also redeeming their notes.

The other case of interest is when bank n was expected to redeem its notes at t', but local banks were expected to be suspended through t''. Using the same logic as above, $d_t(n, j) \leq \tilde{d}_t(n, j)$ for this case. If banknotes were treated as securities, then during times when local banks were suspended but bank n was not, then the discount on bank n's notes should have been no greater than during times when local banks were also redeeming their notes.

It is important to note that the theory does not deliver predictions about the discounts on bank n's notes when both it and local banks were suspended. Since $E_t[q_{t'}(n)] \leq 1$ and $E_t[q_{t''}(j)] \leq 1$ in this case, $E_t[q_{t'}(n)/q_{t''}(j)] \gtreqless 1$.

B. Data

The data seem consistent with these predictions of the view that banknotes were treated as securities. Discounts on a bank's notes were generally smaller when banks were redeeming their notes than when it was suspended and other banks were not.

For the period from May 1837 until the end of 1842 I am able to determine the dates of specie payment suspensions and resumptions for banks in the cities of New York, Philadelphia, Baltimore, Charleston, and Cincinnati; for banks in the states of North Carolina and Kentucky; and for the Bank of Virginia in Richmond and the Bank of Louisiana in New Orleans. A list of these dates is given in Table 1. The table shows that there were several episodes when banks in some of these locations were suspended while banks in other locations were not.

I first consider the evidence from banknote discounts as quoted in New York. There are two episodes when banks in New York were redeeming their notes in specie, but banks in some other locations were not: one from May 1838 to August of that year (or December in the case of New Orleans) and a second beginning in October 1839 and lasting until July 1840 in the case of Charleston and until various times in 1842 for banks in the other locations.

The discounts quoted by New York brokers on the notes of all banks in the other locations listed in Table 1 are shown in Figure 1 for the period 1835 through 1844, one panel per location. (Throughout this discussion, I use the term *foreign banks* to designate banks in locations other than that where the discount is being quoted and *local banks* to designate banks where the discount is being quoted.) Periods when both foreign and New York banks were redeeming are shown in gray, and periods when foreign banks were suspended and New

York banks were redeeming are shown in black.[7] In dating the observations, I assume that the date of the discount is the date of the publication in which it appears.

Testing whether the discounts in these figures are consistent with the banknotes-as-securities view requires an estimate of $\tilde{d}_t(n, j)$, the normal discount on bank n's notes, for banks in each location. For this I use the average discount on the notes of banks in a particular location for the period between 1835 and 1840 when both those banks and New York banks were redeeming their notes. Obviously, this choice is somewhat arbitrary. My justification is that it covers a long enough period to insure that the results are not sensitive to a few outliers, but that the period is short enough that changes in the cost of redeeming notes should not have changed very much.[8] My estimate of $\tilde{d}_t(n, j)$ for banks in each location is shown by the black dashed line in each figure. This line is the average of the gray line for the period 1835 to 1840. For the data to be consistent with the prediction of the banknotes-as-securities view, the discounts in black would always have to lie above this line.

That is true for all cases except the Bank of Louisiana.[9] The strongest support comes from the discounts on the notes of Philadelphia banks (first panel). Not only were the discounts on the notes of Philadelphia banks in the Philadelphia suspended/New York redeeming case always above the dashed line, but they were also always larger than any discount when banks in both places were redeeming.

[7] For completeness, periods when both foreign and New York banks were suspended are shown in dotted light gray. However, these periods are not discussed, because, as noted above, the theory does not deliver predictions about banknote discounts during these periods.

[8] Extending the time period used to estimate $\tilde{d}_t(n, j)$ in either direction would only lower the estimate, and as is shown below, would only make the evidence more consistent with the view that prices were determined by net redemption value.

[9] Because the Philadelphia discount quotations for New Orleans banks differ by bank, I chose to use that for the Bank of Louisiana. The discount quotations for New York are for "All New Orleans banks" of which the Bank of Louisiana was one.

For banks in the other locations, excluding the Bank of Louisiana, there were some times when the discounts on their notes in the foreign suspended/New York redeeming case were smaller than some of the discounts when banks in both places were redeeming. However, these periods were few and short-lived. Further, the large discounts when banks in both places were redeeming mostly occur immediately before times of bank suspensions, and it may not be reasonable to assume that $E_t[q_{t'}(n)/q_{t''}(j)] = 1$ at such times. Hence, I conclude that the evidence for banks in these locations also is consistent with proposition that banknotes were treated as securities.

The evidence for the Bank of Louisiana (last panel) is less consistent with the banknotes-as-securities view. There were two periods when the Bank of Louisiana had suspended while New York banks were redeeming, yet, contrary to the theory, the discounts on its notes fell below the dashed line. These occur from October through December 1838 and from October 1840 to early February 1841. Nonetheless, it is true that when the Bank of Louisiana was suspended but New York banks were not, the vast majority of discounts were larger than when banks in both locations were redeeming.

My conclusion is that, taken as a whole, the evidence from New York shows that discounts on banknotes were greater when banks had suspended specie payments than when they were redeeming their notes and is therefore consistent with the proposition that banknotes were treated as securities.

An interesting regularity also appears in Figure 1. The discounts on the notes of foreign banks always increased when banks in New York suspended payments regardless of whether or not local banks suspended at the same time. The only case for which this did not occur is the Bank of Virginia.

I next consider the evidence from discounts quoted in Philadelphia. Table 1 shows that during 1842 there was a time when banks in Philadelphia had resumed redeeming their notes, but the Bank of Virginia, the Bank of Louisiana, and banks in Kentucky and North Carolina continued to be suspended. The discounts for the period 1839 through 1844 on the notes of the Bank of Virginia and the Bank of Louisiana are shown in Figure 2. I use the same conventions for the lines in these figures as in Figure 1. The results are very similar to those for the discounts as quoted in New York. Specifically, the discounts in black (foreign suspended/Philadelphia redeeming) always lie above the black dashed line (estimate of $\tilde{d}_t(n, j)$). Thus, I conclude that this evidence on discount quotes from Philadelphia is also consistent with banknotes having been treated as securities.

The evidence presented above is for cases when foreign banks were suspended and local banks were redeeming versus discounts when both were redeeming. The fact that I have quotations from Philadelphia permits tests for the opposite case—when Philadelphia banks were suspended but banks in some other locations were not. As noted above, if banknotes were treated as securities, the discounts on notes of redeeming foreign banks should have been no larger during these times than during times when Philadelphia banks were also redeeming their notes.

I consider three episodes. The first two were the times when Philadelphia banks had suspended but New York banks had not. These are the same episodes considered in the discussion of discount quotes from New York, but I now consider them from the point of view of discounts quoted in Philadelphia. The discounts on the notes of New York banks as quoted in Philadelphia for this period are shown in the upper panel of Figure 3 (negative discounts are premia). These are consistent with the predictions of the theory since they were never larger when Philadelphia banks were suspended than when they were redeeming. In fact, the figure shows that during the second suspension by Philadelphia banks, notes of New York banks commanded a substantial premium in Philadelphia.

The third episode is from July 1840, when Charleston banks resumed specie payments, until March 1842 when Philadelphia banks resumed specie payments. The discounts on the notes of Charleston banks as quoted in Philadelphia for 1839–44 are shown in the lower panel of Figure 3. The evidence here is less favorable to the banknotes-as-securities view than that in the upper panel, but only slightly less so. Until January 1844, the discounts quoted in Philadelphia on the notes of Charleston banks were never less than 1 percent when Philadelphia banks and Charleston banks were both redeeming their notes in specie. However, when Philadelphia banks were suspended and Charleston banks were redeeming, the discount is 1 percent or less except for March and April 1841.

I am able to perform another test of whether redemption rates affected banknote prices as predicted by the banknotes-as-securities view. For the period 1839–42 I have data on the exchange rate between specie and local bank notes for Philadelphia. Thus, I have data on $q_{t''}(j)$ for the period October 1839 to May 1842 during which Philadelphia banks were suspended. Because New York banks were not suspended during this period, it is reasonable to assume that $q_{t'}(n) = 1$ for these banks for this time. As can be seen from (1), an implication of the banknotes-as-securities view is that the price of specie and the price of New York banknotes should have been equal except for redemption costs.

The discounts on New York banknotes and on specie for October 1839 to May 1842 as quoted in Philadelphia are shown in Figure 4. Although the difference between the two series was not constant over time, the two series tracked each other very closely over time. The correlation is 0.72. I take this as strong evidence in favor of the proposition that banknotes were viewed as securities.

I conclude that taken as a whole, the evidence from the periods when banks in one location were redeeming while banks in another location were not is consistent with the view that banknotes were priced as securities during the antebellum period.

3. Banknote discounts and redemption costs

If banknotes were treated as securities, then (1) predicts that the discount on a bank's notes should have been positively related to the cost of redeeming its notes, $\delta_t(i, j)$. I test this prediction in three ways. The first is by examining the discounts on the notes of a cross section of banks with different redemption costs at a point in time. The second is by examining whether the discounts on the notes of banks in a particular location changed over time in response to changes in redemption costs. The third is by examining whether discounts on banknotes were symmetric in the sense that the discounts quoted in location i on notes of banks in location j were the same as the discounts quoted in j on the notes of banks in i. I find that although the first sets of tests generally support the view that banknotes were treated as securities, the second and third tests do not.

For these tests, I examine only periods during which all banks could reasonably be expected to be redeeming their notes. In other words, I assume that $E_t[q_{t'}(n)/q_{t''}(j)] = 1$ for all n, j during the time periods used to test this prediction. By limiting the examination to such periods, there are no issues about expected differences in gross redemption values affecting banknote discounts.

To conduct these tests, I use travel costs as the proxy for redemption costs. I obtained information on the cost of traveling from New York or Philadelphia to various locations from *Disturnell's Guide through the Middle, Northern, and Eastern States* for 1847 and *Disturnell's Railway and Steamship Guide* for 1854 and 1855 (I will refer to all three as *Disturnell's*). I assume that the travel cost is the price of a one-way ticket to get from either New York or Philadelphia to some location. By 1854, this was the price of a railroad ticket in most cases. However, there were cases, including that of getting from Philadelphia to New York, in which a steamboat or ferry trip was also involved. Further, getting to Mobile and New Orleans involved taking a stagecoach at least part of the way.

Not all of the locations for which I could obtain travel costs are appropriate for conducting these tests, however. The banks in some locations had some type of special note redemption arrangements that could have affected the discounts on their notes. Specifically, I eliminated all cities in New England except Boston, because of the presence of the Suffolk Banking System, a note-clearing arrangement that virtually all New England banks participated in during this period. While this System was in place, the notes of all New England banks went at par in that region, which meant that the notes of all banks in that region were quoted at the same rate of discount. I also eliminated all cities in the state of New York except Albany. After July 1841, every New York bank was required to have an agent bank in either New York or Albany that would redeem its notes at no greater than a one-half percent discount. I also eliminated virtually all cities in New Jersey because all banks in those cities had par redemption arrangements with banks in either New York or Philadelphia, and I eliminated all cities in Delaware and several cities near Philadelphia because all banks in these cities had par redemption arrangements with banks in that city. Finally, I eliminated all cities in Ohio except Cleveland because according to the General Banking Law of February 24, 1845, "Independent banks were required to redeem each other's notes without discrimination" (Huntington, 1915, p 426). In the end, I was left with a sample of 34 cities. Cost and discount information for these cities is given in the Appendix Tables A1 and A2.

A. Differences across banks

I first consider the case in which the notes of bank n in location n'were more costly to redeem in location j than were the notes of bank i in location i'; that is, $\delta_t(i', j) < \delta_t(n', j)$. When this is true, the banknotes-as-securities view predicts that $d_t(i, j) < d_t(n, j)$; that is, the discount of the notes of bank i should be lower than the discount on the notes of bank n. I find that the data do not consistently support this prediction.

Discounts quoted in New York and Philadelphia are plotted against travel cost for 1847 and 1854 in Figure 5.[10] All plots have an observation at the origin, because when local banks were redeeming, their notes were quoted at par. As the figure shows, in all cases discounts tended to be greater the greater were travel costs, which is consistent with the view that banknotes were treated as securities.

However, in several cases there were large differences in travel costs with little or no difference in discounts. In 1847 the cost of getting from New York to Richmond was $13, the cost of getting to Mobile was $63.50, and the cost of getting to New Orleans was $68.50. Yet the notes of banks in all three locations had an average quoted discount in New York

[10]Also plotted in the figures in the regression line for the equation

$$d_t(i,j) = \begin{cases} \alpha + \beta \ln[\delta_t i, j)] & \text{if } \alpha + \beta \ln[\delta_t(i,j)] \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

for j = New York or Philadelphia. The semi-log form was chosen because it fit the data better than any equation in the class $\delta_t(i,j)^{\gamma-1}/(\gamma-1)$. Consistent with the banknotes-as-securities view, the estimates of β are positively and statistically significant in all panels.

during that year of approximately 1.1 percent. In 1847, the cost of getting from Philadelphia to Charleston was $24 and the cost of getting to New Orleans was $65.50. Yet, the notes of banks in both locations had the same average quoted discount (1.06 percent) during that year. In 1854, getting from New York to Mobile cost $50.42; to New Orleans, $55.42; to Cleveland, only $11. Yet the average annual discount quoted in New York on the notes of banks in all three locations was 2 percent. Also, the average annual discount on the notes of banks in Savannah was 1.25 (cost, slightly more than $33, from New York), the same as Richmond (cost, $11 from New York).

The evidence for 1854 also shows cases in which there were large differences in discounts with little or no difference in travel costs. In 1854, it cost $11 to get from New York to Pittsburgh; Cumberland, MD; or Cleveland. Yet the average annual quoted discounts on the notes of banks in these locations ranged from 0.75 percent (Cumberland and Pittsburgh) to 2 percent (Cleveland). The same types of differences also appear in the discounts quoted in Philadelphia.

Unfortunately, I have only been able to find travel cost data for 1847 and 1854, so I cannot determine how discounts and travel costs were related in other years. Since distance and travel cost were highly correlated in 1847 and 1854, however, distance may be a good proxy for travel costs during the first half of this century. Thus, I examined the relationship between bank note discounts and distance for 1827 and 1836 for New York and for 1836 for Philadelphia. (Discount quotes for Philadelphia are not available for 1827.) The reason for the choice of these years is to have observations at roughly 10-year intervals, so that I have one entry for each decade beginning with 1827. However, I chose 1836 instead of 1837 to avoid the panic beginning in May of that year (see Table 1). The data on distances and discounts are also in Appendix Tables A1 and A2.

The results are shown in Figure 6. The results in these figures are consistent with those for the later years. Discounts on notes generally increased with the distance of the issuing bank from the location in which the discount was being quoted. However, once again, sometimes there were large differences in discounts without there being large differences in distance. The exception here is the result for discounts quoted in Philadelphia in 1836, which include no large outliers; for this time and location the relationship between discounts and distance was linear and tight.

B. Differences across time

I now consider the case in which the cost of redeeming the notes of banks in location i was smaller at time t_2 than at t_1; that is $\delta_{t_1}(i,j) > \delta_{t_2}(i,j)$. If banks in all locations were redeeming their notes, then (1) predicts that $d_{t_2}(n,j) < d_{t_1}(n,j)$ for any bank n in location i. In other words, the discounts on the notes of banks in location i should fall when the cost of traveling to that location falls. This is the prediction I test now. I find that it fails.

An examination of Appendix Tables A1 and A2 shows that my data includes 20 locations for which I have the cost of one-way travel to those locations from New York and Philadelphia for both 1847 and 1854. The movement of discounts on the notes of banks in these locations as quoted in New York and Philadelphia between 1847 and 1854 sorted by change in travel costs is reported below.

Relationship between differences in costs and discounts between 1854–1847

New York

		Δ costs		
		positive	zero	negative
Δ discounts	positive	1	1	4
	zero	3	2	0
	negative	1	1	7

Philadelphia

		Δ costs		
		positive	zero	negative
Δ discounts	positive	3	2	3
	zero	0	0	0
	negative	3	2	7

The entries on the diagonal are those that are consistent with banknotes being treated as securities. The results are not favorable to this proposition: The changes in discounts were essentially independent of the change in travel cost. In both New York and Philadelphia the discounts on banknotes move in the same direction as the cost of travel only half the time. The correlation between the magnitude of changes in discounts and changes in travel costs is -0.16 for New York and a low 0.29 for Philadelphia.

C. Differences across quote locations

Lastly, I compare the discounts on banknotes as quoted in two different locations i and j. Specifically, I examine the discount on the notes of bank n located in i and bank n' located in j. If the travel cost of going between two locations was the same regardless of which direction one was going, then the cost of redeeming bank notes should have been symmetric across locations; that is, $\delta_t(i, j) = \delta_t(j, i)$. Then, assuming that banks in all locations were redeeming their notes, (1) predicts that $d_t(n, j) = d_t(n', i)$. The discount on banknotes should have been symmetric: the discount quoted in j for the notes of bank n located in i should have been the same as the discount quoted in i for the notes of bank n' located in j. I find this prediction also fails.

With my data, I can examine three possible cases to see if banknote discounts are symmetric. First, I compare the discount on the notes of Philadelphia banks in New York with the discount on the notes of New York banks in Philadelphia for the period 1845–56, a period during which banks in both locations were redeeming and for which I have good data. The notes of Philadelphia banks were uniformly at a one-quarter percent discount in New York. In contrast, the notes of New York banks were never at a discount greater than one-eighth percent in Philadelphia, and there were times when they were quoted at par.

Second, I compare the discount on the notes of Cincinnati banks as quoted in Philadelphia and as quoted in New York with the discount on the notes of New York and Philadelphia banks as quoted in Cincinnati. I do this for each observation of banknote price quotes in Cincinnati. The notes of Cincinnati banks were always at discounts of 1 percent or greater in New York and Philadelphia. However, the notes of New York and Philadelphia banks were always quoted at par in Cincinnati.

Lastly, I do the same comparison for the discount on the notes of Cleveland banks as quoted in New York and as quoted in Philadelphia with the discounts on the notes of New York and Philadelphia banks as quoted in Cleveland. I only do this for 1856 since that is the only time when I have discount quotes for Cleveland. I find that the notes of Cleveland banks were at a 1 percent discount in both New York and Philadelphia during that year. However, New York and Philadelphia banknotes were always quoted at par in Cleveland.

D. Travel costs as redemption costs

Using travel costs as the proxy for redemption costs implicitly assumes that each dollar of banknotes purchased by a broker was sent back to the issuing bank and had the same redemption cost. However, it is possible that the volume of notes sent for redemption differed by location of issue. In this case, travel costs would not be a good measure of the average cost of redeeming a dollar's worth of notes. Further, notes came in different denominations. So, if what mattered for the cost of redemption was the number of pieces of paper, not their dollar value, then, once again, travel costs would not necessarily be a good measure of average redemption costs per dollar's worth of notes.

Unfortunately, I have been unable to obtain any information on the volume or total value of notes purchased by brokers in either New York or Philadelphia in the aggregate or by location. However, I am able to obtain information on the population of and the total circulation of banks in each of the locations in my sample. If the volume or total value of notes that banks in a particular location presented to brokers in New York and Philadelphia were positively related to the financial importance of that location as measured by its population and to the total value of notes emitted by banks in that location, then average redemption costs should have been declining functions of these variables.

To determine whether this was the case, I regressed discounts on population (both levels and logs), total circulation (both levels and logs), and log travel costs. For Philadelphia, the estimated coefficients on population and total circulation were never significantly different from zero at the 5 percent level; the estimated coefficients on log travel costs always were. For New York for 1854, the estimated coefficient on population (level not log) was negative and significantly different from zero at the 5 percent level in a regression which included log travel costs as the only other independent variable. The estimated coefficients on circulation were always positive and statistically insignificant. For 1847, the estimated coefficients on population and circulation (levels not logs) were negative and significantly different from zero at the 5 percent level in regressions in which they were the only independent variables in addition to log travel costs. Log travels costs were significantly different from zero at the 5 percent level in all New York regressions. Only for New York for 1847 was there much of an increase in the explanatory power of the regression, as measured by adjusted R^2.

Thus, I find nothing from these regressions to overturn my overall conclusion that the relationship between banknote discounts and redemption costs was not tight indicating that banknotes were not viewed as securities.

4. Conclusion

Before 1860, a large number of currencies circulated in the United States. These were the notes issued by the numerous state-chartered banks that existed during this period. In general, these notes did not circulate at par against each other, and the exchange rates among these various currencies varied over time. I have here examined the determinants of the prices of these notes in terms of the notes of banks in New York, Philadelphia, Cincinnati, and Cleveland. Specifically, this paper examines the proposition that banknotes were treated by the public as securities.

I find some evidence consistent with view that banknotes were considered to be securities. First, I find that banknote prices generally responded to changes in expectations concerning the amount of specie for which they could be redeemed as the proposition predicts. When banks had temporarily suspended specie payments, the discounts on their notes were larger than when they were redeeming their notes in specie on demand and prices tended to track movements in banknote-specie exchange rates. Second, using transportation costs to proxy for redemption costs, I find that the discounts on banknotes were positively related to the cost of getting to the issuing bank from the location of the banknote price quote.

However, I also find evidence not consistent with the proposition. First, I find that the relationship between banknotes prices and transportation costs was not tight. Sometimes the discounts on notes of banks from different locations were the same even though the cost of travel varied greatly. Further, sometimes the discounts on the notes of banks in different locations varied greatly even though the travel cost to these locations was the same. Second, I find that changes in the discount on the notes of banks in a location did not vary systematically with changes in the cost of travel to that location. Third, I find that banknote prices were not symmetric. Prices quoted in one location for notes of banks in another location generally did not equal the prices quoted in the other location for notes of banks in the first location.

My conclusion from the empirical evidence is that the proposition that banknotes were priced to equal their net expected redemption value is not correct. Instead, to understand how banknote prices were determined during this period, we need a richer theory. Based on the empirical evidence presented here, I would argue that such a theory should take into account not only the fact that the suspension of specie payments affected the price of banknotes, but also the fact that notes of different banks could have different degrees of acceptability in different transactions. This richer theory is needed before one can answer the question of whether a uniform currency would have been a welfare improvement on the state banknote currency.

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Table 1: Dates of bank suspensions and resumptions by location, 1837 - 1842

Location	1837 suspensions	1838 resumptions	1839 suspensions	1840 resumptions	1842 resumptions
New York	10-May	**10-May**			
Philadelphia	11-May	13-Aug	9-Oct		17-Mar **
Baltimore	11-May	13-Aug	10-Oct		18-Mar **
Charleston	17-May	1-Sep	14-Oct	**21-Jul**	
Cincinnati	17-May	13-Aug	14-Oct		18-Feb
North Carolina	18-May	1-Aug	9-Oct		June
Kentucky	19-May	13-Aug	16-Oct		June
Bank of Virginia	15-May	13-Aug	12-Oct		**15-Sep** **
Bank of Louisiana	13-May	24-Dec	18-Oct		**5-Dec**

** brief resumption Jan/Feb 1841

Figure 1: Discounts on selected banknotes as quoted in New York, 1835 - 1844

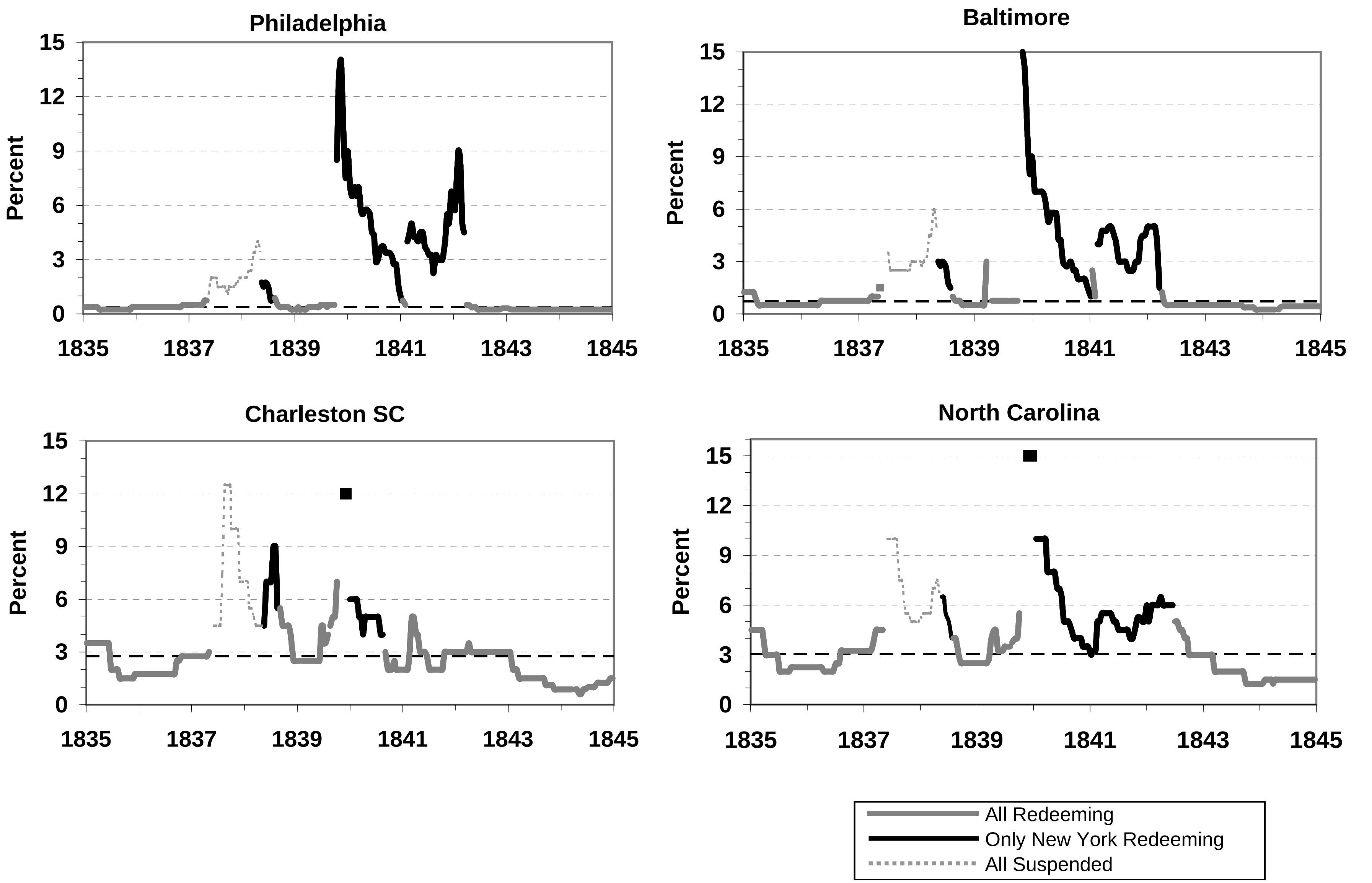


Figure 1: (continued)

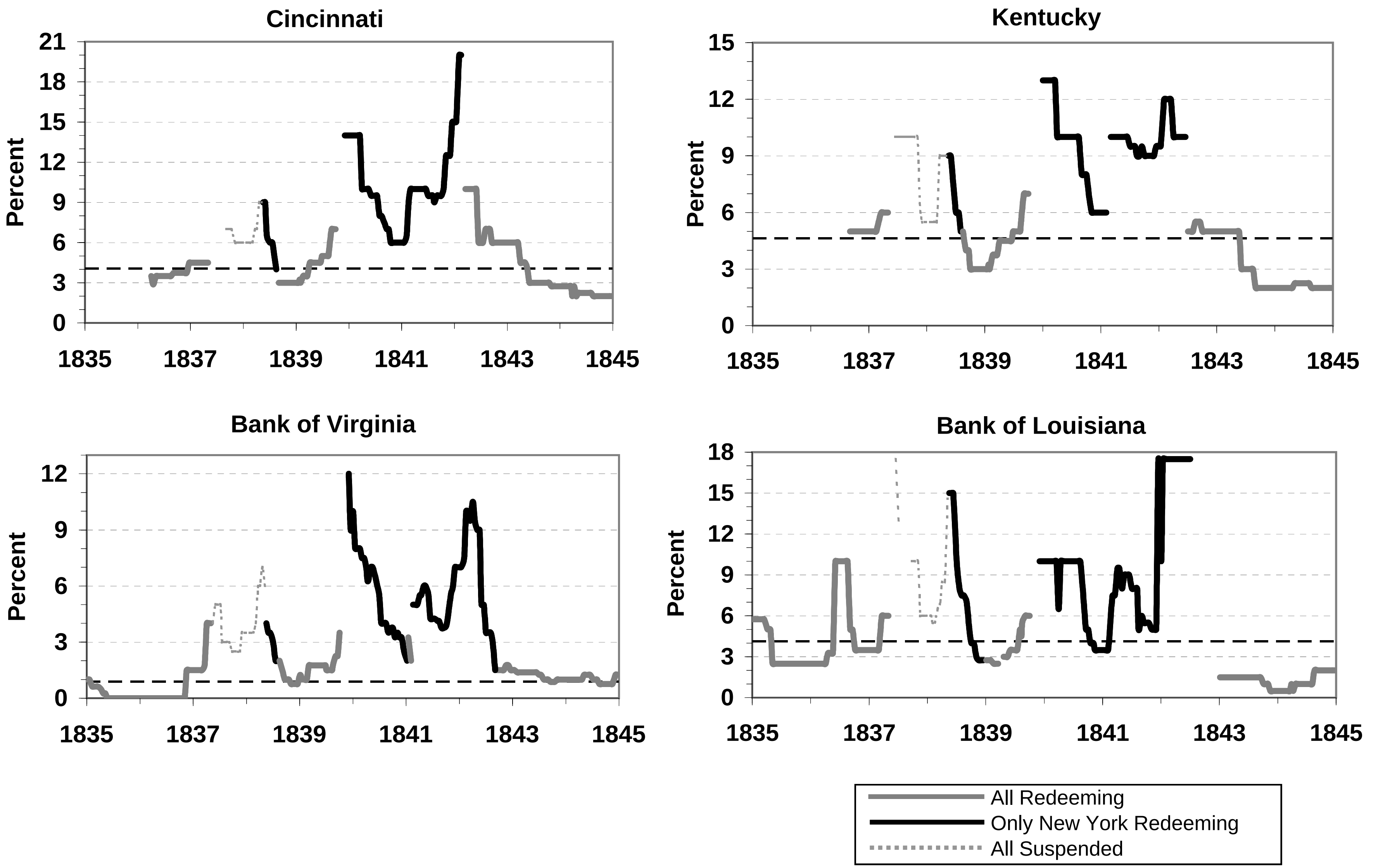


Figure 2: Discounts on selected banknotes as quoted in Philadelphia, 1835 - 1844

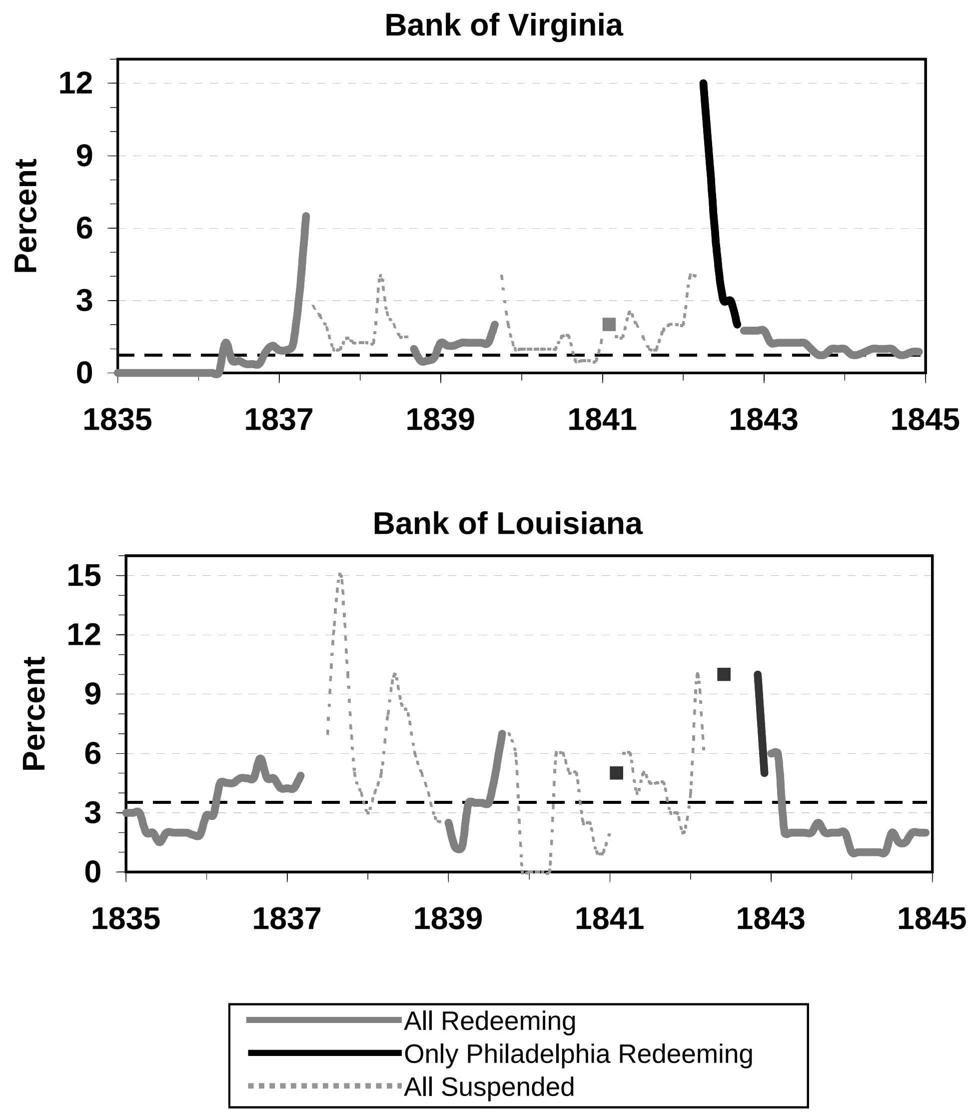


Figure 3: Discounts on selected banknotes as quoted in Philadelphia, 1835 - 1844

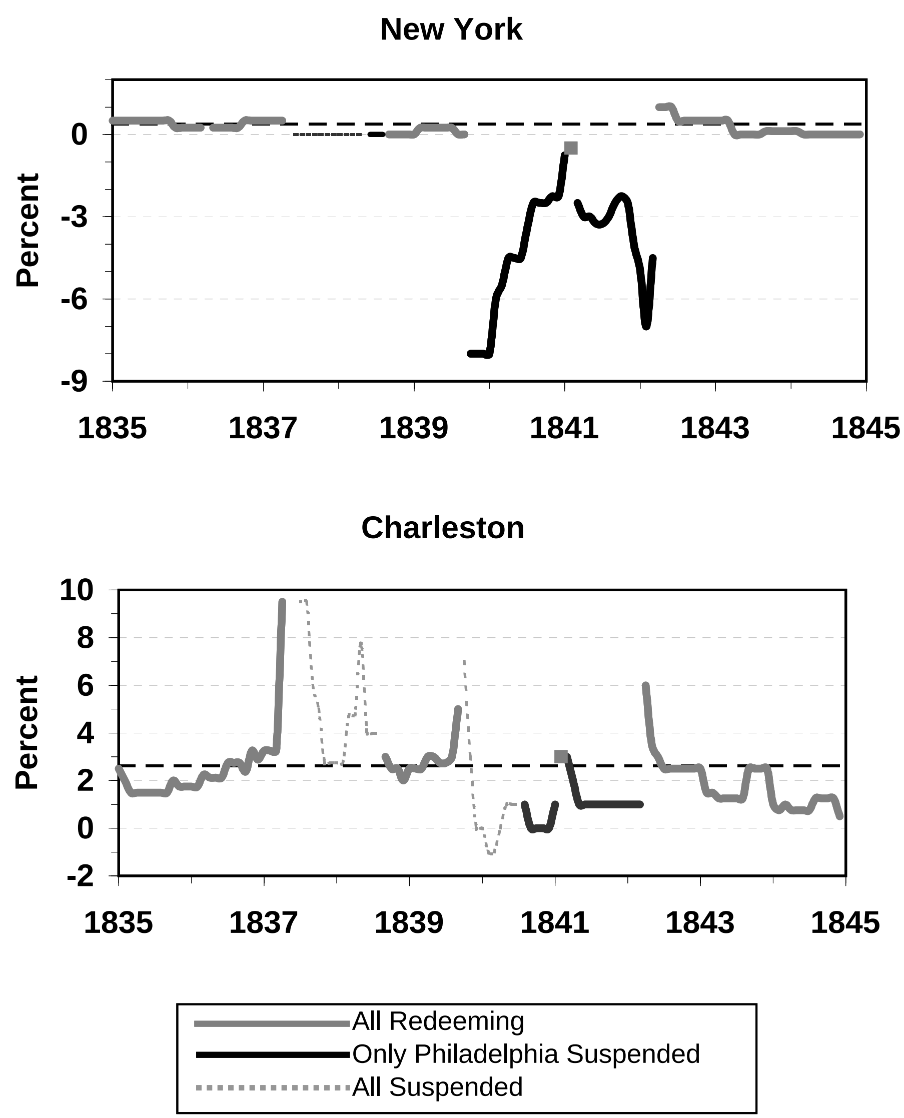


Figure 4: Discounts on notes of New York banks and specie as quoted in Philadelphia, 1839 - 42

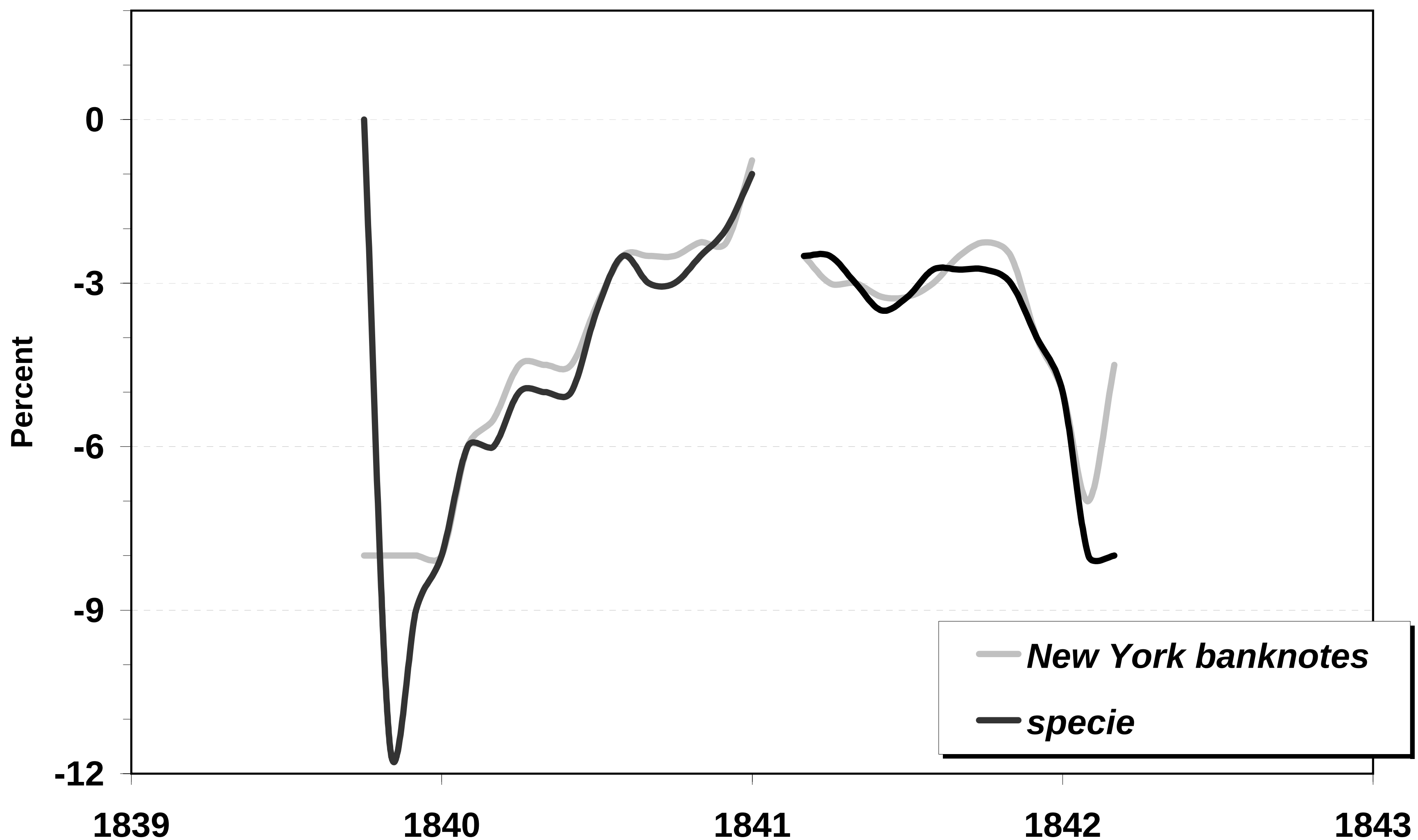


Figure 5: Discounts on banknotes versus travel cost

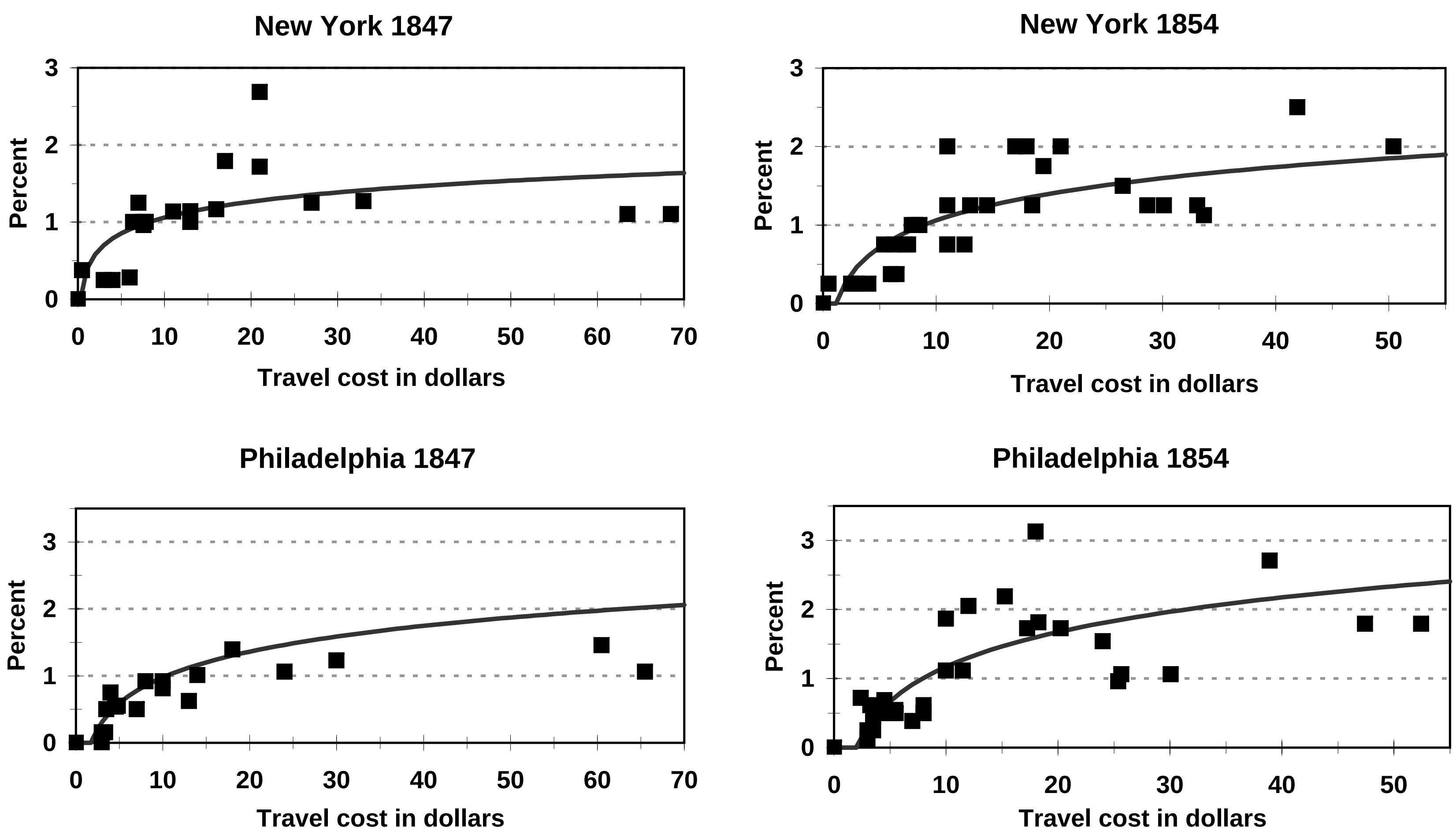
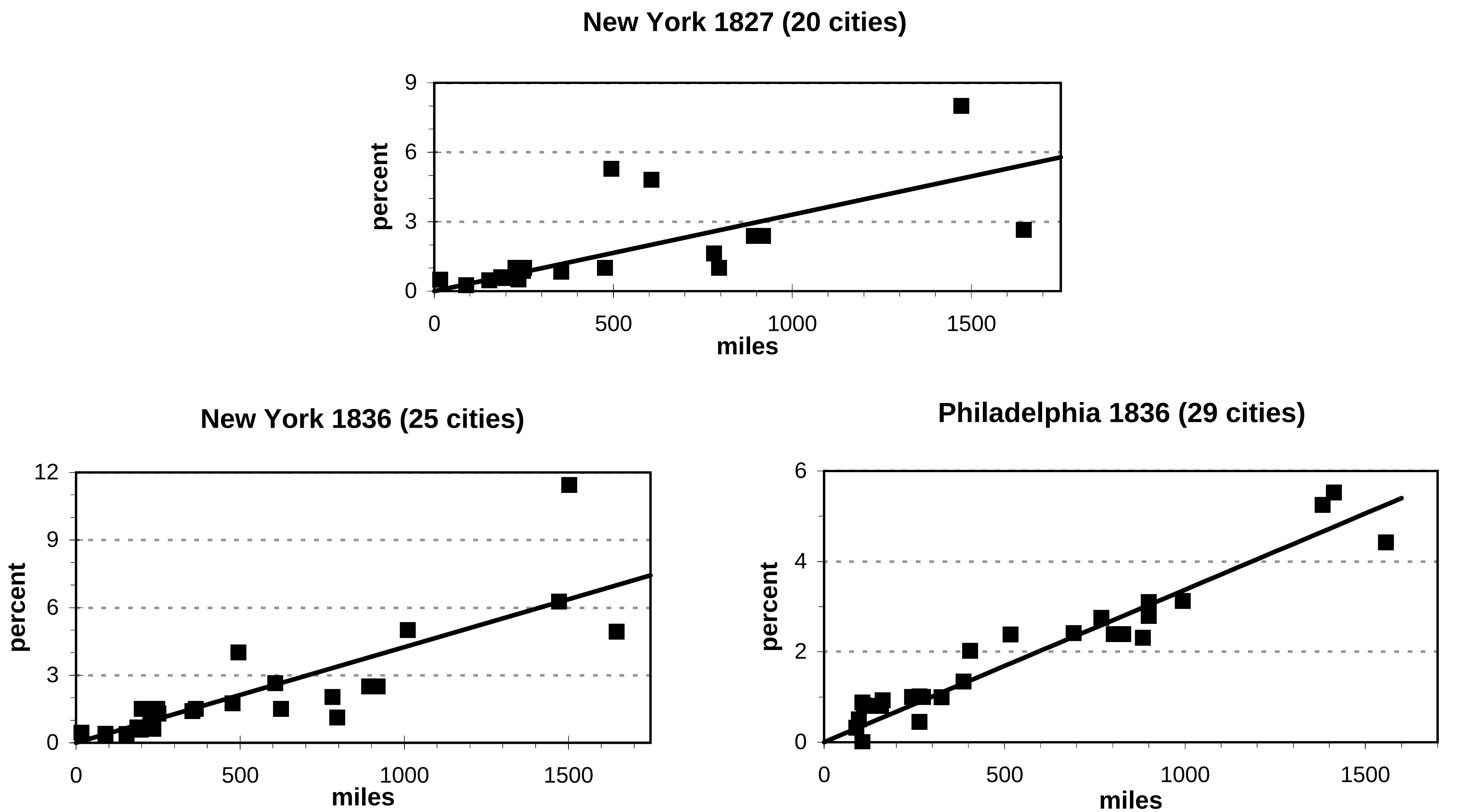


Figure 6: Discounts on banknotes vs. distance



Appendix

A. Data sources

The data for this study are discounts or premiums on the notes of individual U.S. state banks as quoted in four locations: New York, Philadelphia, Cincinnati, and Cleveland. Overall, the data cover the period 1817–58. All data used in this study are available at my website: http://minneapolisfed.org/research/economists/ wewproj.html.

I have collected bimonthly data for New York for the period from July 1817 through December 1849 and monthly data for the period from January 1850 through November 1852 from the *Shipping & commercial list (and New-York price current).* This source also has observations for October and November 1853 and for July, August, and December 1856. In addition, I have data for November 1853, August 1854, December 1855, all months of 1857 except March, and June 1858 from *Thompson's Bank Note and Commercial Reporter* (Thompson's).[11]

The data for Philadelphia are monthly for the period from August 1830 through January 1831 and from August 1832 through December 1858. The data through January 1839 are from *Bicknell's Reporter, Counterfeit Detector, and General Prices Current* (Bicknell's). The later data are all from *Van Court's Counterfeit Detector and Bank Note List* (Van Court's).[12]

For Cincinnati, I have observations for February 1841 and for the period from July 1845 through June 1847 from Goodman's *Western Counterfeit Detector and Bank Note Table*, February 1850 from Lord's *Bradley & Co.'s Cincinnati Counterfeit Detector and Bank Note*

[11] Actually, Thompson's had several titles during this period. See Dillistin (1949, pp 83-93) for a discussion.

[12] These publications also had several different titles during these periods. See Dillistin (1949, pp 126, 132-134) for a discussion.

Reporter, and July 1854 from *Lord's Detector and Bank Note Reporter.*

I have three observations for Cleveland: January, June, and September 1856 from the *Cleveland Bank Note Reporter* published by the bankers Pierce & Co.

In all these sources, discounts and premiums are quoted for banks throughout the country in terms of notes of banks in the particular city where the banknote reporter was published. These quotes are not quotes for exchanges of banknotes for specie. When banks are redeeming their notes for specie, this difference is not important. However, as shown in Section 2, it makes a difference when banks have suspended specie payment on their notes.

My focus here is the prices of notes of banks that are actually in business. Consequently, quotes for the notes of banks that are "closed," "winding up," or "broken" are not taken into account. After the quotes for such banks are eliminated, I have over 200,000 individual banknote price observations covering more than 2000 banks.

Appendix Table A1
Travel cost, discount, and distance data for New York

Location	1827 Average discount in percent	1827 Distance in miles	1836 Average discount in percent	1836 Distance in miles	1847 Average discount in percent	1847 Travel cost in dollars	1854 Average discount in percent	1854 Travel cost in dollars
Albany, NY	0.47	154	0.38	154			0.25	2.50
Annapolis, MD	0.88	228	1.50	228	1.00	7.50	1.00	7.85
Atlanta, GA					1.27		1.13	33.67
Augusta, GA	2.38	919	2.49	919	1.27	33.00	1.25	28.67
Baltimore, MD	0.60	187	0.67	187	0.28	6.00	0.38	6.00
Boston, MA	0.5	236	0.62	236	0.25	4.00	0.25	4.00
Chambersburg, PA	1.00	251	1.29	251	1.25		0.75	7.52
Charleston, SC	1.63	782	2.02	782	1.25	27.00	1.25	30.14
Chicago, IL							1.25	18.50
Cleveland, OH			1.50	625	1.77		2.00	11.00
Cumberland, MD			1.50	365	1.00	13.00	0.75	11.00
Detroit, MI	1.00	796	1.11	796	2.69	21.00	0.75	12.50
Ellicott's Mills, MD			1.50	201	1.00	6.38	0.38	6.50
Frederick, MD	0.88	248	1.50	248	1.00	7.85	1.00	8.15
Hagerstown, MD					0.87		1.00	8.52
Harrisburg, PA	0.56	197	0.5833	197	1.25	7.00	0.75	5.40
Indiana (State Bank)							2.00	17.00
Lexington, KY							2.00	21.00
Louisville, KY			5.00	1011			2.00	18.00
Memphis, TN			11.44	1503				
Mobile, AL	8.00	1472	6.26	1472	1.10	63.50	2.00	50.42
Nashville, TN					2.76		2.50	41.92
New Orleans, LA	2.64	1647	4.93	1647	1.10	68.50	2.00	55.42
New York, NY					0.00	0.00	0.00	0.00
Norfolk, VA					1.14	11.00	1.25	13.00
Paterson, NJ	0.49	17	0.4375	17	0.38	0.50	0.25	0.50
Philadelphia, PA	0.25	90	0.39	90	0.25	3.00	0.25	3.00
Pittsburgh, PA	1.00	477	1.75	477	1.17	16.00	0.75	11.00
Richmond, VA	0.84	355	1.40	355	1.14	13.00	1.25	11.00
Savannah, GA	2.38	893	2.49	893			1.25	33.07
St. Louis, MO							1.50	26.50
Washington, DC	1.00	227	1.25	227	0.96	7.60	0.75	7.25
Wheeling, VA	5.28	495	4.00	495	1.79	17.00	1.25	14.50
Wilmington, NC	4.80	607	2.64	607	1.72	21.00	1.75	19.50
York, PA					1.13		0.75	6.25

Appendix Table A2
Travel cost, discount, and distance data for Philadelphia

Philadelphia	1836 Average discount in percent	1836 Distance in miles	1847 Average discount in percent	1847 Travel cost in dollars	1854 Average discount in percent	1854 Travel cost in dollars
Albany, NY	1.00	244	0.50 (a)		0.54	5.50
Annapolis, MD	0.80	138	0.55	4.50	0.50	4.85
Atlanta, GA					4.20	30.67
Augusta, GA	2.39	829	1.23	30.00	1.06	25.67
Baltimore, MD	0.50	97	0.16	3.00	0.25	3.00
Boston, MA	0.99	326	0.50	7.00	0.39	7.00
Chambersburg, PA	0.93	163	0.75		0.69	4.52
Charleston, SC	2.41	692	1.06 (b)	24.00	0.96	25.39
Chicago, IL					3.13 (d)	18.00
Cleveland, OH			1.33		1.87	10.00
Cumberland, MD	1.00	275	0.81	10.00	0.50	8.00
Detroit, MI	2.31	884	5.00	24.00	2.05	12.00
Ellicott's Mills, MD	0.81	111	0.16	3.38	0.25	3.50
Frederick, MD	0.80	158	0.55	4.85	0.50	5.15
Hagerstown, MD			0.57		0.50	5.52
Harrisburg, PA	0.00	107	0.75	4.00	0.72	2.40
Indiana (State Bank)	3.10	900	1.33		2.19	15.25
Lexington, KY	3.13	994	1.29		1.73	20.25
Louisville, KY	2.79	900	1.29		1.73	17.25
Memphis, TN	5.52	1413				
Mobile, AL	5.25	1382	1.46	60.50	1.79	47.42
Nashville, TN			2.44		2.71	38.92
New Orleans, LA	4.42	1557	1.06 (c)	65.50	1.79	52.42
New York, NY	0.32	90	0.00	3.00	0.13	3.00
Norfolk, VA			0.92	8.00	1.11	10.00
Paterson, NJ	0.88	107	0.50	3.50	0.46	3.50
Philadelphia, PA			0.00	0.00	0.00	0.00
Pittsburgh, PA	1.34	387	0.63	13.00	0.61	8.00
Richmond, VA	0.45	265	0.92	10.00	0.50	8.00
Savannah, GA	2.39	803	1.23		1.06	30.07
St. Louis, MO			1.27		1.54	24.00
Washington, DC	0.80	137	0.54	4.60	0.50	4.25
Wheeling, VA	2.02	405	1.01	14.00	1.11	11.50
Wilmington, NC	2.38	517	1.40	18.00	1.81	18.25
York, PA			0.75		0.61	3.25
Cincinnati, OH	2.75	769				
Richmond, VA (2nd obs)	1.01	265				

(a) 6 at .50; 2 at .75
(b) 4 at 1.06, 1 at 1.04, 2 at 1.14
(c) 9 at 1.06, 1 at 1.08, 3 at 25
(d) 1 at 3.11, 5 at 3.13, 4 at 3.17