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**Working Paper**

## Bailing Out Sovereign Debt : An Old Texan Precedent

Claremont Colleges Working Papers, No. 2004-04

**Provided in Cooperation with:**

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*Suggested Citation:* Burdekin, Richard C. K. (2004) : Bailing Out Sovereign Debt : An Old Texan Precedent, Claremont Colleges Working Papers, No. 2004-04, Claremont McKenna College, Department of Economics, Claremont, CA

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**WORKING PAPER SERIES**

**Bailing Out Sovereign Debt:  
An Old Texan Precedent**

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WP 2004-04

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## **Bailing Out Sovereign Debt: An Old Texan Precedent\***

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**October 2004**

### Abstract

The fate of the distressed debt issued by the 1836-1845 Republic of Texas has received surprisingly little attention. Annexation by the United States was almost certainly a necessary condition for the debt rising from the pennies-on-the-dollar values seen in the early 1840s. But the largest gains awaited legislation in the early 1850s that fixed the repayment terms on the debt. Statistical analysis confirms the link between the debt price and actual, or anticipated, congressional actions on the debt settlement after 1844.

\*The author is most grateful to Rose Razaghian for sharing her originally-collected data on nineteenth century US government debt prices, thanks Greg Hess, Farrokh Langdana, Dick Sylla, Marc Weidenmier and Ida Whited for helpful comments and thanks Nancy Tao, Tanya Vashchilko and Ling Cao for research assistance and extended sojourns with the old newspaper archives.

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The question of sovereign debt defaults has received renewed attention recently with the controversy over Iraq debt in the aftermath of Saddam Hussein's overthrow. In Iraq's case, however, proposals have focused more on forgiveness or restructuring rather than an outright bailout by the US government or other foreign agency (see, for example, Looney, 2003). A complication is that a lot of the debt is owed to France, Germany and Russia, all of whom strongly opposed the US invasion of 2003 that toppled Hussein's regime. A recent prominent example where public funds do clearly seem to have been used to bailout private financial interests is the 1994 Mexican rescue operation, where US and IMF intervention saved most investors in Mexican "tesobonos" bonds from the losses they would otherwise have faced (Weintraub, 2000). Given that these tesobonos were high-risk, high return securities, at least relative to most other sovereign debt issues, the market had already driven down purchase prices to compensate for the greater risk relative to US government debt.

In the nineteenth century Republic of Texas debt also traded at a steep discount to US government debt owing to high default risk. In this case debt holders were again major beneficiaries of US led intervention. But the size of the gain for the bondholders was dramatically greater as was the scale of the intervention, involving as it did the incorporation of the Texan Republic into the United States. Later on, just the threaten of intervention by President Roosevelt led to dramatic price increases in distressed Central American and Latin American debt. Mitchener and Weidenmier (2005) identify price increases averaging 74% over the year following the 1904 announcement of the Roosevelt Corollary that threatened "police actions" against nations that reneged on their debts.

Hopes for interventions making bondholders whole have not always been met, of course. Oosterlinck (2003) describes how expectations that Tsarist debt obligations would be taken over either by the French government or another foreign power helped limit the price decline in these bonds on the Paris bourse after the Soviet government's repudiation announcement of February 8, 1918. In reality, no such bailout materialized. French holders of Tsarist debt had to wait until 1993 for partial reimbursement by

the new Russian regime. In contrast to the Texan and Iraqi cases, the key point is that the Soviet regime prevailed whereas the Texan and Iraqi regimes (voluntarily or involuntarily) were removed from the scene – although the foreign invasions of Russia during 1918-1920 certainly made this outcome far from obvious from the perspective of those making investing decisions in 1918. Shareholder interest in regime overthrow also appears evident in the trading of German debt after the outbreak of World War II, with gains generally being associated with positive developments for the Allies and setbacks for Nazi Germany (Brown and Burdekin, 2002).

#### THE EVOLUTION OF REPUBLIC OF TEXAS DEBT

The deep discounts on Republic of Texas debt in the early 1840s came at a time when there was also widespread concern about the soundness of debt issued by US states, with Arkansas, Florida, Illinois, Indiana, Louisiana, Maryland, Michigan, Mississippi and Pennsylvania all defaulting on their interest in payments in 1841-1842 (see English, 1996; Wallis, Sylla and Grinath, 2004). Texas debt had been heavily discounted from the outset, however, and the original government sales sometimes netted less than 25 cents per dollar of face value. For example, the initial discount on Texas 8% bonds, issued under the act of February 5, 1840, was between 75% to 85% -- leaving the government of the Republic of Texas to itself only receive about twenty cents on the dollar (Miller, 1916, pp. 78-79).

These bonds were issued during the great expansion of Texas' public debt under the administration of President Mirabeau B. Lamar, who succeeded General Sam Houston in November 1838. Under President Lamar the public debt increased from under two million dollars in 1838 to over seven million dollars in November 1841 (see Table 1) – while the market value of the government's debt instruments dropped from 65-85 cents on the dollar in 1838 to 15-20 cents in 1841 (Gouge, 1852, p. 115). Although the bonds promised semi-annual 8% interest payments in gold and silver, the government

“never in one half year fulfilled its promise” (Gouge, 1852, p. 196). Beard and Beard (1927, pp. 597-598) note that by 1845 8% Texan bonds and notes

were selling on the streets of the capital at a price as low as three cents on the dollar ... It was obvious to everybody who held any of the vagrant paper or knew anything about the failing security behind it that the annexation of Texas and the stabilization of its finances could alone prevent its bonds and notes from becoming worthless, destroying real values as well as potential gains for its holders.

In addition to the marketing of both 8% and 10% bonds, Treasury notes (known as “red-backs”) were issued in vast quantities under the Lamar administration in 1839 and 1840. By September 30, 1841, the outstanding circulation of the red-backs exceeded \$2.9 million (Miller, 1916, p. 70). The values attached to these red-backs not surprisingly plunged as the rate of issuance increased, falling from an already- low 37.5 cents on the dollar in 1839 to 8-11 cents in January 1842 (Miller, 1916, p. 71). Miller (1916, p. 71) states that, after 1839, “the notes ceased to circulate as a medium of exchange and became merely objects of speculation.” After the fall of 1840, the government itself paid the notes out at the steep prevailing rates of discount prevailing in the market. The Texas constitution never allowed anything other than gold or silver to be legal tender among individuals and, in January 1841, the notes were stripped of their limited legal tender status for payments of customs and direct and license taxes (Gouge, 1852, p. 116). This left the red-backs only acceptable in payment of land dues and arrears of taxes previously assessed (Miller, 1916, p. 72).

Despite attempts to restore fiscal stringency after Sam Houston returned to power in November 1841, repeated failures to obtain a major foreign loan (from the French) left Texas’ finances in a very weak state with insufficient internal revenue sources to service the large debt burden. Possible salvation from Texas’ fiscal embarrassments lay in annexation by the United States, an option clearly favored by Anson Jones, who succeeded President Houston in 1844 and “was in favor of ‘Independence,’ as were all parties in Texas, but preferred annexation, if practicable” (Jones, 1859, p. 581). On March 1, 1845 the president of the United States approved a joint resolution for annexing Texas. Texas’ own congress

convened on June 16, 1845 to consider this resolution. Assent to annexation followed in July 4, 1845 from a convention in Austin and after this Texas debt rallied sharply as seen in Figures 1-3. Later in 1845 speculation arose as to whether the United States finance the paying off of Texas debt through purchasing its lands. According to the Philadelphia *Public Ledger* (September 12, 1845):

It is evident ... a vigorous effort will be made at the next session of Congress to acquire the Public Lands of Texas ... Should the United States ... take the lands, and include them in our well tried Land system, and thus enable Texas at once to meet its debts, the whole would move forward prosperously—the United States would acquire a prolific source of revenue, and Texas, untrammelled with debt, march on to greatness.

This ideal was not so easily realized in practice, however. Delays followed owing to disputes in setting Texas' boundaries and land values and especially strong disagreement as to how, and at what rate, Texas' existing debt was to be honored. The first state legislature, meeting in Austin in February 1846, proposed that debt repayments be limited to the amount the government received at the time of issue, i.e., a repayment of around 20 cents on the dollar in the case of the 8% securities mentioned earlier and similarly low rates for the other debt issued, for the most part, under the Lamar administration. This proposal was not well received by Texas' creditors. With war breaking out with Mexico on April 25, 1846, final settlement of this issue by the US Congress was postponed. Texas debt received renewed attention as hostilities with Mexico came to a close in the fall of 1847, however.<sup>1</sup>

On November 13, 1847, Congressman Henry Clay made a widely-noted speech at Lexington, Kentucky, in which he stated that the United States was "bound, in honor and morality, to pay the just debts of Texas" (see Philadelphia *Public Ledger*, November 25, 1847). But disagreement and confusion on how this issue was to be resolved continued through the rest of the 1840s. Texas' Second Legislature passed an act on March 20, 1848 that reiterated that debt repayment would be "scaled," i.e., based on the actual price received when the debt was sold (Miller, 1916, p. 118). A later act of February 11, 1850

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<sup>1</sup> Santa Anna resigned the presidency on September 22, 1847 after the fall of Mexico City to US forces. Major fighting was over even though the final peace agreement, the Treaty of Guadalupe Hidalgo, was not signed until February 2, 1848 (see, for example, Connor and Faulk, 1971, Chapter 7).

provided for paying the debt off in land at 50 cents an acre, with all interest payments to end on July 1, 1850. Neither the rate of repayment nor the provision for paying in kind with wilderness land was acceptable to Texas' US creditors (see Miller, 1916, p. 120).

After Zachary Taylor's election as president in November 1848, the US Congress again took up the issue of Texas debt, however, and eventually provided for much more generous terms to Texas' creditors as part of a broader settlement of the issue of slavery in the western states and territories. Indeed, holders of the hitherto deeply-discounted Texas treasury notes and interest-paying debt enjoyed huge gains in 1850, when Texas received a \$10 million indemnity for settling her boundary dispute with New Mexico. According to the bill finally approved on September 9, 1850, half of the sum was earmarked for paying off old Republic of Texas debt. The road to this bill began with a series of resolutions presented to the US Senate by Henry Clay on January 29, 1850 that sought to include the Texas debt settlement within the slavery Compromise of 1850. In particular, Clay argued that the United States "shall pay the amount of the debt contracted by Texas prior to its annexation ... and that Texas shall also, in consideration of a sum to be advanced, relinquish any claim she has to any portion of New Mexico" (Sargent, 1852, p. 344). The Philadelphia *Public Ledger* (February 2, 1850) reports that this led to "growing confidence in the public mind that the non-dividend paying loans of Texas, Indiana and Illinois will all be honorably provided for." Beard and Beard (1927, p. 598) assert that "the very introduction of the indemnity project swept the price of Texas bonds upward from four or five cents on the dollar to fifty cents."

Texas securities generally continued on their upward trend as debate continued in Congress through the end of the summer in 1850. On March 15, 1850, for example, the Philadelphia *Public Ledger* noted:

All the prominent members of the Senate have expressed themselves in favor of paying to Texas a fair consideration for her disputed territory and public lands, and Mr. Clay and some others have expressed the opinion that, for all that portion of the debt of Texas for which the revenues of the republic were pledged, the United States Government, by



annexing Texas and taking its revenues, is now liable ... If settled in the manner suggested ... these securities offer still a very large margin for profit ...

Trading volume in Texas securities remained heavy, standing at around \$50,000 worth in late April, for example (Philadelphia *Public Ledger*, April 30, 1850). The fact that the Texas debt settlement was entangled in the broader debate about slavery in the west kept it in the public eye – but also made it harder for congress to agree on a final resolution. In early June, the Hon. Leslie Coombs of Kentucky, himself a holder of \$60,000 in Texas bonds, was quoted as saying that many of the Texas bondholders “are now in Washington, ready to speak and act for themselves” (Philadelphia *Public Ledger*, June 5, 1850). In mid-July, the Philadelphia *Public Ledger* (July 18, 1850) noted how the Texas securities “fluctuate as chances of the compromise bill increase or lessen.” Texas debt rose with the early-August presentation of the Texas bill, containing provision for the \$10 million payout (Philadelphia *Public Ledger*, August 9, 1850), but later subsided somewhat in the face of the Texas Governor’s objection to paying holders the full face value of the debt (Philadelphia *Public Ledger*, September 2, 1850).

The heaviest trading of the Texas securities took place on the Philadelphia Stock Exchange. This was true in the 1840s as well at the time of the debt settlement in the early 1850s. On November 25, 1847, the Philadelphia *Public Ledger* noted that a “large amount of Texas securities are held by persons in this city, some of the bonds being for moneys loaned and articles furnished directly to Texas during her struggle for independence ...” The rise of Texas debt prices during 1850 has previously been noted by Hamilton (1964, pp. 127-128), based on the trading of Texas 10% bonds:

February 1, 1850:	29 cents on the dollar (a 20% increase from prior values)
April 1850:	40
May 1850:	54
June 28, 1850:	47½
July 31, 1850:	42½
August 17, 1850:	45
August 31, 1850:	50
September 9, 1850:	55
September 26, 1850:	60
September 30, 1850:	65½

The later purchasers were generally viewed as speculators somewhat akin to today's "vulture" investors, who buy distressed debt in large quantities and then seek to force favorable repayment terms. For example, Connor and Faulk (1971, p. 174) allege that "[m]uch of this debt had been bought cheaply by Eastern speculators, and they joined their voices to those of the Texans to urge the government to leave Texas its land." Jay Cooke, future financier of the Northern war effort during the Civil War, went further in alleging that the bond-boosting legislation passed in 1850 was actually known in advance by large holders – including newspaper correspondent and lobbyist Francis J. Grund:

Grund purchased, through [Clark's banking house], large amounts of the various kinds of Texas debt certificates and bonds and many of the government officials of the time did likewise ... Some of this debt, owing to the peculiar conditions of issue, was paid in full; other portions were scaled down and a correct knowledge of what all this legislation was to be was always in the possession of Mr. Grund, and he and his friends availed themselves of it in making their investments. This arrangement failed at the first session and the bonds and scrip declined in value very rapidly; but at the next session of Congress the bill was passed and large sums were realized by those who were directly and indirectly interested in obtaining the legislation for final settlement.<sup>2</sup>

The activities of other prominent lobbyists and large bondholders are detailed by Hamilton (1964, Chapter VII). There were even claims that outright bribery was involved. According to Congressman Joshua R. Giddings of Ohio, "three million dollars worth of the paper was afloat in Washington at the time and members were offered as much as fifty thousand dollars apiece for their votes."<sup>3</sup>

Even after the legislation of 1850 was passed it still took some time for the bondholders to fully cash in, however, as Texas resisted paying out so much more than the Republic had ever received from issuing its various debt securities. Governor Bell laid out his objections in a November 10, 1851 communique to the state legislature:

These securities, generally speaking, were concentrated at very low rates, in the hands of moneyed speculators, who had contributed nothing to the achievement of her

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<sup>2</sup>Quoted in Oberholtzer (1907, pp. 73-74).

<sup>3</sup>See Beard and Beard (1927, p. 599).

independence, or to the relief of her actual necessities in the administration of the government at the time they were issued.<sup>4</sup>

Texas debt spiked upward in January 1853 based on rumors from Washington that “some movement will probably be made in the Senate ... to make provision for payment of these long-deferred claims ...” (Philadelphia *Public Ledger*, January 21, 1853). These hopes were disappointed, however, when Governor Bell reiterated his objections to payment of the debt at face value – stating that “the proposition pending in Congress to pay, without the concurrence of Texas, the revenue debt at its face ... would manifest great disregard of the sovereignty of Texas, and should be repelled” (Philadelphia *Public Ledger*, February 3, 1853).

Final settlement was delayed until a February 28, 1855 act of Congress, appropriating \$7.75 million to pay the principal and interest due on the bonds, was ratified by the Texas legislature on February 1, 1856. When disbursements began in 1856, northern bondholders, particularly those located in the Philadelphia area where the bonds primarily traded, were disproportionately represented. The largest recipients collected over \$400,000 apiece and, as Hamilton (1964, p. 180) puts it:

the fact that not a few of the certificates were acquired in 1850 (when they were rising in value) or in 1849 (just before the rapid rise began) spelled impressive gains for those who had purchased the Texas bonds on speculation.

The annexation of Texas and the Compromise of 1850 are clearly major historical milestones. The trading in Republic of Texas debt can shed light on how bondholders saw their interests being advanced by these acts. It appears that annexation *per se*, which was completed on February 19, 1846, was not a key factor. Rather it was the later US Congressional insistence on Texas redeeming the debt at pre-specified values that appears to have triggered the big run-up in Texas debt prices.

Comparison of the available data on the 8% and 10% bonds reveals a very similar trajectory to that of the non-interest-bearing Treasury notes (see Figures 1-3). As more quotes are available on this latter series, the empirical tests that follow below focus on the Treasury notes. Although nearly \$800,000

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<sup>4</sup>Quoted in Gouge (1852, p. 181).

of the red-backs were funded in 8 or 10% bonds at the beginning of the 1840s, over \$3 million of the Treasury notes remained outstanding. Of these, just under \$2.2 million were eventually redeemed in 1856 on the basis of 76.9 cents on the dollar (Miller, 1916, p. 74). This settlement took over ten years after annexation was agreed upon in 1845 and was subject to considerable uncertainty as reflected in the price fluctuations detailed below. Nevertheless, this represented a rather dramatic advance from the lows of under 10 cents on the dollar in Texas in 1842.

The early trading of the red-backs in the New Orleans currency market over the 1837-1842 has been documented by Pecquet and Thies (2003), who identify temporary reversals to the downward trend associated with (false) rumors of a French loan. Pecquet and Thies (2003) observe that, after the red-backs were essentially repudiated in January 1842 (being no longer acceptable for all taxes), their quotations disappear from the New Orleans market in May. As we have seen, they remained quite actively traded in Philadelphia, however, with volume spiking, first, when annexation approached in 1845 and then reaching new highs as Congress began debating the term of the debt settlement in 1850. As with the 8 and 10% bonds, the final payout on the red-backs was in the order of six or seven times the lows recorded in the early 1840s.

## EMPIRICAL ANALYSIS

In considering the trading history of Texas Treasury notes (Figure 1), four high-volume sub-periods stand out where the volume reached over 25,000 shares a day. These four sub-periods are initially analyzed individually in order to see if the sharp price fluctuations that accompany the high-volume periods can be tied to actions and announcements by the US Congress and the Texas legislature. This sub-period analysis is then followed by an investigation over the full-sample for key “turning points” that produce non-reversed upward or downward shifts in the Treasury note series. Texas Treasury notes are also compared to US Treasury debt in order to control for changes in general money market conditions over

the period in question using new US bond price data most kindly provided by Rose Razaghian (see Razaghian, 2004). The empirical work covers the 1844-1853 period over which a reasonably consistent series of market quotes is available. Quotes become very sparse after 1853, by which time the disposition of the Texas debt had largely been determined even though the final payments to debt holders were delayed until 1856.

The four high volume periods occur in 1844-1845, 1846-1847, 1850 and 1852-1853. Weekly data are employed throughout. For each sub-period the percentage change of the Treasury note price is regressed on a constant, a time trend and its own lagged value. The Perron-Vogelsang (1992) procedure was then applied to identify the most significant breakpoint. After entering a dummy for this most significant breakpoint, the procedure was reapplied to search for a possible second break point. The search was limited to two potential breakpoints in light of the fact that the samples for these sub-periods are all less than two years in length. The 1850 sub-period is actually only just under a year in length, but features the highest and most consistent trading volumes. The final sub-period is the most questionable given the mere twenty-nine week span and smaller number of total available quotes. In this case only one breakpoint was allowed for. With all the sub-periods, the breakpoints identified by the Perron-Vogelsang really just offer additional confirmation of inflection points implied by the graphical display presented in Figures 4-7, however.

The results of applying the Perron-Vogelsang procedure to the four sub-periods are laid out in Table 2. As noted in Table 2, each period has some missing observations ranging from a low of 23% in sub-period 3 to a high of 48% in sub-period 4. Given that major shifts in the series tend to be accompanied by higher volumes, it is unlikely that the missing observations interfere with our ability to identify the most important breaks in the series. Indeed, in entering the end-of-week values used in the regressions, any missing observations are simply replaced by the last-available preceding quote. The equations are estimated with White-heteroskedasticity-consistent standard errors and examination of Q-

statistics for up to six lags showed no evidence of serial correlation.<sup>5</sup> Each of the dummies for the suggested breakpoints is significant at better than the 99% confidence level. All of the dummies correspond either to actual acts by US or Texas legislators or else to speculation about pending actions that would lead to a debt settlement.

The first sub-period features a breakpoint in mid-July 1845 that follows the July 4 assent to annexation by a convention in Austin, Texas. The second breakpoint, featuring a positive residual somewhat smaller in magnitude than the first, occurs in mid-September 1845 at a time when there was speculation that the United States would allow for the paying off of the Texas by purchasing the lands that still remained under Texas' ownership (*Philadelphia Public Ledger*, September 12, 1845). The second sub-period includes the only negative breakpoint. This occurs in early June 1846 and appears to be attributable to the postponement of debt settlement owing to the war with Mexico. A second (positive) breakpoint in late December 1847 follows the end of the major fighting in Mexico and renewed discussion of the Texas debt by prominent Congressman Henry Clay.

The third sub-period features the heaviest trading volumes of all as the US Congress debated and eventually passed the historic Compromise of 1850. Although better known for its provisions regarding slavery in the new western territories, the settlement of the Texas debt featured prominently in the debate and, in a series of resolutions put forward in early 1850, Henry Clay argued for full settlement of the Texas debt in return for Texas giving up claims on territory now included within New Mexico. The first breakpoint in mid-March 1850 corresponds closely to an article on the *Philadelphia Public Record* (March 15, 1850) emphasizing the very large profits to be had if the Henry Clay's proposals received congressional approval. The second breakpoint in mid-August corresponds to the actual presentation of the Texas bill that provided for a \$10 million payout.

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<sup>5</sup>Although application of the Jarque-Bera test does show evidence of non-normality of the residuals in three of the four sub-samples, curing this through a moving average representation of the data artificially smooths the data over such a short sample period and thus interferes with the ability to identify breakpoints.

The fourth sub-period, like the third, includes days when over 35,000 Texas Treasury notes were traded. The trading is much more sporadic, however, and this sub-sample is both the shortest and the one with the most missing observations. The one breakpoint occurs in late January 1853 at a time when there were rumors that final provision for payment of the Texas debt was imminent (*Philadelphia Public Ledger*, January 21, 1853). The gains were sharp but short-lived, however, as settlement was again delayed. During the wait for the final Congressional appropriation in 1855, prices of the Texas securities all but cease to be quoted. Interestingly, the sharp spike in the price of the Texas Treasury notes in late January 1853 took the price up very close to the final settlement price of 76.9 cents on the dollar. The few scattered subsequent quotes are at considerably lower prices, however. One possibility is that this was due to distress selling by holders unable to wait for the final disbursement but, in any event, active trading of the securities on the Philadelphia stock exchange ends in 1853.

Although analysis of the four high volume sub-periods yields some insights into the most important shifts in the series, this does not reveal whether any of these breaks represented non-reversed “turning points” in the Texas Treasury notes. In order to examine this question, full-sample analysis is employed. The Texas data is first converted to a monthly basis by selecting the average quote from the last week in each month – or, alternatively, the latest available quote in that month in cases where no trades took place in the last week. Over the October 1844 - April 1853 period, 79 months have at least one available quote and 24 months have missing data. In addition to simply entering the observation from the previous month in place of the missing data point, as before, a moving-average representation was also constructed for comparative purposes. In order to correct for general money market movements over the sample period, the Texas Treasury notes were regressed not only on their own past values but also on US 6% Treasury bonds maturing in 1862 (average price from the last week in each month, drawn from Razaghian, 2004). The two series are graphed in Figure 8. Each series was then converted to percentage changes for the regression analysis. After allowing for up to two lags, this left an estimation

period of December 1844-April 1853. Only one lag was found to be significant for the US series and this was included in the final specification alongside the lagged Texas debt price and a constant. Neither equation shows any evidence of serial correlation or heteroskedasticity. As shown below, the lagged Texas debt price was always insignificant while the US series and the constant were significant at or around the 10% level in each case:

*Using last observation available:*

$$\% \Delta \text{TXBOND} = 0.029^* - 0.003 \text{ \%} \Delta \text{TXBOND}(-1) + 1.397^* \text{ \%} \Delta \text{USBOND}(-1)$$

$$(0.017) \quad (0.105) \quad (0.839)$$

$$R^2 = 0.03$$

*Using moving-average representation:*

$$\% \Delta \text{TXBOND} = 0.026^* - 0.021 \text{ \%} \Delta \text{TXBOND}(-1) + 1.487^* \text{ \%} \Delta \text{USBOND} + 1.282\# \text{ \%} \Delta \text{USBOND}(-1)$$

$$(0.015) \quad (0.107) \quad (0.797) \quad (0.799)$$

$$R^2 = 0.05$$

where  $\% \Delta \text{TXBOND}$  is the percentage change in the price of Texas Treasury notes,  
 $\% \Delta \text{USBOND}$  is the percentage change in the price of US 6% Treasury bonds,  
(-1) indicates the first lag of the series,  
standard errors are in parentheses,  
\* denotes significance at the 90% confidence level or better, and  
# denotes significance at the 89% confidence level.

Following the procedure suggested by Banerjee, Lumsdaine and Stock (1992), each equation was then re-estimated recursively over the sample. In this case, the basic estimation period (or “window”) was set at a year and the equations were then repeatedly re-estimated beginning with the first 12 observations, then over observation 2-13, then 3-14, and so on through the end of the sample period. This yields a series of  $R^2$  values for each of these successive estimation periods that are depicted graphically in Figures 9 and



10.<sup>6</sup> The windows with the lowest  $R^2$  values are the ones where a structural break is most likely. Taking those clearest-cut cases where the  $R^2$  is near zero yields potential turning points in the vicinity of August 1845, June 1847 and July 1851 for the last observation series and January 1849 and September 1850 for the moving average series. In an attempt to pin down the data of the break, as in, for example, Brown and Burdekin (2000, 2002), the equations were re-estimated over an extended window surrounding each of these dates with a dummy variable added. This dummy is defined successively for each month in the two-year period surrounding each potential turning point and takes on a value of one for that month and every month thereafter. The month for which this rolling dummy achieves the highest significance level is then taken as our best estimate of the exact date at which the turning point occurs. These dates, along with estimated coefficient value and standard error on the associated dummy variables, are set-out in Table 3.

Both the last observation and moving average series yield strong evidence of a (negative) turning point in late 1850 or early 1851. The October 1850 date identified by the last observation series occurs at the beginning of the downturn that sets in after the euphoria surrounding the Congressional actions during the summer of 1850. This downturn accelerates around the January 1851 date identified by the moving average series. The timing of these potential turning points suggested that the breakdown in Texas Treasury notes after the passage of the Compromise of 1850 was a more significant departure from the previous trend than was the run-up seen earlier in the year.

The strong uptrend in Texas Treasury note prices actually dates from around the middle of 1849 and corresponds well with the other (positive) turning point identified by the moving average series in July 1849. The coefficient and significance level are both somewhat below the January 1851 values, but the July 1849 dummy remains significant at better than the 95% confidence level. Although trading volumes were much lower than in 1850, the summer of 1849 did turn out to have been the better time to buy the Texas securities. To what extent purchasers were able to anticipate the following year's activities in the

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<sup>6</sup>The dates listed in Figures 9 and 10 refer to the mid-point in each window.

US Congress remains unclear. The Philadelphia *Public Ledger* (July 28, 1849) does, however, quote Governor Wood of Texas' statement that the state's debt "might easily be discharged by the sale of public land." Although the large-volume jumps identified in the 1850 sub-period remain important, the turning point analysis points to the major inflections in the series occurring on either side of this period of frenzied activity.

The last observation series identifies an even earlier positive turning point in July 1846. This marks the end of the price drop accompanying the February 1846 proposal by the Texas legislature for a low payout on the debt and the outbreak of war with Mexico in April. The July 1846 date appears less convincing as a true turning point, however. Not only does no sustained uptrend in the series occur until 1849 but also the last observation series yields some evidence of a prior, negative turning point in January 1846. Taken together, the statistical analysis appears to capture the reversal of a localized downturn that set in early in 1846 rather than a sustained upturn that prevails beyond the estimation window.<sup>7</sup>

## CONCLUSION

Although the annexation of Texas restored some value to her distressed and defaulted debt issues, the largest gains awaited settlement of the prices at which the various debt instruments would be redeemed. As US Congressional action appeared more imminent, the Texas debt rallied. But delays due to the Texas Legislature's own opposition to paying out more than the Republic had ever received when the debt was first issued, as well as the outbreak of war with Mexico in 1846, prevented any sustained rally from emerging until 1849. The Texas debt received most widespread attention when settlement terms were included in the historically important Compromise of 1850, a bill that attempted to settle the issue of slavery in the western states and territories. The turning point analysis highlights the fact that the heavy

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<sup>7</sup>There was little scope for identifying possible turning points in the first (1844-1845) and last (1852-1853) sub-periods because these occur right at the beginning and end of the available full sample period.

trading in 1850 was neither the beginning of the uptrend in Texas Treasury notes nor the final seal on their price appreciation, however. Given the continued delay until the final payout on the debt was actually received by holders in 1856, “buying the rumor” in 1849 and “selling the news” in 1850 around the turning points indicated in the empirical work would actually appear to have been the best course of action. Traders certainly seemed able to respond quickly to events that were important to repayment prospects and bond prices seemed to effectively anticipate the settlement reached in 1850. And the dramatic effects of regime change have seldom been more vividly illustrated than by the rally in the Texas debt from mere pennies on the dollar in the early 1840s.

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TABLE 1

Public Debt and Treasury Note Issuance of the Republic of Texas

	Public Debt	Treasury Note Circulation
1836	\$1,250,000	--
1837	1,090,984	--
1838	1,886,425	\$ 684,069
1839	3,855,900	2,013,762
1840	6,241,409	3,287,962
1841	7,446,740	2,920,860
1846	9,949,007	2,674,447

Source: Miller (1916, p. 391)

TABLE 2

## Testing for Structural Breaks in Four Sub-Periods

	Constant	Time Trend	Lagged Dependent Variable	D1	D2	R <sup>2</sup>
Dependent variable = percentage change in the price of Texas Treasury notes						
<b>Sub-period 1</b> Oct. 7, 1844-Dec. 15, 1845 (63 weeks, 22 missing observations)	0.012 (0.032)	-0.001 (0.001)	-0.189 (0.185)	0.610*** (0.020)	0.390*** (0.016)	0.413
D1 = July 14, 1845 D2 = Sept. 15, 1845						
<b>Sub-period 2</b> Jan. 21, 1846-Dec. 29, 1847 (102 weeks, 42 missing observations)	0.012 (0.013)	-0.001 (0.001)	-0.269*** (0.081)	-0.400*** (0.065)	0.388*** (0.065)	0.471
D1 = June 3, 1846 D2 = Nov. 3, 1847						
<b>Sub-period 3</b> Jan. 28, 1850-Dec. 9, 1850 (48 weeks, 11 missing observations)	0.021 (0.037)	0.001 (0.001)	-0.086 (0.129)	0.412*** (0.120)	0.342*** (0.118)	0.331
D1 = March 18, 1850 D2 = August 12, 1850						
<b>Sub-period 4</b> Sep. 30, 1852-March 31, 1853 (29 weeks, 14 missing observations)	0.038 (0.053)	-0.004 (0.003)	-0.147 (0.168)	0.448*** (0.128)		0.390
D1 = Jan. 27, 1853						

Notes: All equations are estimated by OLS with White heteroskedasticity-consistent standard errors, standard errors are in parentheses, and \*\*\* denotes significance at the 99% level or higher (with no other coefficients significant at even the 90% level)

TABLE 3

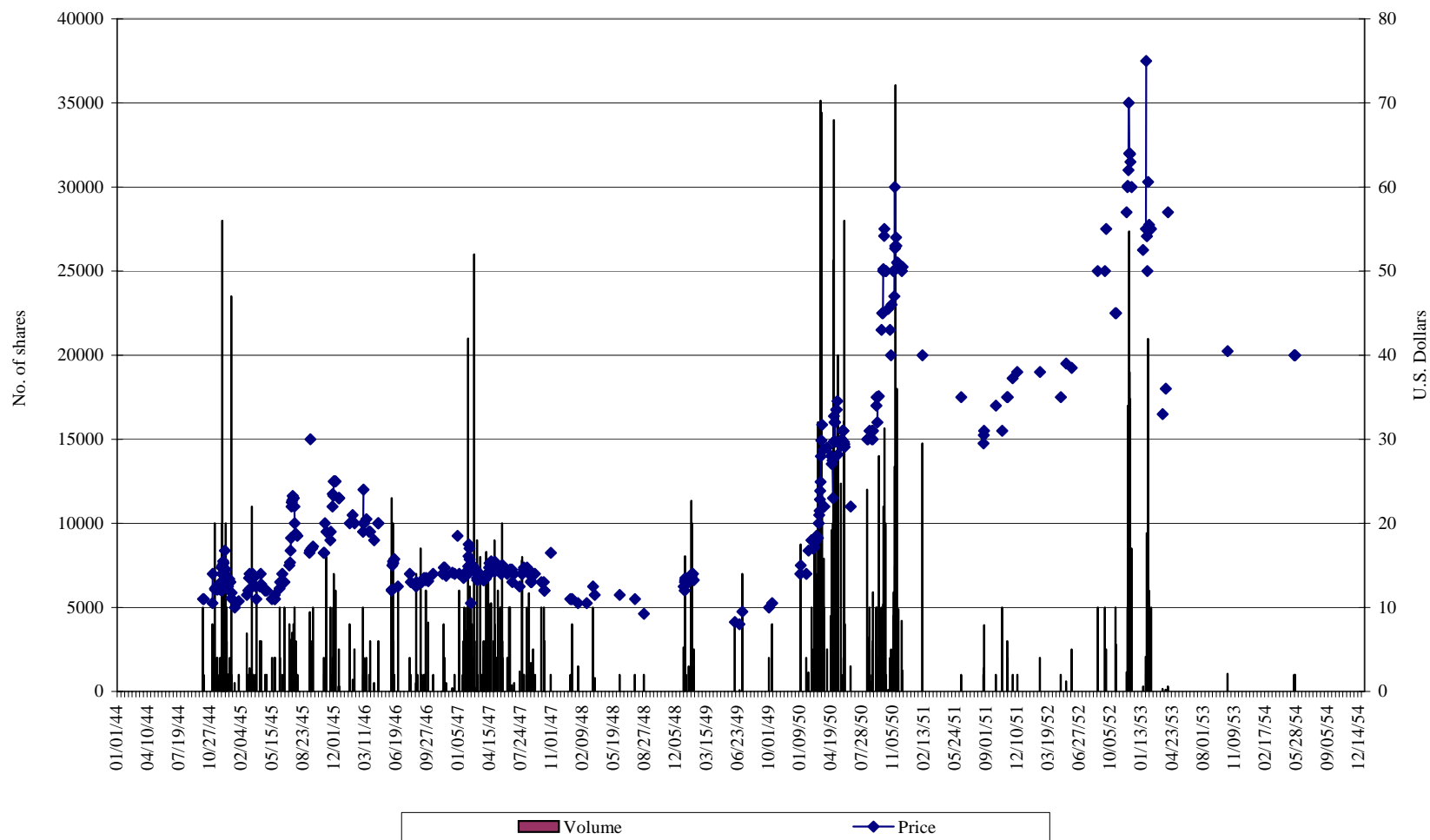
## Turning Points in the Texas Treasury Notes Series

Month	Dummy Variable Coefficient	Standard Error	Significance Level
<i>Using last observation available in each month</i>			
January 1846	-0.191	0.093	0.061
July 1846	0.356	0.114	0.005
October 1850	-0.281	0.069	0.001
<i>Using moving average representation</i>			
July 1849	0.104	0.047	0.037
January 1851	-0.196	0.071	0.012

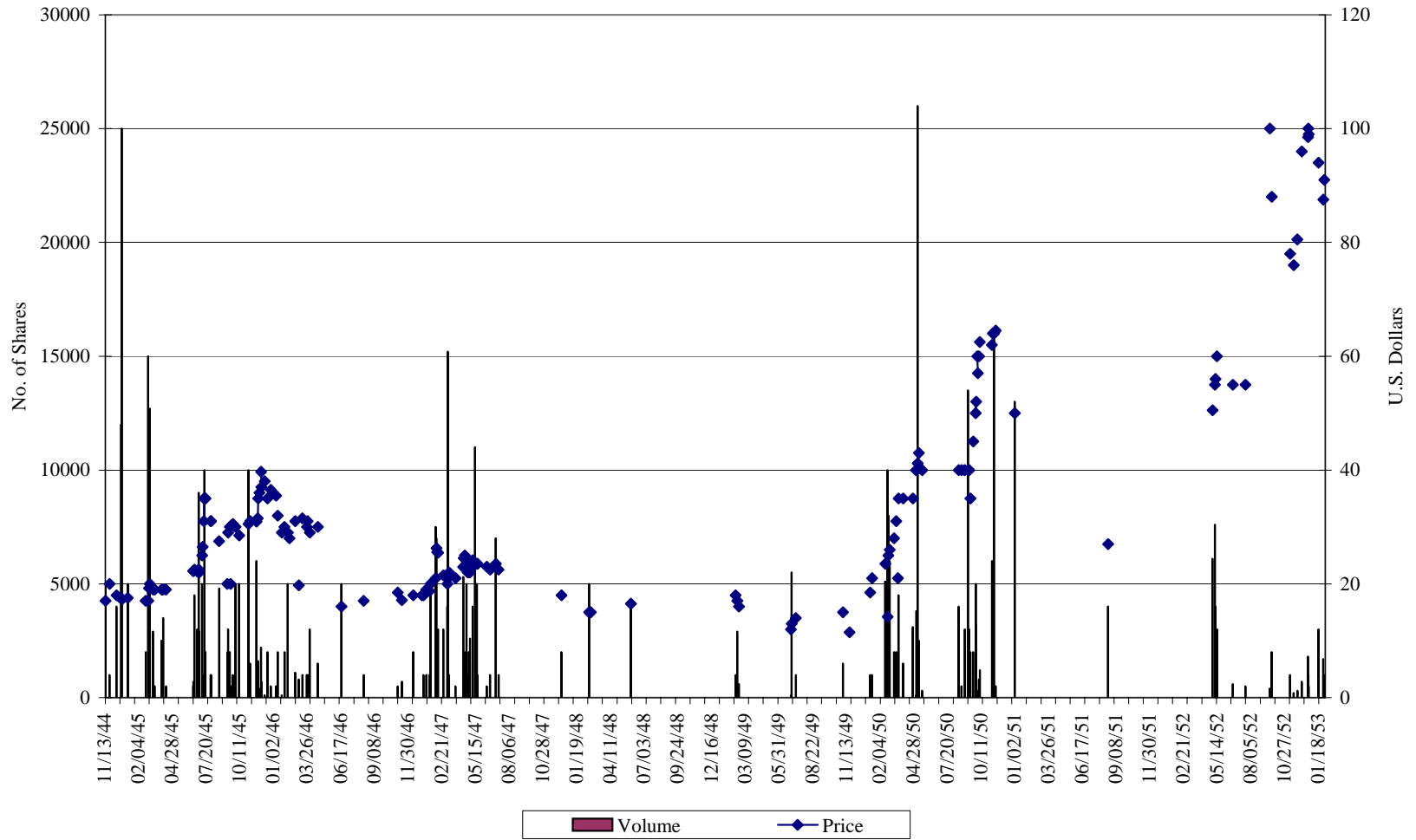
Note: The dummy variable is set equal to one for this month and all remaining months in the two-year “window.”



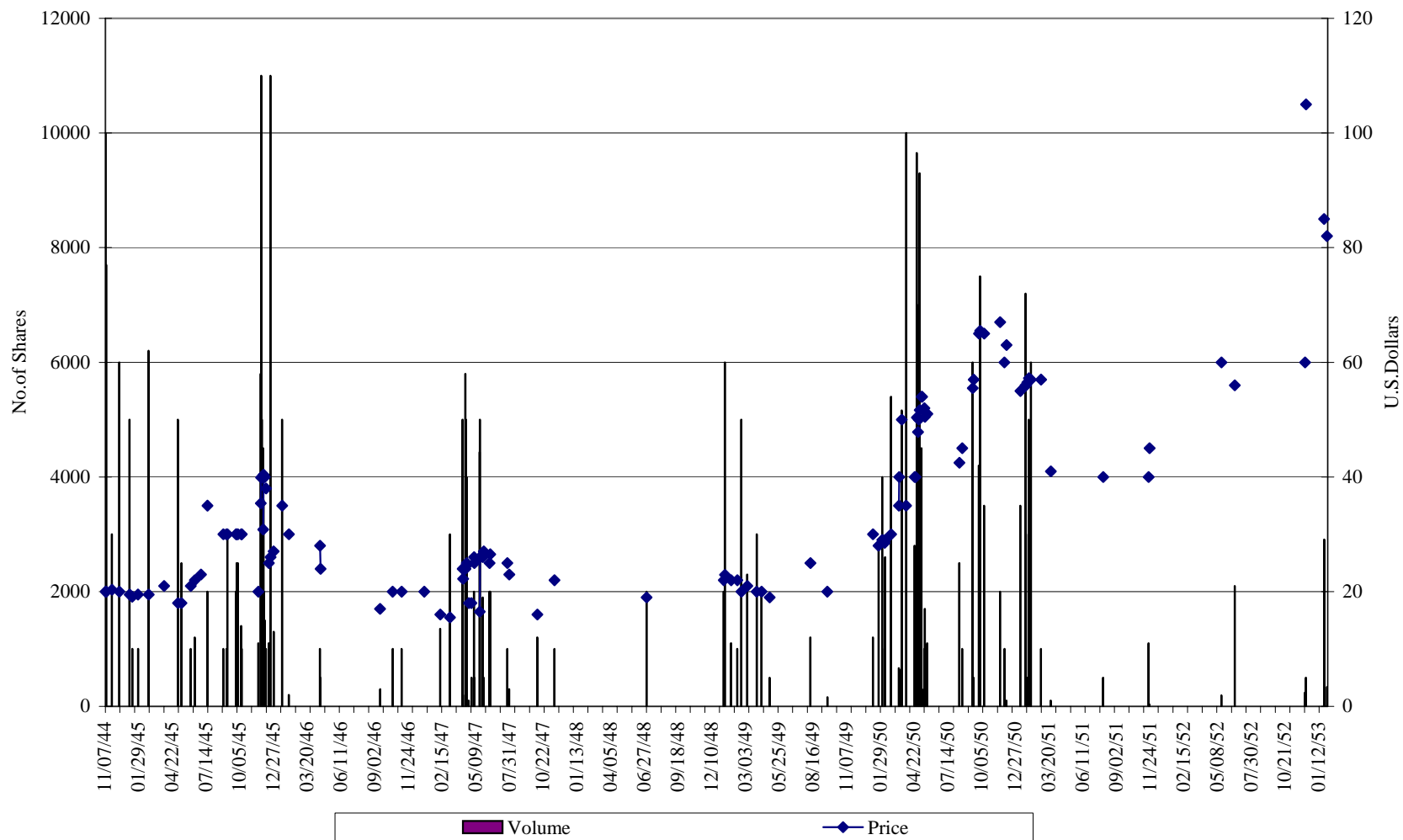
**Figure 1: Price and Trading Volume of Texas Treasury Notes, 1844-1854**



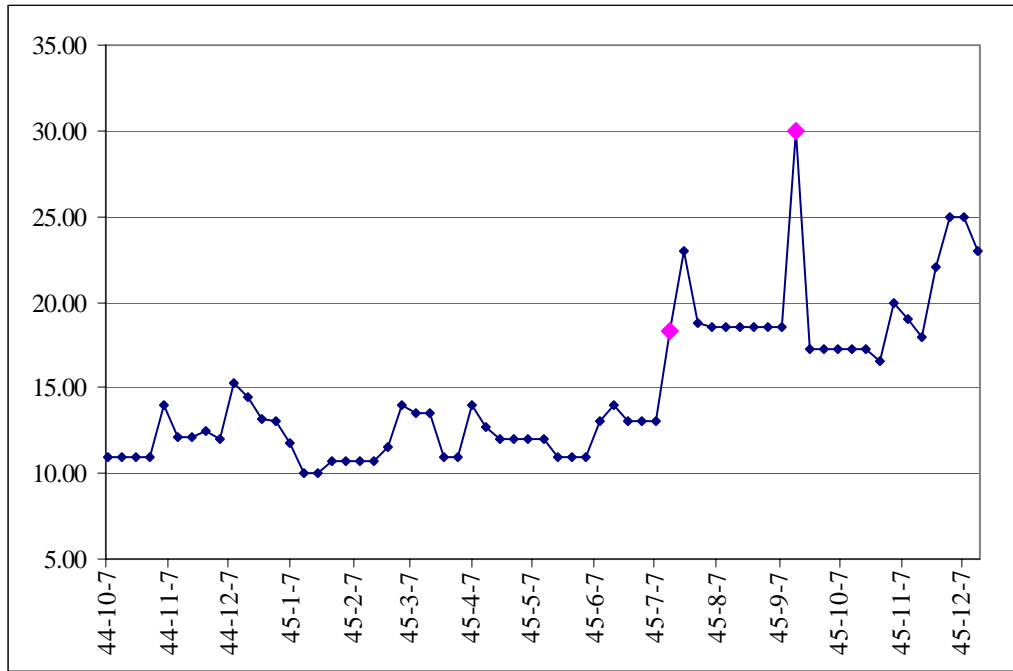
**Figure 2: Price and Trading Volume of Texas 8% Treasury Bonds, 1844-1853**



**Figure 3: Price and Trading Volume of Texas 10% Treasury bonds, 1844-1853**

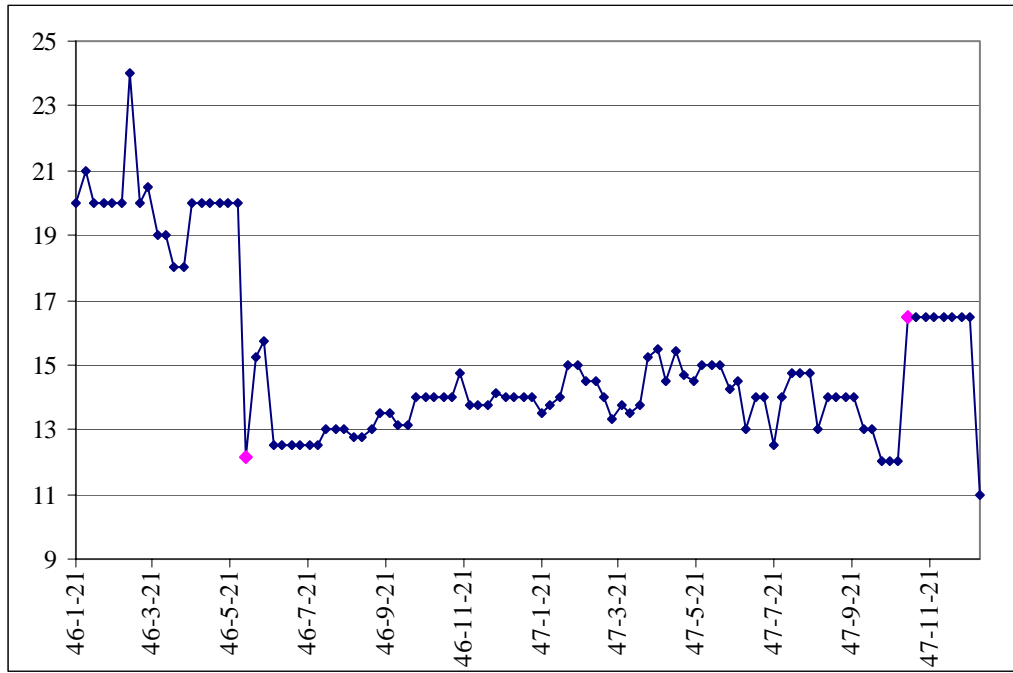


**Figure 4: Texas Treasury Note Prices over the 1844-1845 Sub-period**



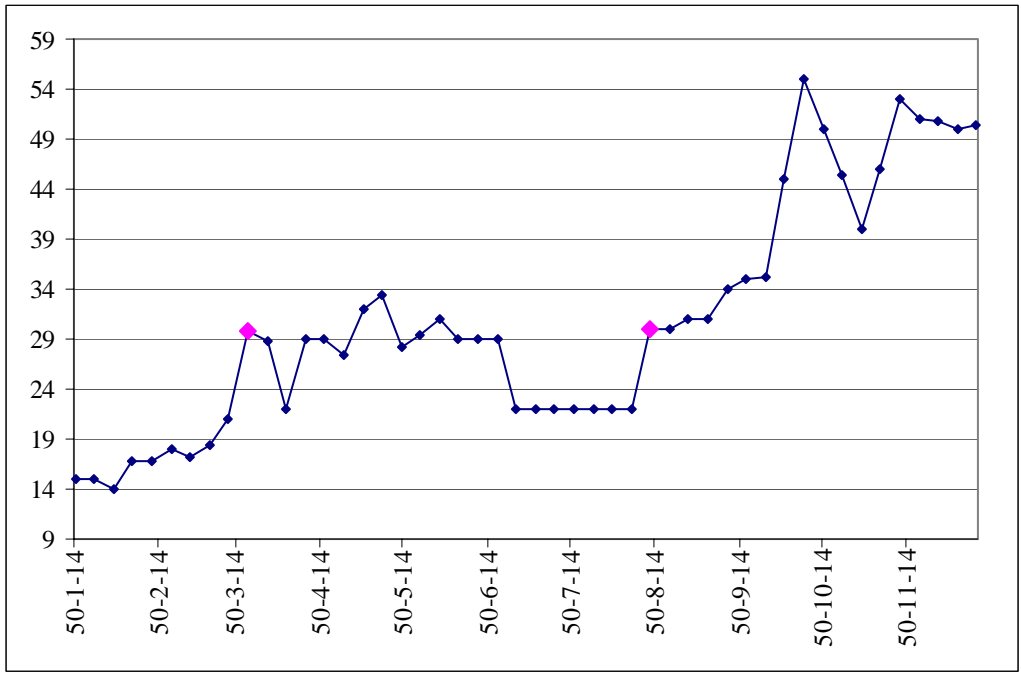
Break points: 07/14/1845 and 09/15/1845

Figure 5: Texas Treasury Note Prices over the 1846-1847 Sub-period



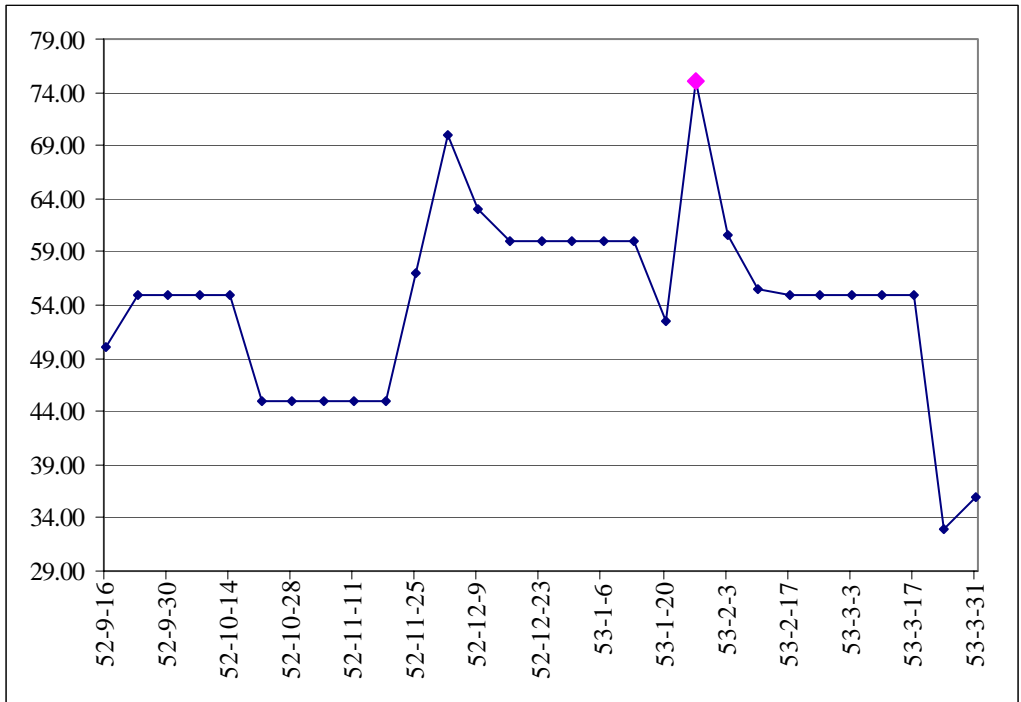
Break points: 06/03/1846 and 11/03/1847

**Figure 6: Texas Treasury Note Prices over the 1850 Sub-Period**



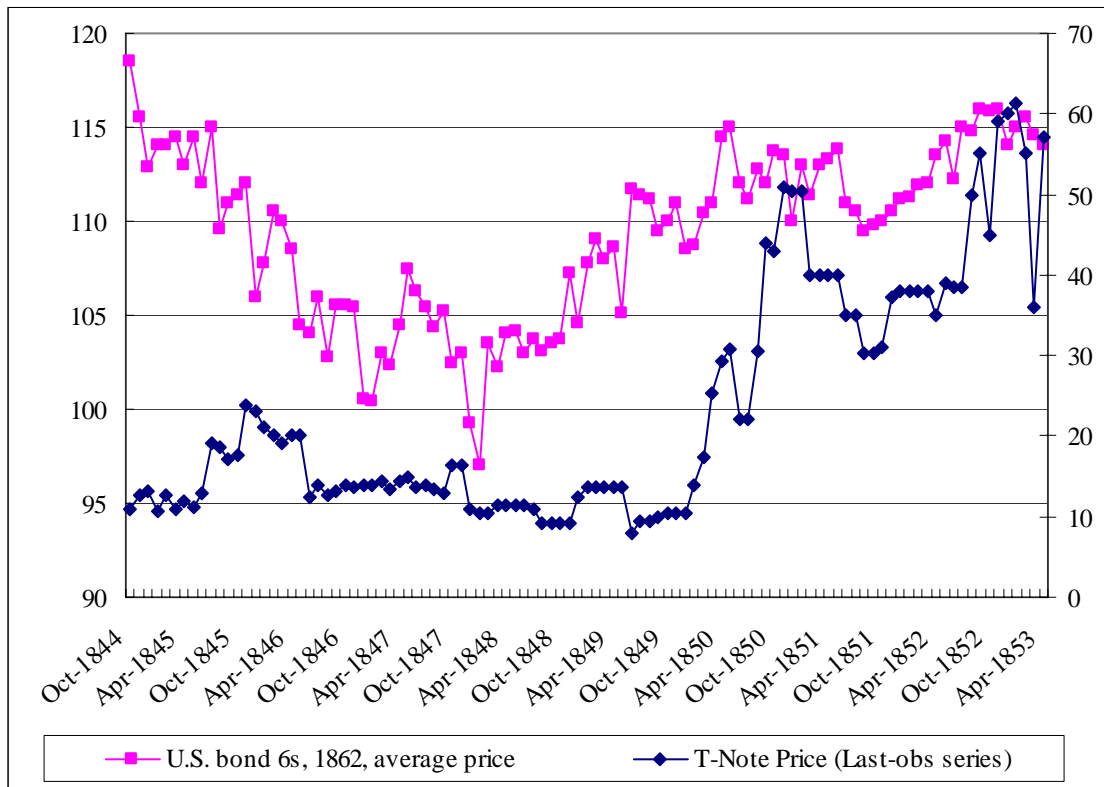
Break points: 03/18/1850 and 08/12/1850

**Figure 7: Texas Treasury Note Price over the 1852-1853 Sub-Period**



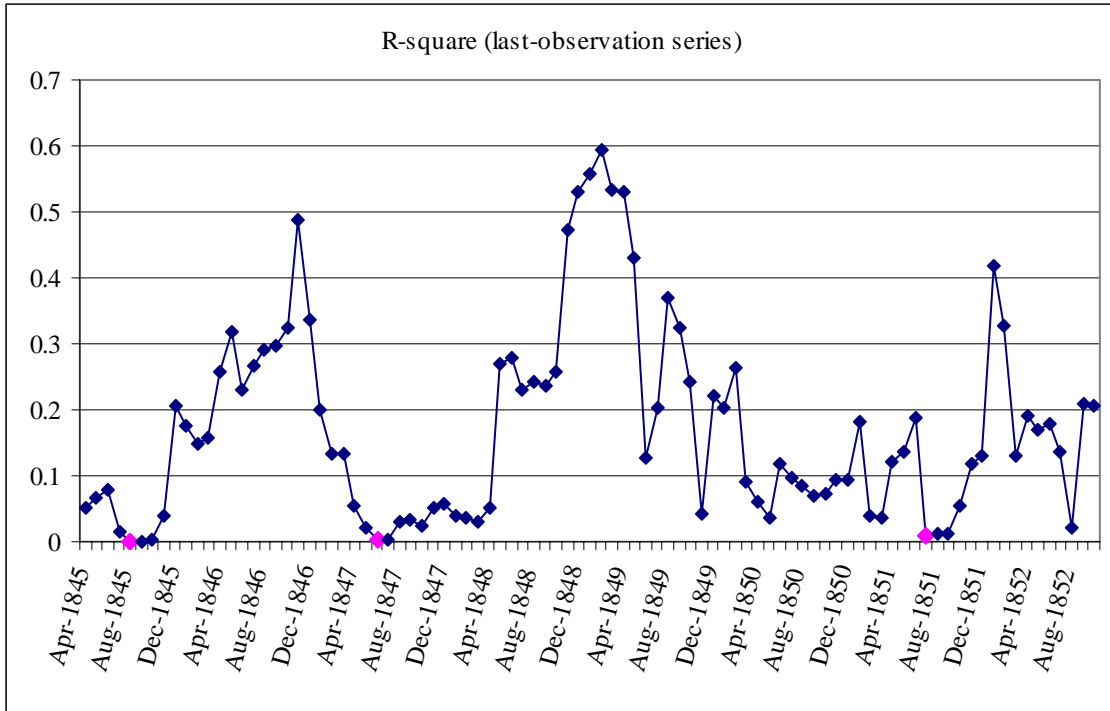
Break point: 01/27/1853

**Figure 8: Texas Treasury Notes vs. US Treasury bonds**





**Figure 9: Recursive Estimation using the Last Observation in Each Month, April 1845-September 1852**



**Figure 10: Recursive Estimation in Moving Average Form, April 1845-September 1852**

