Seigniorage in the Civil War South☆

Bryan P. Cutsinger*, Joshua S. Ingber

Department of Economics, George Mason University, MS 3G4, Fairfax, VA 22020, USA

ABSTRACT

During the U.S. Civil War, the Confederate Congress adopted three currency reforms that were intended to reduce the quantity of Treasury notes in circulation by inducing the money-holding public to exchange their notes for long-term bonds. In this paper, we examine the political factors that influenced the adoption of the reforms and their effect on the flow of seigniorage - revenue that the government derived by using the newly-printed Treasury notes to purchase the goods and services it required. We argue that the bifurcation of the Confederate Congress into two groups – those legislators that represented the Confederacy's interior and those from areas no longer under Confederate control – contributed to the adoption of the reforms. Our findings indicate that representing an area outside of the rebel government's control increased the likelihood that a legislator would support efforts to reform the currency by over 90 percent. In addition, our results indicate that the rate of monetary expansion in the South was below that which would have maximized the revenue from seigniorage. We find that the reforms reduced the flow of seigniorage by approximately 57 percent, depriving the Confederate government of much-needed revenue.

> "Of all the features of maladministration in the Confederacy, which we have unwillingly traced, that of the currency was certainly the most marked, and perhaps the most vital."
>
> –Pollard (1866, p. 186)

1. Introduction

Between 1861 and 1865, the price level in the Confederacy skyrocketed by 5000%, propelled, in part, by the rebel government's reliance on the printing press (Burdekin & Langdana, 1993; Lerner, 1955). Unlike the Union, which relied primarily on long-term loans, nearly 60% of the Confederacy's expenditures were financed with revenue from seigniorage – income that the government derived by using the newly-printed Treasury notes, known as graybacks, to purchase the goods and services it required (Ball, 1991, p. 255). In consequence, the quantity of outstanding Treasury notes increased by 780%, resulting in one of the worst inflationary episodes in U.S. history (Godfrey, 1978, pp. 118–119).[1]

[1] This outcome is consistent with the consensus among economists that episodes of high inflation are often the result of the government's need to raise seigniorage revenue to finance high budget deficits. See Sargent (1982), for example.

Perhaps surprisingly, some Civil War historians have argued that the South could have benefited financially from printing more money than it did. Schwab (1901), for example, argues that efforts by the Confederacy to reform the currency (i.e., to reduce the quantity of currency in circulation) "wrecked the government's finances beyond the hope of saving them from utter ruin" (p. 69). Likewise, Godfrey (1978) concludes that the financial collapse of the South was due to the government "not recognizing that currency issues were its most expedient method of commanding resources" (p. 37). Did the South fail to take full advantage of the printing press as Schwab and Godfrey suggest, and not, why? In this paper, we examine the political factors that contributed to the passage of the reforms, and then use them to evaluate whether the rate of monetary expansion in the South was below that which would have maximized the revenue from seigniorage.

The literature on the Confederate economy has chronicled and examined the Confederacy's finances (Schwab, 1901; Todd, 1954), the South's monetary and fiscal programs (Godfrey, 1978; Lerner, 1954, 1955; Morgan, 1985), and the role that these programs played in contributing to the Confederacy's defeat (Ball, 1991). Inquiries into the determinants of the grayback's value have found that its purchasing power was a function of both the quantity of notes in circulation as well as money-holders' expectations of Southern success, which was due to the peculiar nature of the Confederate currency (Burdekin & Langdana, 1993; Burdekin & Weidenmier, 2001, 2003; Davis & Pecquet, 1990; McCandless, 1996; Pecquet et al., 2004; Weidenmier, 2002).[2] While a subset of these studies have used the currency reforms to evaluate the link between money and prices, the effect of the reforms on seigniorage in the Civil War South remains understudied.

Given the Confederate Congress' role in the conduct of monetary policy, and the currency reforms in particular, any analysis of the South's currency policies must account for the political factors that influenced the rebel government's monetary strategy. One of the important themes that emerges from the literature on the political economy of the Confederacy is that the rebel government's economic policies reflected both legislators' private interests as well as those of their constituencies, and that as Union forces made inroads into the South's territory, economic policy evolved in a manner consistent with those interests.[3] For instance, Ekelund et al. (2010) find that despite the widespread commitment to free trade in the South, Union occupation influenced the way in which legislators voted for currency reform late in the war.[4] Likewise, Razaghian (2004), finds that as the war progressed, and the prospects of victory dimmed, the Confederacy's fiscal policies shifted to reflect the private interests of the legislators and those that they represented. Of course, these findings do not imply that party affiliation and secessionist ideology were unimportant; indeed, there is an extensive literature that suggests that those factors did in fact influence Confederate policy (see, for example, Alexander and Beringer, 1972; Jenkins, 1999, 2000).[5] What these findings do imply, however, is that in order to understand the South's currency policies it is necessary to consider both the private interests of the legislators (as well as the interests of those that they represented) and the influence that these interests had on policy outcomes. While this literature has analyzed the roll call voting records for many of the South's policies, no analysis of the political factors that influenced support for the currency reforms has been conducted.

We build on these literatures in two ways. Our first contribution is to examine the roll call voting records from the final, and most significant currency reform to determine which factors influenced legislative support for this measure. In Section 3, we combine these records with biographic and demographic information on both Confederate legislators as well as the districts that they represented, and, using logistic analysis, find that representing an area no longer under the rebel government's control increased the likelihood that a legislator would vote for the reform by over 90%. Our results are consistent Ekelund et al. (2010) and Razaghian's (2004) findings that the Union's incursion into the South influenced Confederate policy. We argue that this factor bifurcated the Confederate representatives into two groups: those who represented the Confederacy's interior, where graybacks continued to circulate, and those who represented areas that were outside of Confederate control, where graybacks were no longer a part of people's asset portfolios, with those in the latter group naturally supporting more drastic reforms because they would not have had to bear the full cost of the reforms' effects.

Our second contribution builds on the research that examines the Confederate economy. We use Cagan's (1956) model of inflationary finance to evaluate the effect that the currency reforms on the flow of seigniorage.[6] The relevant implication of this model, which we derive in Section 4, is that once the money-holding public anticipates the inflation brought on by additional monetary expansion, the potential revenue from seigniorage becomes finite and eventually declines as the demand for money becomes increasingly elastic. Thus, the model provides a framework to determine whether the Confederacy was maximizing the revenue from seigniorage by observing how the flow of seigniorage responded to efforts by the Confederate Congress to reform the currency. We

---

[2] Although the Confederate currency is often described as being a fiat money, it was in fact a credit money due to the promise to redeem the notes in exchange for specie following the end of the war. See Mises (1981, pp. 74–76) for a discussion of the distinction between these two types of monies. We thank George Selgin for bringing this to our attention.

[3] See McCormick and Tollison (1981) for an overview of the interest-group theory of government.

[4] See McGuire and Van Cott (2002) for a discussion of the South's commitment to free trade and the Confederate Constitution.

[5] For an historical account of the Confederate Congress, see Yearns (2010).

[6] In addition to Cagan's (1956) initial analysis, which examined hyperinflations in Austria, Germany, Greece, Hungary, Poland, and Russia, this approach has been found to be applicable to a number of inflationary episodes including those in Argentina, Bolivia, and Brazil (Phylaktis & Taylor, 1993); Belarus (Korosteleva, 2007); Mexico (Loviscek, 1996; Turner & Benavides, 2001); and Yugoslavia (Frenkel & Taylor, 1993). Consideration was also given to alternative models of seigniorage. Mankiw (1987) has a model of optimal seigniorage wherein the monetary and fiscal authorities minimize the social losses from inflation and taxation subject to the government's intertemporal budget constraint. One of the testable implications of this model for which data on the Confederacy is available is that inflation should follow a random walk. In our analysis of Confederate inflation, however, we did not find any evidence to support this implication. Accordingly, we did not attempt any further analysis of Confederate seigniorage using this model (details are available from the authors upon request).
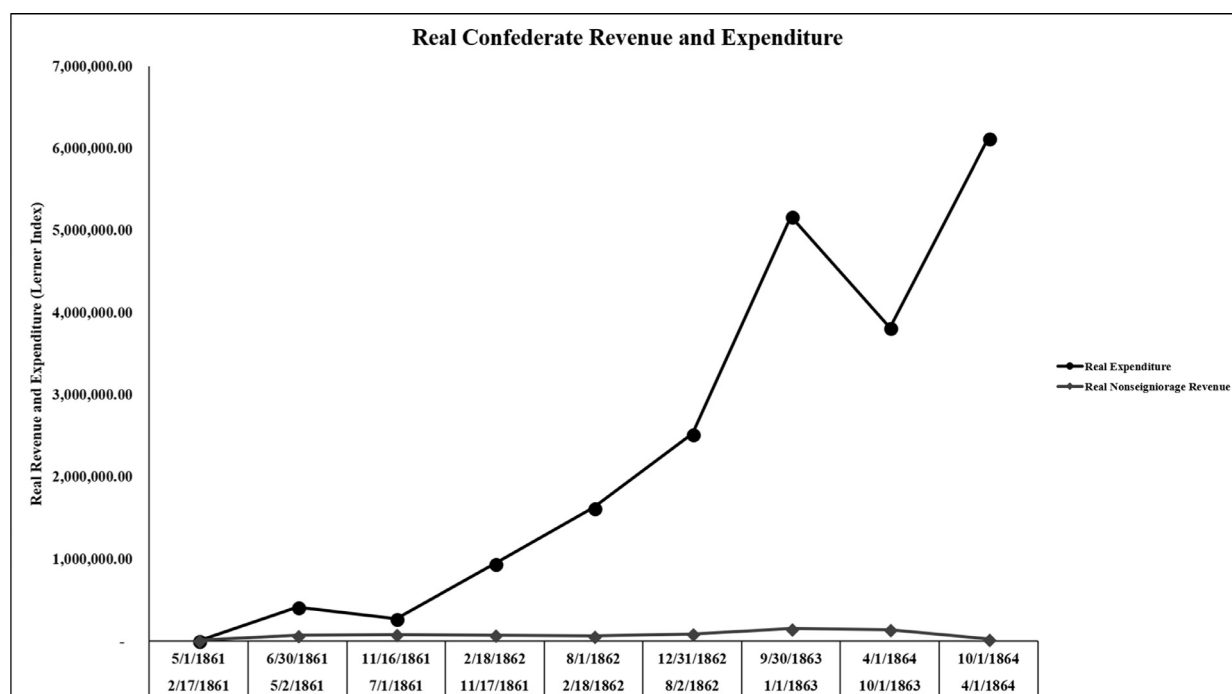
Fig. 1. Real confederate revenue and expenditure.
Source: Burdekin and Langdana (1993, pp. 354–355).

use the currency reforms as event studies and find that the rate of monetary expansion in the South was below that which would have maximized the revenue from seigniorage. Our results, which we present in Section 5, indicate that the currency reforms reduced the flow of seigniorage by approximately 57%, depriving the Confederacy of much-needed revenue.

2. A brief history of confederate monetary policy

From the outset of the war, the Confederacy had difficulty raising revenue through traditional means. Fig. 1, which is a graphical representation of Burdekin and Langdana's (1993, pp. 354–355) estimates of the real revenue and expenditure flows in the Confederacy, illustrates the sizable budget deficit the rebel government faced. Here, we have excluded revenue from seigniorage to highlight the trivial contribution that revenue from taxes and bond finance made relative to the Confederacy's real expenditures. Beginning in November 1861, the gap between non-seigniorage revenues and expenditures began to widen significantly, shrinking somewhat between October 1863 and April 1864, only to widen again late that same year.

To cover the expanding deficit, the Confederacy resorted to the printing press, issuing both interest- and noninterest-bearing Treasury notes that became the dominant form of money in the South for the duration of the war. Fig. 2, which is also based on Burdekin and Langdana's (1993, pp. 354–355) estimates, highlights the central role that non-interest-bearing Treasury notes played in supplying the Southern government with income. Beginning in July 1861, these notes became the Confederacy's primary source of revenue and remained so until 1864. Fig. 2 also highlights the abrupt shift away from the South's early reliance upon bond finance. Initially, the Confederate Congress approved two loans: the $15 million loan and the $100 million loan, both of which paid 8% interest in specie semiannually (Todd, 1954, pp. 26 & 31). The former loan was guaranteed by an export duty on cotton that was supposed to be paid either in gold or interest coupons on the loan. Due to the Union blockade and the South's self-imposed cotton embargo, however, the export duty did not raise a significant amount of revenue. Eventually, the Confederacy was forced to default on its commitment to make coupon payments in gold due to a lack of specie and opted to use Treasury notes instead. Given the rising inflation, this decision reduced the potential revenue that could have been raised by from bond finance. As Ball notes, however, this issue could have been avoided with a more careful use of the South's available specie (Ball, 1991, p. 123).[7]

The Confederate money stock consisted of four primary components: state-issued currency, bank deposits, bank notes, and Confederate Treasury notes. These data are shown in Fig. 3. The largest component of the Confederate money stock consisted of Confederate

---

[7] The Confederacy also tried to take advantage of European financial markets. The Erlanger Loan of 1863 being the most well-known example. Grossman and Han (1996) argue that the reason the Confederacy did not rely more upon external financing was due to the fact the South's prewar resource endowment was large relative to its postwar endowment, and thus required little outside funding to accomplish the optimal amount of consumption smoothing. See Gentry (1970), Brown and Burdekin (2000), and Weidenmier (2000) for additional analyses of the Erlanger Loan.
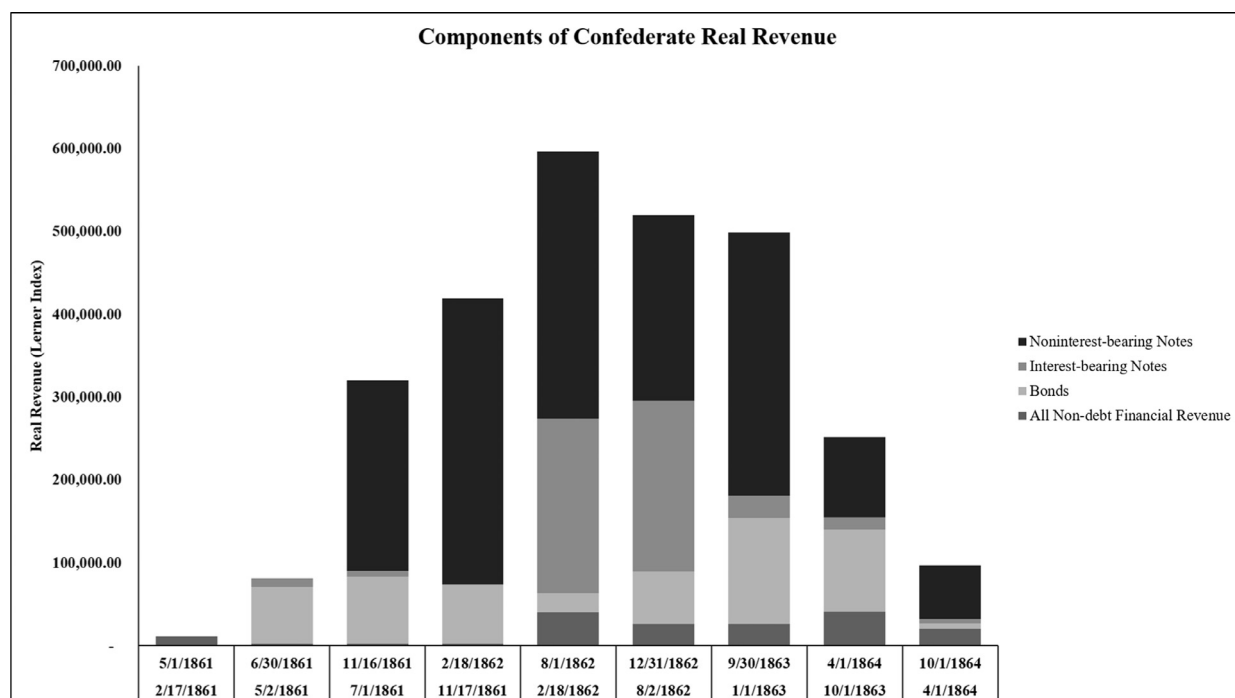
Fig. 2. Components of confederate real revenue.
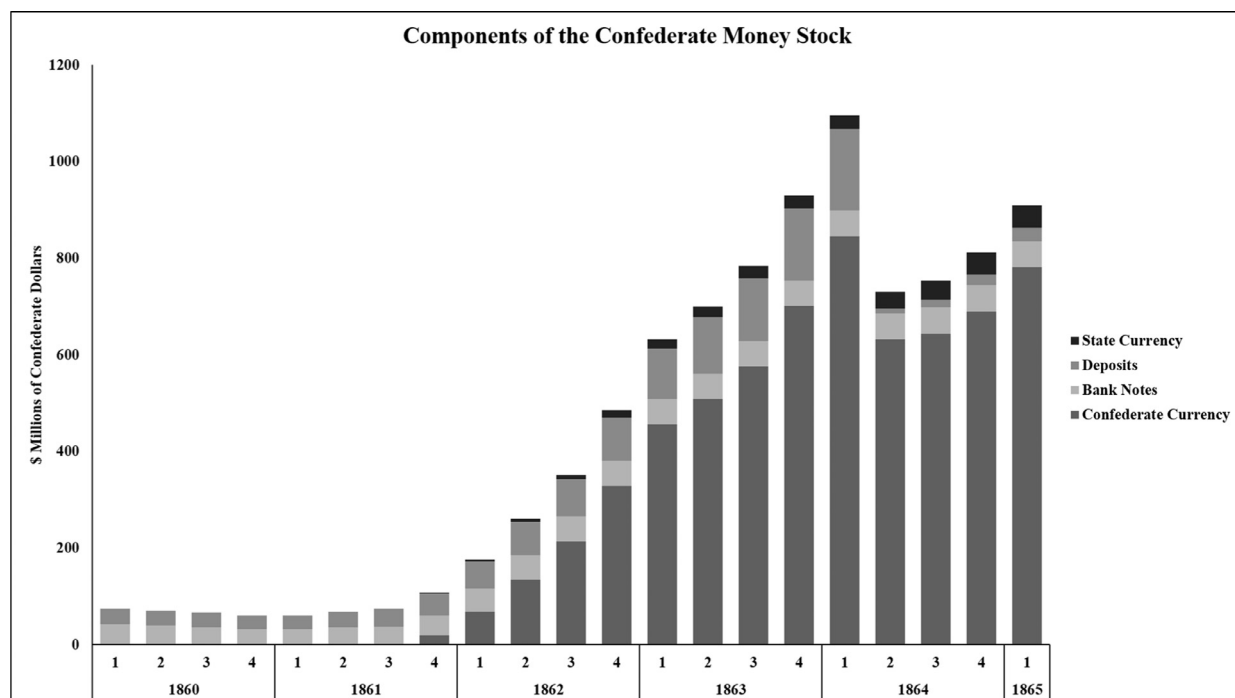*Source:* Burdekin and Langdana (1993, pp. 354–355).

Fig. 3. Components of the confederate money stock.
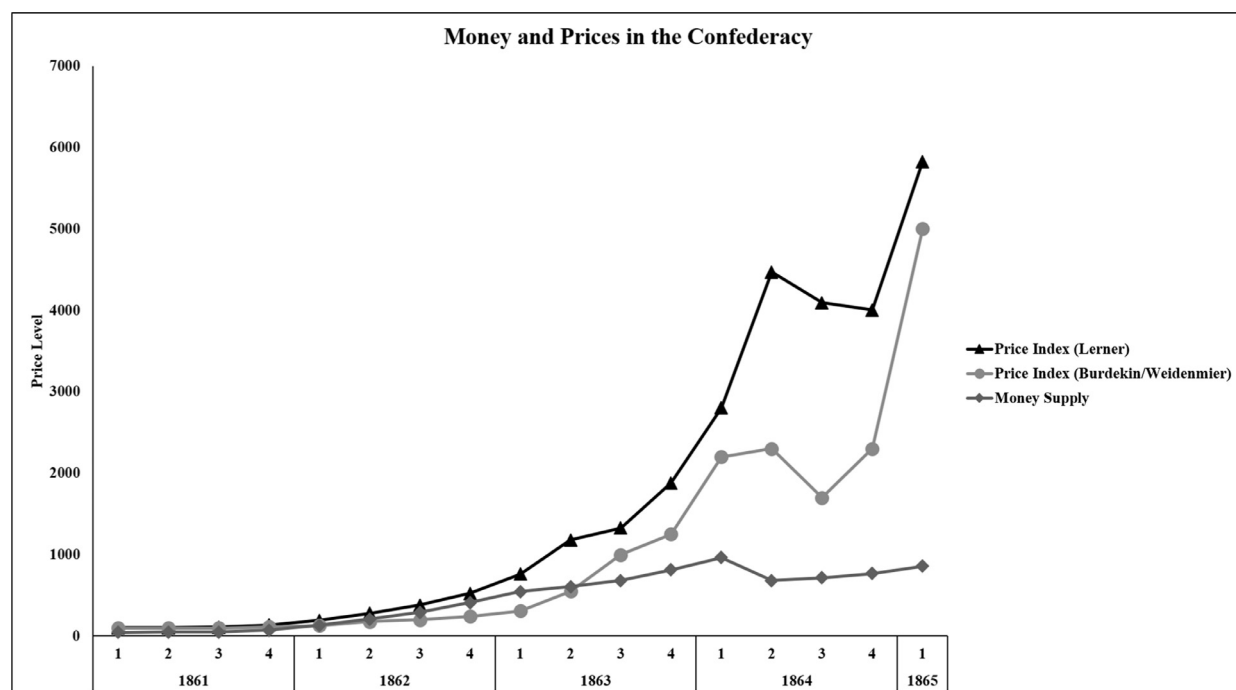*Source:* Godfrey (1978, pp. 118–119).

Fig. 4. Prices in the confederacy.
Source: Burdekin and Weidenmier (2003, p. 431), Godfrey (1978, pp. 118–119) and Lerner (1955, p. 24).

Treasury notes. In July 1861, these notes represented only 2% of the money stock but by the end of the war this fraction had increased to approximately 90%. The Confederate currency was comprised of three types of notes: general currency, interest-bearing Treasury notes, and call certificates. General currency consisted of noninterest-bearing Treasury notes and were issued in denominations of up to $100. The interest-bearing Treasury notes were of two types. The first type paid 3.65% interest per year and the second type paid 7.3% interest per year. These interest-bearing notes both circulated as currency and were held by banks as reserves to offset deposits. Call certificates were exchangeable on demand for Treasury notes in the amount of the principle and interest due.

The Confederacy's reliance upon inflationary finance resulted in a substantial increase in the money stock, which in turn, caused the price level in the South to increase significantly. Between 1861 and 1865, the quantity of Treasury notes in circulation increased by 780%, while the total money stock increased by 1700% (Godfrey, 1978, pp. 118–119). Over that same time period, prices in the South increased by 5000%, or at a rate equal to 10% per month (Burdekin & Weidenmier, 2003; Lerner, 1955). Fig. 4 illustrates the time paths of the price level and the money supply during the war. Two additional factors contributed to the grayback's depreciation. First, real income declined, although it is difficult to know by precisely how much since no reliable estimates of real output in the Confederacy exist.[8] Second, Confederate Treasury notes were to be redeemable in specie following a peace treaty with the Union. Consequently, their value was not only a function of the quantity of notes in circulation but was also a function of people's expectations of Confederate victory. Thus, as the prospects of Confederacy victory diminished, so too did the value of the South's Treasury notes.

As Fig. 5 indicates, at least initially the real value of the Confederate money stock increased despite the rapid expansion in the number of graybacks.[9] Between 1861 and the end of 1862, it appears that velocity fell below its long-run equilibrium due to an excess supply of money brought on by the Confederacy's monetary expansion. Depending on the price index used, the real value of the Confederate Treasury notes peaked around the end of 1862 or the beginning of 1863 and declined steadily thereafter. The difference in the behavior of the two series is likely attributable to the fact that the Burdekin and Weidenmier series is based on gold price quotations whereas the Lerner index was constructed using wholesale prices for the Eastern region of the Confederacy. Based on Fig. 5, it seems reasonable to conclude that, at least prior to the end of 1862, commodity prices adjusted more rapidly to the increase in Confederate Treasury notes than did gold prices.

What accounts for the decline in the real value of the Confederate currency at the end of 1862? At the outset of the war, both the Union and the Confederacy expected that the rebellion would be over quickly. After the Battle of Antietam in September 1862 and the Emancipation Proclamation in January 1863, however, it became evident that there would not be a swift resolution to the conflict. Recognizing the reality of the situation, noteholders, who up to that point had been willing to hold graybacks due to their

---

[8] One was produced by Lerner (1956, p. 174), who, using reports by Confederate Treasury Secretary Memminger in 1863 stating that velocity of circulation had decreased by two-thirds its pre-war rate, estimated that real income had fallen by 40%.

[9] Per the quantity equation, the real value of the money stock, M/P, is defined as the ratio of real output to velocity: $\frac{M}{P} = \frac{y}{V}$.
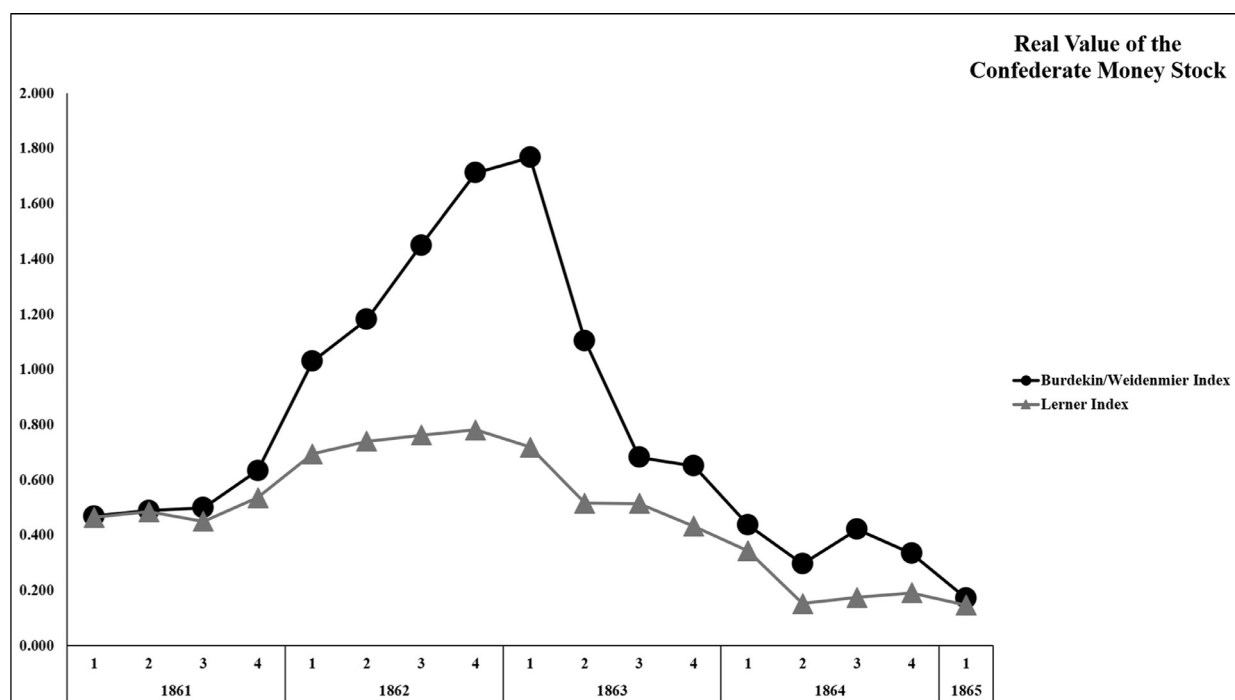
Fig. 5. Real value of the confederate money stock.
Source: Burdekin and Weidenmier (2003, p. 431), Godfrey (1978, pp. 118–119), and (1955, p. 24).

expectation that they would be redeemable for specie in the near future, quickly exchanged their notes once it became evident that Southern victory may be a long way off, if it were to come at all (Pecquet et al., 2004; Weidenmier, 2002).

By October 1862, prices in the Confederacy were approximately 420% higher than their pre-war level (Lerner, 1955, p. 24). Confederate Treasury Secretary Christopher Memminger warned Confederate lawmakers that the quantity of notes in circulation would soon be double what he regarded as the desirable maximum of $150 million (Yearns, 2010, p. 197). Writing to Jefferson Davis around the same time, Memminger (as quoted in Todd, 1954, p. 109) reiterated his concern that the Confederate monetary situation may soon become unstable, noting that:

> When it is remembered that the circulation of all the Confederate States before the present war was less than one hundred millions, it becomes obvious that so large an increase must produce depreciation and final disaster, unless sufficient remedies are provided.

To prevent the circulation of Confederate Treasury notes from becoming too large, Memminger proposed that Congress place a time limitation on funding notes into 8% bonds (Ball, 1991, p. 179). In response, Congress adopted the first of three currency reforms on October 13, 1862 stipulating that Treasury notes issued prior to December 1, of that same year would continue to be exchangeable for 8% bonds until April 22, 1863, after which point such notes would only be redeemable for 7% bonds. Memminger, relying on a crude version of the quantity theory of money, defended what was essentially an abrogation of the agreement printed on each and every Treasury note by arguing that following the reform, the value of the remaining currency outstanding would appreciate, thus leaving noteholders with the same purchasing power (Memminger, 1863b, p. 9).

As it happened, however, the reform had the opposite effect. As Lerner (1954, p. 516) notes, rather than reduce inflation, the act increased velocity as noteholders attempted to exchange their notes prior to the April 1863 deadline, thus causing commodity prices to increase. Once the reform took effect, however, the growth rate of Confederate Treasury notes fell by 27 percentage points from the previous quarter, which temporarily arrested the grayback's ongoing depreciation (Godfrey, 1978, pp. 118–119). Nonetheless, this temporary abatement was not large enough to offset the prior increase in commodity prices, and consequently, the purchasing power of the grayback declined (Burdekin & Weidenmier, 2003).

By January 1863, prices in the Confederacy had risen an additional 44% since Congress had adopted the first currency reform (Lerner, 1955, p. 24). Memminger (1863b, p. 5) urged the Confederate Congress to reduce the circulation, arguing that:

> …the mere fact that its actual volume has been increased threefold would lead us to expect a corresponding increase in prices. Such increase, although eventually certain, does not usually appear at the same moment with the expansion. Prices will reach the height adjusted by the scale of issues, and they can only be restored to their usual condition by a return to the normal standard of currency. In other words, the only remedy for an inflated currency is a reduction of the circulating medium.

Memminger proposed that the Confederate Congress adopt a compulsory funding program that would, after a certain date, repudiate those notes issued prior to December 1, 1862, which would then make it possible for the Treasury to issue $200 million worth of new notes and thereby reduce inflation (Memminger, 1863b, p. 7). Prior to the first currency reform going into effect, the Confederate Congress adopted a funding act on March 23, 1863 that separated non-interest-bearing treasury notes into two categories. Those printed prior to December 1, 1862 could be exchanged for 8% bonds until April 22, 1863 and for 7% bonds until August that same year. After that point, the notes would no longer be fundable, although they retained their tax-receivable status and would still be redeemable for specie six months after the war ended. Those notes printed between December 1, 1862 and April 6, 1863 could be exchanged for 7% bonds until August 1, 1863 and for 4% bonds thereafter. They too retained their tax-receivable status.

Unlike the first reform, however, the second removed comparatively little currency from circulation. Todd (1954, p. 37) estimates that the first reform withdrew $163 million notes out of circulation, whereas the second only removed $21 million (p.72). Indeed, Godfrey's estimates indicate that the quantity of notes in circulation actually increased by 2 percentage points during the third quarter of 1863 when the act's provisions went into effect. Consequently, the second reform was unsuccessful in terms of reducing the rate of currency depreciation (Burdekin & Weidenmier, 2003).

By December 1863, prices in the Confederacy were over 2000% higher than their January 1861 level (Lerner, 1955, p. 24). Secretary Memminger reported to the Confederate Congress that the previous reforms had failed to reduce the outstanding currency from $700 million to the desired $200 million (Memminger, 1863a, p. 4). In fact, despite the South's efforts to reform the currency, the quantity of Treasury notes in circulation had doubled over the previous year. Secretary Memminger (1863a, p. 5) made his position on the matter plain to Congress, stating that, "the currency must be reduced." To address the shortcomings of the previous reforms, and to generate the revenue necessary to fund the government's expenses, he proposed that the government issue $1 billion in 6% 20-year bonds, which would be tax exempt until April 1864 (July 1864, west of the Mississippi), after which point, those in possession of the old notes would not be allowed to exchange their currency for Confederate bonds and those still outstanding would be considered repudiated. Finally, Memminger asked Congress to authorize $200 million of new Treasury notes, the quantity of which would thereafter remain fixed to limit inflation (Memminger, 1863a, p. 8).

Members of the Confederate House also made a variety of reform proposals. Critically, as Ball (1991, p. 185) notes, all of these schemes were "disguised forms of debt scaling or repudiation." As we discuss in the following section, this type of repudiation would have affected those Southerners living in the interior of the Confederacy differently than it would have those living in areas occupied by the Union, and thus, would have influenced the pattern of political support for reform. Unable to reach agreement, the House created the Special Committee on the Currency, which proposed a bill to tax, fund, and limit the currency that was similar to Memminger's proposal. The measure would allow all non-interest-bearing notes to be funded in 6% bonds until March 1864 and into 4% bonds until May 1, after which point the notes could be exchanged for bonds at a rate of $0.25 on the dollar until August when those notes that remained outstanding would be repudiated. The Special Committee also authorized the Secretary to issue $200 million in new notes with a guarantee of a maximum future circulation of $250 million.

Representatives from the Atlantic coast states and Alabama, where the concentration of graybacks was greatest, were generally opposed to the Special Committee's bill (Yearns, 2010, p. 206). However, their efforts to moderate the proposed reform were unsuccessful, and on January 16, 1864, the bill passed the Confederate House of Representatives by a vote of 38 to 32 (*Journal of the Congress of the Confederate States of America, 1861–1865*, 1904, p. 644). The Confederate Senate, however, was unwilling to adopt the House measure. To resolve the issue, both houses agreed to a conference committee, where the House bill was moderated by concessions intended to alleviate the Senate's concerns. Despite these concessions, those legislators from Atlantic coast states and Alabama generally continued to oppose the measure; indeed, 25 of the 34 votes against the final reform bill represented states where the concentration of graybacks remained the greatest (*Journal of the Congress of the Confederate States of America, 1861–1865*, 1904, p. 843). As Memminger's biographer, Capers (1893, p. 348) put the matter, the reform was "at best but a compromise between opposing factions."

The final reform was passed on February 17, 1864. The act split non-interest-bearing notes into four categories. Notes with a face value less than $5 were not affected by the reform. $5 notes would be tax-receivable and exchangeable at par for 4% bonds until July 1, 1864, after which point they were fundable at two-thirds their face value until January 1, 1865 when all remaining $5 notes would be taxed at 100%. Those notes between $5 and $100, which comprised the majority of the outstanding graybacks, were treated similarly except that they were only exchangeable for bonds at par until April 1, 1864. Finally, $100 notes, of which there were $200 million in circulation, could be exchanged for bonds at par until April 1, 1864, after which point they were no longer tax-receivable and subject to an immediate 33.33% tax as well as to a 10% per month tax until they were exchanged for bonds.

The final currency reform reduced the growth rate of Confederate Treasury notes in the second quarter of 1864 by 45 percentage points and successfully halted the advance of prices in the Confederacy as is evident in Fig. 3 (Godfrey, 1978, pp. 118–119). Like the first reform, however, the temporary reduction in the rate of currency depreciation was insufficient to offset the increase in commodity prices that occurred prior to April 1, 1864 (Burdekin & Weidenmier, 2001, 2003).[10] Critically, the act deprived the Confederacy of much-needed revenue, which can be clearly seen in Fig. 2. As Godfrey notes (1978, p. 37), the reform required the Treasury to allocate nearly half of its $46 million per month note-issuing capacity to exchanging new notes authorized by the currency reform, which left the Treasury with only $26 million per month to use for war expenditures. As a result, the rebel government fell further behind in meeting its financial obligations, with arrears in payment increasing by 133% from $150 million in January 1864 to $350 million in October of that same year (Ball, 1991, p. 296). Despite being repudiated, the quantity of old currency outstanding was so large that

---

[10] For an analysis of the reform's effect west of the Mississippi, see Pecquet (1987).

Congress was forced to defer the penalty date of January 1, 1865, thereby making the old notes tax-receivable and fundable in 4% bonds until July 1, 1865 (1991, p. 188). Deprived of its most significant source of the revenue, the rebel government had no choice but to rely once again on the printing press, and by October 1864 the quantity of outstanding Treasury notes in circulation, both and old and new, stood at $689 million (Godfrey, 1978, p. 36).

3. The politics of Confederate currency reform

All three of the currency reforms were adopted during the first session of the Confederate Congress, which was split into four sessions. The first and final reforms were passed on the final days of the second and fourth sessions, respectively, while the second reform was passed in the middle of the third session. Unfortunately, roll call voting records for the first two reforms do not exist since the votes were taken during a secret session. Thus, our analysis of the political factors that influenced the currency reforms is confined to the final, and most significant one.

As we discussed in the previous section, the congressional debates over the various proposals to reform the currency in late 1863 and early 1864 pitted representatives from the Eastern states and Alabama, where graybacks continued to circulate, against those from the states that were occupied by the Union or cut off from Confederate control, where the circulation of graybacks had greatly diminished. That the Confederate House of Representatives would be divided along these lines is not surprising given the magnitude of the currency repudiation being debated. The proposed repudiation of the currency was essentially equivalent to the rebel government defaulting on a fraction of its debt, and would have involved noteholders only receiving one dollar for every ten they had lent the government (1991, p. 185). Those primarily affected by such a default would have been concentrated in the interior of the Confederacy. And while, per Ricardian equivalence, such a repudiation would have represented a reduction of future tax obligations, the benefits of this reduction would have disproportionately accrued to those not affected by the partial default, i.e., those living in areas where graybacks were no longer circulating (Barro, 1974).[11]

To test whether being outside of Confederate control affected a legislator's support for the 1864 currency reform, we constructed a data set that combines the roll call voting records for the reform with biographical information on each representative that participated in the vote along with information on their district.[12] The roll call records come from the Journal of the of the Congress of the Confederate States of America (1904), while the biographical and district information were collected from Alexander and Beringer's (1972) analysis of the members of the Confederate legislature and Martis' (1994) historical atlas of the Confederate Congress. The biographical characteristics include three political variables: party, views on secession, and lame duck status, as well as three economic variables: occupation, personal slave holdings, and 1860 estate value. We constructed the occupation variable such that the effect of being a lawyer or planter could be analyzed separately from other professions. Here, we are assuming that being a lawyer may indicate being part of the political elite and working in agriculture may indicate being part of the planter class. Data on each legislator's district includes a slave index indicating the average slave holdings in a Congressman's county, a land value index indicating the average property value in the district, and a variable that indicates whether the district produced cotton or tobacco. Finally, we created a variable indicating whether the legislator represented a district located in a state that was no longer under Confederate control in early 1864 (AR, KY, LA, MO, MS, TN, TX), which we expect to be positively correlated with support for the currency reform. Moreover, we expect the importance of this variable to be larger for the initial vote than in the final one owing to the concessions made to those living in the Confederacy's interior. The results of this analysis are presented in Table 1.

As predicted, the coefficient estimate for the Confederate control variable for both the initial and final reform vote is positive and statistically significant at the 95% level. Moreover, the magnitude of this variable decreased for the final reform, which is in line with our prediction that the concessions made to those in the Confederacy's interior would diminish the importance of geographical differences in representation.[13] The coefficient for State Outside of Confederate Control can be interpreted as the logarithmic odds ratio of voting for the currency reform. In other words, representing a district located in a state that was outside of Confederate control increased the probability that a legislator would support the initial reform by 94%. Likewise, in the case of the final vote, this factor increased the probability of supporting the reform by 91%.

Our findings suggest that congressional support for, or opposition to the final currency reform was politically motivated. Unlike Secretary Memminger, who was concerned with controlling inflation, Confederate lawmakers appear to have been concerned with pursuing policies that were consistent with their constituents' interests. Since there are no roll call voting records for the first two currency reforms, it is not possible to extent this analysis further. That said, by the time the first and second currency reforms were passed, between 37 and 39% of the Confederate House districts were either occupied or had been disrupted by the Union. When the final currency reform was adopted in February 1864, the fraction of Union-occupied or disrupted districts had only increased to 47% (Martis, 1994, p. 49). Based on the available evidence, therefore, we do not think that it is unreasonable to conclude that this factor could have contributed to the first two currency reforms as well.

---

[11] Such a bifurcation had effects on policy effects that extend beyond monetary issues. Ekelund et al. (2010), for example, found that whether a legislator represented a district that was outside of Confederate control influenced their support for severe trade legislation that regulated blockade-running in early 1864.

[12] Given the limited number of observations for the Confederate Senate, we confine our analysis to the Confederate House of Representatives.

[13] It should be noted that this result is merely suggestive given the differences between the two samples.

Table 1
Logistic analysis of roll call voting for currency reform.

	(1) Initial vote	(2) Final vote
State outside of confederate control	2.738*(1.156)	2.337*(0.925)
Democrat	2.076(1.219)	1.328(1.089)
Secession	0.419(0.745)	0.715(0.968)
Lame Duck	0.605(0.874)	0.183(0.760)
Slave Holdings	0.0186(0.0202)	0.0513**(0.0183)
1860 Estate Value	−0.00000349(0.00000959)	−0.0000233**(0.00000755)
Lawyer	2.038(1.189)	−0.0310(1.100)
Agriculture	−0.667(1.218)	0.819(1.155)
Slave index	0.173(0.206)	0.103(0.233)
Land value index	−0.102(0.0895)	0.0532(0.0959)
Cotton/Tobacco	1.009(0.935)	−0.396(0.827)
Constant	−4.375(2.393)	−2.739(1.851)
Observations	53	59
Pseudo R-Squared	0.386	0.286

* $p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$ Standard Errors in Parentheses.

4. A model of inflationary finance

In this section, we derive a steady-state relationship between seigniorage and the growth rate of the nominal money stock.[14] To do so, we begin with three assumptions.[15] First, we assume that money takes only one form, e.g. Confederate Treasury notes. Next, we assume that the public correctly anticipates the inflation rate. Lastly, we assume that the difference between the growth rates of velocity and real income is constant. In other words, we are assuming that the inflation rate moves one-for-one with the growth rate of the nominal money stock. These latter two assumptions imply that changes in the growth rate of the money stock are matched one-for-one by changes in the actual and expected rate of inflation. The higher the inflation rate, the greater is the cost of holding real money balances. Thus, increases in the growth rate of the money stock will cause the real quantity of money demanded to decrease.

Under these assumptions, the amount of real seigniorage collected by the monetary authority is equal to the product of the real money stock and the rate at which that stock depreciates. Since, under a fiat monetary system, the real money stock is determined entirely on the demand side via movements in the price level, and because we have assumed that changes in the growth rate of the money stock are matched exactly by changes in actual and expected inflation, we can express steady-state real seigniorage as:

$$s = \frac{M}{P} g_M \tag{1}$$

where s is real seigniorage, M/P is the real money stock, and g_M is the rate of monetary expansion.[16] To make this point more concrete, consider the following Cagan-style money demand function:

$$\left(\frac{M}{P}\right)^d = e^{-\alpha g_M - \gamma} \tag{2}$$

where e is the natural logarithmic base and α (which is necessarily positive) and γ are constants.[17] Since the real money stock accommodates itself to the real quantity of money demand, we can think of the real money stock as being equal to real money demand. Accordingly, we can substitute Eq. (2) into Eq. (1), which yields:

$$s = e^{-\alpha g_M - \gamma} g_M \tag{3}$$

To maximize seigniorage, the monetary authority must account for the negative effect that higher growth rates of the money stock have on real money demand. The seigniorage-maximizing growth rate of the money stock occurs where:

$$\frac{\partial s}{\partial g_M} = \left(1 - \alpha g_M\right) e^{(-\alpha g_M - \gamma)} = 0 \tag{4}$$

---

[14] For a detailed discussion of this approach, see Blanchard and Fischer (1989, pp. 195–201) or Romer (2011, pp. 567–576).

[15] These assumptions are similar to those found in both Bailey's (1956) and Cagan's (1956) analysis of seigniorage maximization (as well as the aforementioned textbooks). While these assumptions are not necessarily realistic, they allow us to establish a steady-state relationship between the growth rate of Confederate Treasury notes and the flow of real seigniorage that we can use to derive a first approximation of the effect that changes in the growth rate of Confederate Treasury notes had on seigniorage.

[16] For our purposes, the fact that Confederate Treasury notes were a credit rather than a fiat money does not alter the implications of the analysis. In both cases, the real money stock is determined entirely on the demand side.

[17] Under our assumptions, $-\alpha$ is the semi-elasticity of the money demand function with respect to the growth rate of the money stock, and γ is a scale parameter – the smaller γ becomes the greater is real money demand for any given growth rate of the money stock. Policies such as reserve requirements and legal tender laws can augment the values of these parameters thereby increasing or decreasing real seigniorage. We do not explore these factors in this paper. Instead, we take the Confederacy's policies vis-à-vis currency restrictions and reserve requirements as given to focus on the effect that the currency reforms had on real seigniorage.
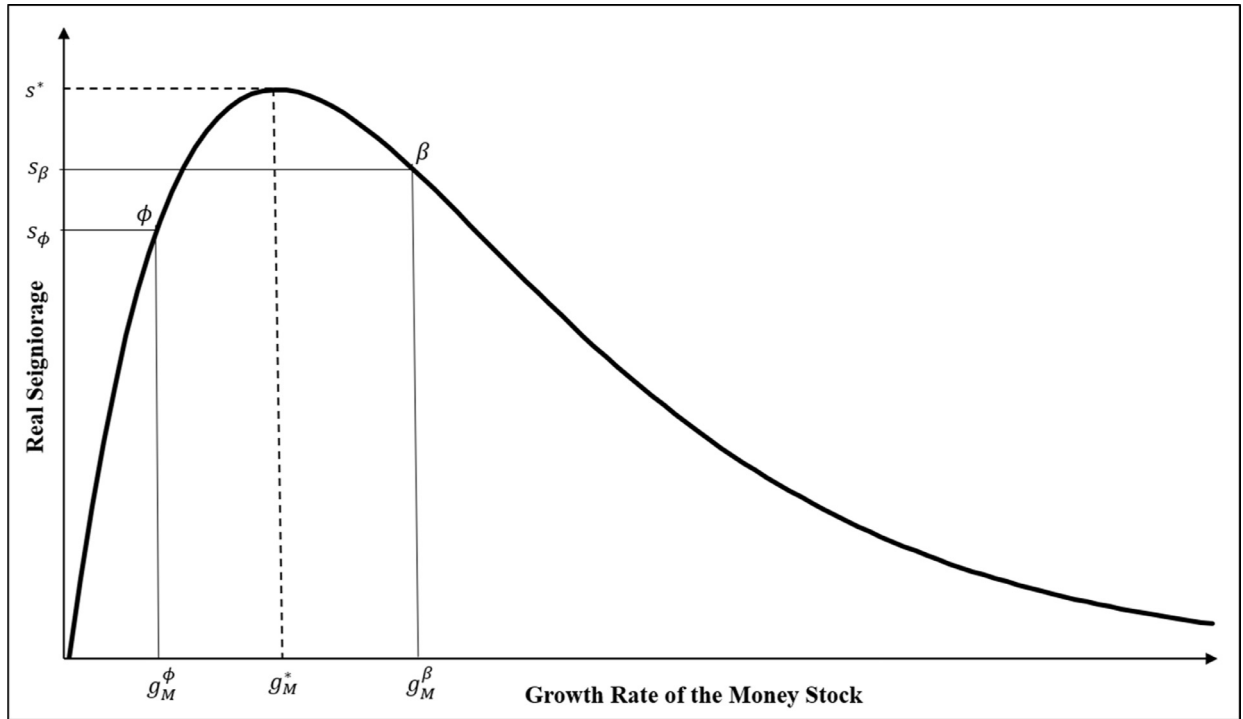
Fig. 6. Real seigniorage as a function of the growth rate of the money stock.

and

$$\frac{\partial^2 s}{\partial g_M^2} = \left(\alpha^2 g_M - 2\alpha\right)e^{-\alpha g_M - \gamma} < 0 \tag{5}$$

These first- and second-order conditions are satisfied where:

$$g_M^* = \frac{1}{\alpha} \tag{6}$$

In other words, the seigniorage-maximizing rate of monetary expansion occurs where the demand for real money balances is unit elastic.[18]

Fig. 6 is a graphical representation of Eq. (3). The curve, which was first derived by Bailey (1956), maps steady-state real seigniorage as a function of the growth rate of the nominal money stock. At low levels of monetary expansion, the corresponding flow of real seigniorage is also low. As the growth rate of the money stock increases, the note-issuing authority generates greater amounts of real seigniorage, but at a decreasing rate. Eventually, as real money demand becomes increasingly elastic, the additional revenue generated by further increases in the growth rate approaches zero as the elasticity of demand for real money balances approaches unity. After that point, the additional revenue generated by a continued depreciation of the real money stock becomes negative.

We can use this relationship to evaluate whether the rate of monetary expansion in the Confederacy was consistent with seigniorage maximization by observing how real seigniorage responded to the currency reforms. For instance, if, prior to the currency reforms, the growth rate of Confederate Treasury notes was to the right of g_M^* at g_M^β, then we expect that the currency reforms will cause seigniorage to increase. If, on the other hand, the growth rate of Confederate Treasury notes prior to the reform was to the left of g_M^* at g_M^ϕ, then we expect the opposite. Moreover, the model predicts that if the Confederacy was operating to the left s^*, then the subsequent increases in the rate of monetary expansion following the currency reforms should increase the flow of seigniorage and vice versa.

Before proceeding, three qualifications are in order. First, the monetary authority only earns seigniorage on the notes that it is issues. Thus, while the Confederate money stock consisted of more than Treasury notes, as we noted in Section 2, the Treasury only derived revenue from the notes it issued. Thus, our analysis in the next section focuses exclusively on the relationship between the expansion of Confederate Treasury notes and its effects on seigniorage. Next, the relationship between the flow of seigniorage and the rate of monetary expansion that we have derived in this section assumes that the long-run demand for money is constant. Graphically, if the demand for real money balances was to shift, so too would the curve in Fig. 6. In other words, a decrease in real

[18] The elasticity of the Eq. (2) with respect to g_M is: $\eta = -\alpha e^{-\alpha g_M - \gamma}\left(\frac{g_M}{e^{-\alpha g_M - \gamma}}\right) = -\alpha g_M$ Setting this equal to -1 yields the same result as found in Eq. (5): $-1 = -\alpha g_M$ $g_M^* = \frac{1}{\alpha}$.
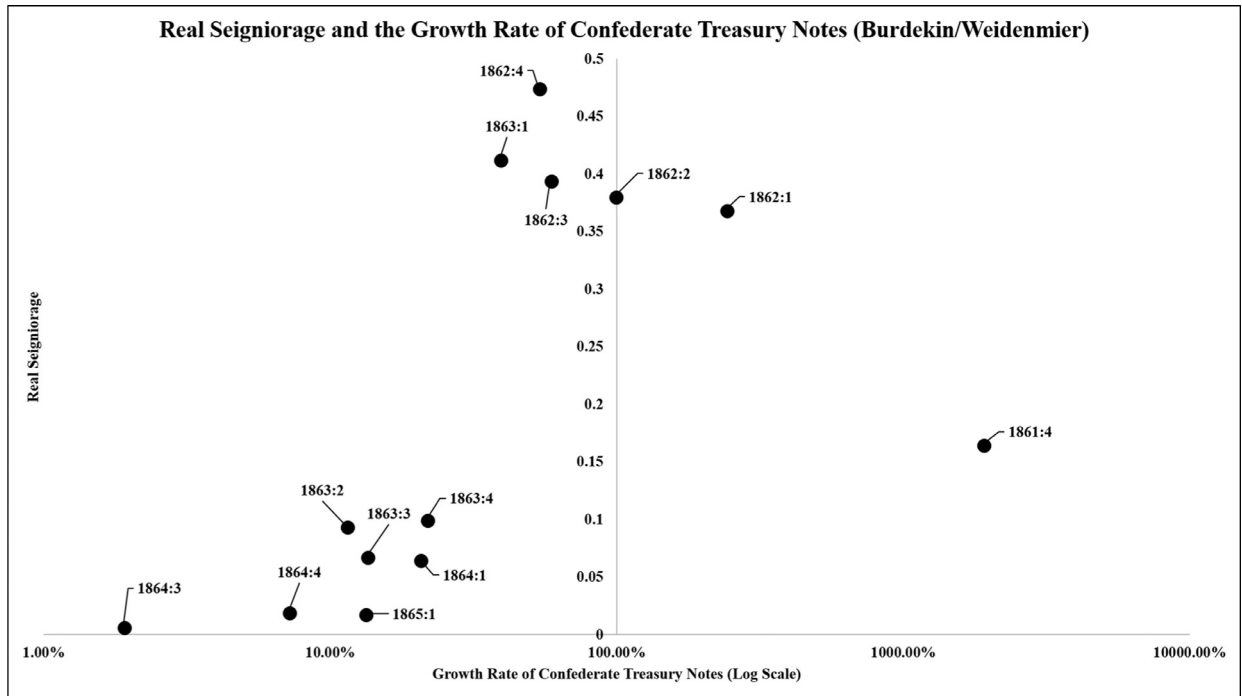
Fig. 7. Real seigniorage and the growth rate of confederate treasury notes (Burdekin/Weidenmier)
Source: Burdekin and Weidenmier (2003, p. 431) and Godfrey (1978, pp. 118–119).

money demand would shift the curve in Fig. 6 downward, reducing the flow of seigniorage for any given rate of monetary expansion. In such a situation, therefore, the monetary authority would need to increase the rate of monetary expansion in order to maintain a constant flow of seigniorage. Accordingly, it will be necessary to control for factors that influenced the demand for Confederate Treasury notes, e.g., decreases in real output and noteholders expectations of Confederate success.

Finally, if we relax the second assumption that the money-holding public correctly anticipates the inflation rate and instead forms their inflation expectations based on the previous period's inflation, then it is possible for the note-issuing authority to be *temporarily* off the curve in Fig. 6. Once people's inflation expectations adjust, however, seigniorage converges to the steady state equilibrium. Under the assumption of adaptive expectations, for example, a reduction in the growth rate of Confederate Treasury notes will initially cause seigniorage to fall below that indicated in Fig. 7. Once inflation expectations, adjust, however, seigniorage will converge to the steady state, assuming that there are no further changes in the growth rate of Confederate Treasury notes, which, as discuss in the following section, was not the case.

5. Empirical analysis of the currency reforms

Data on the quantity of Confederate Treasury notes is limited by the Confederacy's relatively short existence and the small number of Treasury reports that exist. Unfortunately, this limitation prevents us from estimating the demand for Confederate Treasury notes directly; however, we can use the existing data to evaluate how the flow of real seigniorage responded to the currency reforms by using the theoretical framework developed in the previous section.[19]. Using Godfrey's (1978, pp. 118–119) quarterly data on the quantity of Treasury notes in circulation along with Burdekin and Weidenmier's (2003, p. 431) and Lerner's (1955, p. 24) price indices, we generated two time series of real seigniorage, which are listed in Table 2.[20]

Here, we are defining real seigniorage as the ratio of the change in Confederate Treasury notes to the price level:

$$S = \frac{\Delta M}{P} \tag{7}$$

This definition follows directly from Eq. (1).[21] Because our assumptions in the previous section imply that changes in the growth rate of the money stock are matched one-for-one by changes in the actual and expected rate of inflation, it was unnecessary to distinguish between alternative definitions of seigniorage. That is, in the steady-state there would be no difference between defining

---

[19] Our data, including instructions and code, are available at Open-ICPSR (2018).

[20] Based on the Augmented Dickey–Fuller test, we were unable to reject the null hypothesis that both series have a unit root, which we addressed by taking the first difference of each series. Details are available from the authors upon request.

[21] Since g_M can be rewritten as $\Delta M/M$, Eq. (1) can be expressed as: $s = (\frac{M}{P})(\frac{\Delta M}{M})$ which simplifies to: $s = \frac{\Delta M}{P}$.

Table 2
Quarterly data for confederate monetary and price variables.

Year/Quarter		(1) Confederate currency (Millions of Confederate Dollars)	(2) Growth rate of confederate treasury notes	(3) Burdekin/ Weidenmier price index	(4) Real seigniorage (Burdekin/ Weidenmier index)	(5) ΔSeigniorage (Burdekin/ Weidenmier Index)	(6) Lerner Price Index	(7) Real seigniorage (Lerner Index)	(8) ΔSeigniorage (Lerner Index)	(9) Casualties
1861	3	1		100	0.01	–	111	0.009	–	–
	4	20	1900.00%	115	0.165	0.155	136	0.140	0.131	0.00
1862	1	68	240.00%	130	0.369	0.204	193	0.249	0.109	0.00
	2	135	98.53%	176	0.381	0.011	281	0.238	−0.010	2.48
	3	214	58.52%	200	0.395	0.014	380	0.208	−0.031	0.41
	4	328	53.27%	240	0.475	0.080	526	0.217	0.009	0.23
1863	1	456	39.02%	310	0.413	−0.062	762	0.168	−0.049	0.00
	2	508	11.40%	550	0.095	−0.318	1178	0.044	−0.124	0.16
	3	576	13.39%	1000	0.068	−0.027	1326	0.051	0.007	0.22
	4	701	21.70%	1250	0.100	0.032	1879	0.067	0.015	0.21
1864	1	845	20.54%	2200	0.065	−0.035	2801	0.051	−0.015	0.01
	2	632	−25.21%	2300	0.036	−0.029	2947	0.027	−0.024	0.25
	3	644	1.90%	1700	−0.128	−0.164	4470	−0.066	−0.093	0.10
	4	690	7.14%	2300	0.007	0.135	4094	0.003	0.069	0.05
1865	1	781	13.19%	5000	0.020	0.013	4001	0.011	0.009	0.03

seigniorage as the product of the real money stock and the rate of monetary expansion or as the product of the real money stock and the inflation rate. Such a distinction, however, is critical for empirical research.

There are two reasons that we defined seigniorage as the product of the real money stock and the rate of monetary expansion. First, as Honohan (1996) notes, defining seigniorage as the product of the real money stock and the rate of monetary expansion is most appropriate in situations wherein the government's deficit is being financed by issuing currency, as was the case for the Confederacy. Second, recall that the value of the grayback was a function of both the quantity of notes in circulation and people's expectations of Confederate success. Inflation caused by people's diminished expectations of Confederate success would not have generated additional seigniorage revenues for the rebel government. Thus, defining seigniorage in this manner would overstate the amount of real revenue that the Confederacy collected by issuing Treasury notes.

Both real seigniorage series are plotted against the growth rate of Confederate Treasury notes in Figs. 7 and 8.[22] Each series exhibits a pattern like that predicted by the model we derived in the previous section.[23] Real seigniorage was at its highest between the first quarters of 1862 and 1863, after which point it is clustered at lower rates of monetary expansion. It is worth noting that the majority of the observations, which occurred later in the war, are clustered at lower rates of monetary expansion, indicating that the South may have failed to maximize the revenue from seigniorage.

To capture the effect of the currency reforms on seigniorage, we first created three reform variables that were set to 1 for the quarters in which the reforms went into effect and 0 otherwise, i.e., Currency Reform 1 was set to 1 for 1863:2, Currency Reform 2 was set to 1 for 1863:3, and Currency Reform 3 was set to 1 for 1864:2. To estimate the joint effect of all three currency reforms, we created an additional dummy variable that was set to 1 for the quarters in which the reforms went into effect and 0 for all others. Since there was a gap in between the time the Confederate Congress passed the reforms and when their stipulations went into effect, consideration was also given to the response of real seigniorage to the passage of the reforms; however, these were not found to have had a statistically significant influence on seigniorage.[24] Next, to account for the effect that subsequent changes on the growth rate of Treasury notes would have had on seigniorage, we created a lagged reform dummy variable for each reform that was set to 1 for the quarter following the implementation of each reform and 0 for all other quarters, i.e., Lagged Currency Reform 1 was set to 1 for 1863:3, Lagged Currency Reform 2 was set to 1 for 1863:4, and Lagged Currency Reform 3 was set to 1 for 1864:3. Finally, to capture the lag on the joint reforms, we created a joint lagged reform variable that was set to 1 for the quarters following those in which the reforms went into effect and 0 for all others.

Weidenmier's (2002) analysis of the value of the grayback indicates that the market responded quickly, i.e., often within weeks, to major events that affected people's expectations of Confederate success. Based on this finding and given that the currency reforms were each announced, not to mention debated in Congress, more than a month prior to their implementation, it seems reasonable to conclude that people's inflation expectations adjusted quickly enough in response to the currency reforms to ensure that deviations from the steady state would have been short-lived. Accordingly, it seems unlikely that people's inflation expectations would

---

[22] In both figures, the growth rate of Confederate Treasury notes is displayed on a logarithmic scale owing to the wide variation in the rates of monetary expansion. Accordingly, it was necessary to omit the observation from the third quarter of 1864 when, due to the final currency reform, the growth rate of Confederate Treasury notes was negative.

[23] The correlation coefficient for two series is 0.961 and the correlation for the first difference of the two series is 0.932.

[24] This finding is not altogether surprising since money-holders could exchange their notes without penalty up to the day prior to the reforms going into effect. Details are available from the authors upon request.
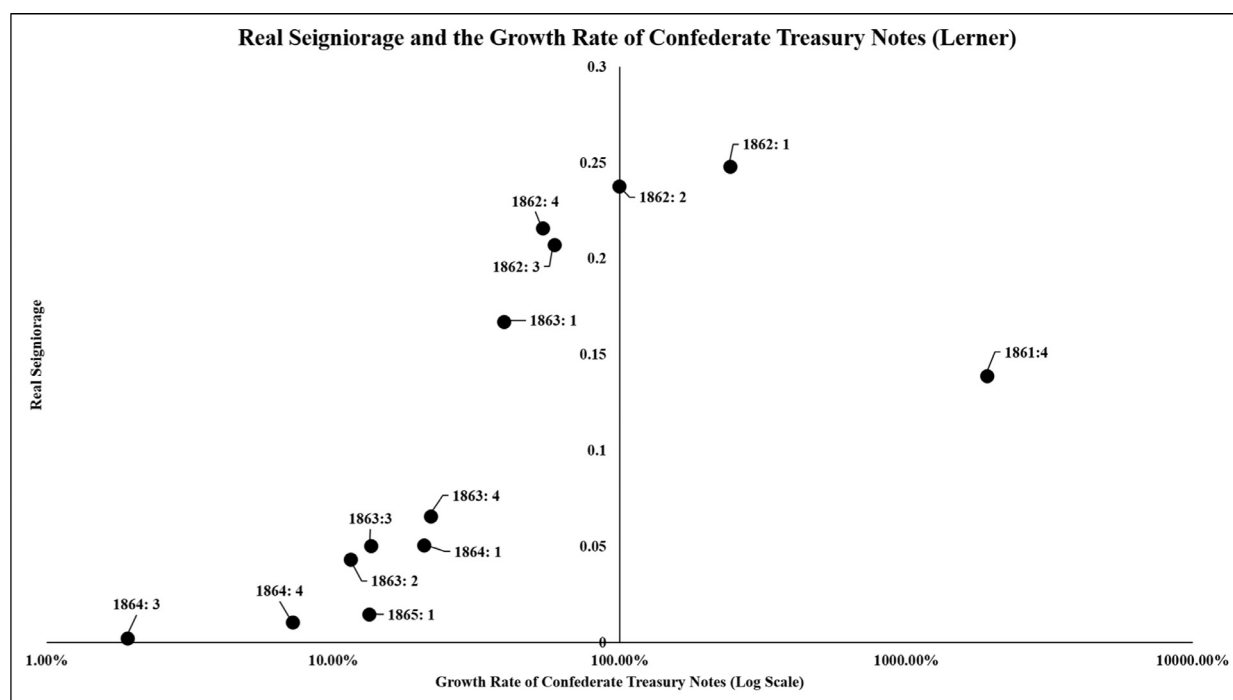
Fig. 8. Real seigniorage and the growth rate of confederate treasury notes (Lerner).
Source: Godfrey (1978, pp. 118–119) and Lerner (1955, p. 24).

Table 3
Effect of the currency reforms on the rate of monetary expansion.

	(1) Initial effect of the currency reforms on the growth rate of confederate treasury notes (in percentage points)	(2) Subsequent change in the growth rate of confederate treasury notes (in percentage points)
Currency reform 1 (1863:2)	−27.62	1.98
Currency reform 2 (1863:3)	1.98	8.31
Currency reform 3 (1864:2)	−45.75	27.10

significantly bias the coefficient estimate on the initial reform variable. Also, recall from the previous section that if inflation expectations do not adjust instantaneously to reflect a decrease in the growth rate of the nominal money stock, that real seigniorage will initially fall and subsequently increase until the steady state is achieved, all else equal. While the currency reforms did temporarily reduce the growth rate of Confederate Treasury notes, these reductions were not permanent; that is, all else was *not* equal. In fact, as Table 3 illustrates, in the quarters following each of the three currency reforms, i.e., 1863:3, 1863:4, and 1864:3, the growth rates of Confederate Treasury notes increased by 2, 8, and 27 percentage points, respectively (Godfrey, 1978, pp. 118–119). Thus, if the rate of monetary expansion was below that which would have maximized the revenue from seigniorage, then we expect the coefficient estimates on the initial and lagged reform variables to be negative and positive, respectively. On the other hand, if the Confederacy was operating to the right of the maximum in Fig. 6, then we expect the coefficient estimates on the initial and lagged reform variables to be reversed.

Additional consideration was given to factors other than the currency reform that could have influenced the demand for Treasury notes. First, the empirical evidence from the war news literature indicates that the value of the Confederate currency responded to political and military events that influenced people's expectations of Confederate success (Burdekin & Langdana, 1993; Davis & Pecquet, 1990; McCandless, 1996; Pecquet et al., 2004; Weidenmier, 2002). To control for this factor, we constructed a war news variable that was set to 1 in the quarters following those turning points identified in Weidenmier's analysis of the grayback market, which were the Battles of Antietam (1863:1) and Gettysburg (1863:4) as well as the Union's finance and conscription bills (1863:2).[25]

---

[25] We also constructed a war news variable based on Burdekin and Langdana's (1993, p. 367) war news variable, which, while statistically significant, lacked the same explanatory power as our variable. Details are available from the authors upon request.
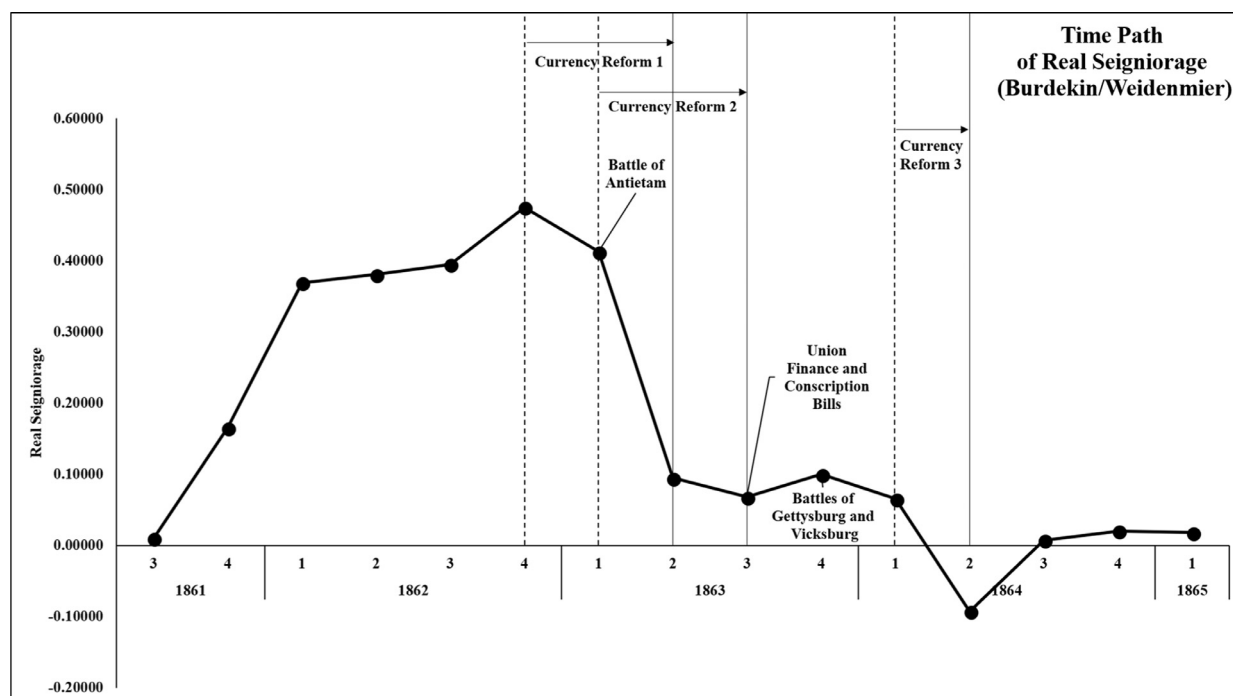
Fig. 9. Time path of real seigniorage (Burdekin/Weidenmier).
Source: Burdekin and Weidenmier (2003, p. 431) and Godfrey (1978, pp. 118–119).

Here, we expect the coefficient estimate to be negative – bad news will cause the Confederate Treasury notes to depreciate thereby decreasing the demand for Confederate Treasury notes, which in turn will decrease real seigniorage.

Next, the steady-state relationship between the rate of monetary expansion and the flow of real seigniorage derived in the previous section assumed that the difference between the growth rates of velocity and real income was constant. Since real income in the South was likely declining over the course of the war, it is necessary to control for changes in income that may have influenced the demand for Treasury notes. While no reliable measure of output or production for the Confederacy exists, Burdekin and Langdana's (1993) findings suggest that casualty figures may serve as a proxy for lost productive potential. The intuition here is that an increase in the casualty rate may have effects that are like those of a supply shock, which would cause the price level to rise thereby reducing real seigniorage. To account for changes in real income, we used Burdekin and Langdana's casualty variable, which is equal to the logarithm of the ratio of the cumulative casualty total at the end of each :45 cumulative total of the preceding quarter.[26] Here, we also expect the coefficient estimate to be negative.

The time paths of each real seigniorage series are illustrated in Figs. 9 and 10. The figures also include the dates of the currency reforms – the dashed lines indicate when the currency reform was passed by the Confederate Congress and the solid lines indicate when the currency reform went into effect. Also included in the figures are the dates included in the war news variable. Given the high degree of correlation between the two series, their time paths follow approximately the same pattern. Real seigniorage temporarily increases between the second and fourth quarters of 1863, declines again at the beginning of 1864, and increases slightly until the beginning of 1865.

Our analysis of seigniorage in the Confederacy is limited to the sample period of 1861:3 – 1865:1 – 15 observations in total. As we noted, the sample is quite small, though the considerable variation in the data somewhat offsets this problem. The results reported in Tables 4 and 5 have the change in real seigniorage regressed on the currency reform and lagged currency reform variables, the war news and casualties variables, and a lagged dependent variable.

For the Burdekin and Weidenmier seigniorage series, the coefficient estimate for the joint currency reform variable is negative and statistically significant at the 99.9% level, and the coefficient estimate for the lagged joint currency reform variable is positive and similarly significant, which indicates that the rate of monetary expansion in the South was below that which would have maximized the revenue from seigniorage. In other words, the reforms reduced the flow of seigniorage and the subsequent increases in the rate of monetary expansion generated additional seigniorage revenue, which is consistent with the Confederacy operating on the left-hand side of the curve in Fig. 6. We also find that the coefficient estimates for the war news and casualty variables have the expected signs and are statistically significant at the 99.9 and 95% level, respectively.

---

[26] Details of the battles included in the variable are available from the authors upon request. We thank Richard Burdekin for his assistance with recreating variable.
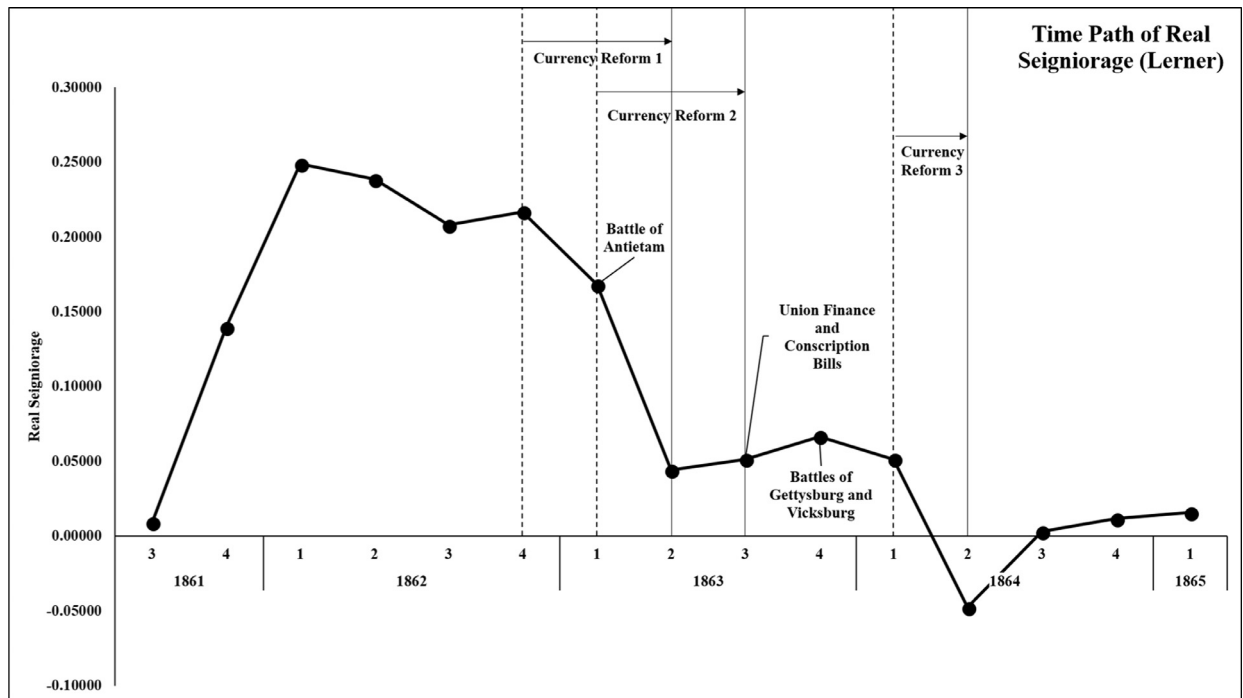
Fig. 10. Time path of real seigniorage (Lerner).
Source: Godfrey (1978, pp. 118–119) and Lerner (1955, p. 24).

Table 4
Change in real seigniorage (Burdekin/Weidenmier).

	(1) ΔSeigniorage	(2) ΔSeigniorage	(3) ΔSeigniorage	(4) ΔSeigniorage
Currency reform (joint effect)	−0.184***(0.0317)			
Lagged currency reform (joint effect)	0.148***(0.0258)			
Currency reform 1		−0.299***(0.0340)		
Lagged currency reform 1		−0.0737(0.0400)		
Currency reform 2			−0.0578(0.0786)	
Lagged currency reform 2			0.234*(0.0911)	
Currency reform 3				−0.201*(0.0887)
Lagged currency reform 3				0.0925(0.0663)
War news	−0.127***(0.0248)	−0.0572(0.0535)	−0.237*(0.103)	−0.148(0.205)
Casualties	−0.0458*(0.0192)	−0.0237(0.0239)	−0.0277(0.0266)	−0.0272(0.0358)
Constant	0.0594(0.0537)	0.0474(0.0418)	0.0475(0.0404)	0.0488(0.0362)
Lagged dependent variable	0.738**(0.231)	0.125(0.382)	0.0774(0.411)	0.118(0.857)
Constant	0.0469***(0.00603)	0.0871***(0.0170)	0.0979***(0.0159)	0.0929***(0.0199)
Observations	14	14	14	14
R-Squared[++]	0.8470	0.5304	0.5304	0.4671

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
[++]A measure of the correlation coefficient that does not depend on a linear estimation, is the squared correlation between observed and in-sample forecast values. This is the version of R-Squared in the table.
White robust standard Errors in Parentheses.

Turning to the effects of the individual reforms, the initial effect of the first reform is negative and statistically significant at the 99.9% level; however, the lagged effect is not statistically significantly different from 0, which is likely explained by the relatively small increase in the growth rate of Treasury notes following the first reform. Likewise, the initial effect of the third reform was negative and statistically significant at the 95% level while the lagged effect was not statistically significantly different from 0, which is somewhat surprising since the growth rate of Treasury notes following the implementation of the final reform was relatively large. Thus, while we find that the effect of the first and third reforms was to reduce the flow of seigniorage, we did not find that the subsequent increases in the growth rate of Confederate Treasury notes affected the flow of seigniorage. In the case of the first and third reforms, we also find that neither the war news or casualties variables were statistically significant. Unlike the first and third reforms, however, we find that the lagged effect of the second reform is positive and statistically significant at the 95% level while

Table 5
Change in real seigniorage (Lerner).

	(1) ΔSeigniorage	(2) ΔSeigniorage	(3) ΔSeigniorage	(4) ΔSeigniorage
Currency reform (joint effect)	−0.0736***(0.00548)			
Lagged currency reform (joint effect)	0.0782***(0.00750)			
Currency reform 1		−0.103***(0.0171)		
Lagged currency reform 1		−0.0172(0.0290)		
Currency reform 2			0.00495(0.0460)	
Lagged currency reform 2			0.115***(0.0347)	
Currency reform 3				−0.0913***(0.0117)
Lagged currency reform 3				0.0615***(0.0114)
War news	−0.0571***(0.00799)	−0.0310(0.0349)	−0.103*(0.0464)	−0.0468(0.0329)
Casualties	−0.0248(0.0193)	−0.0213*(0.0104)	−0.0245*(0.00994)	−0.0238(0.0132)
Constant	0.0432(0.0735)	0.0247(0.0308)	0.0240(0.0300)	0.0266(0.0363)
Lagged dependent variable	0.865***(0.200)	0.318(0.393)	0.318(0.463)	0.539(0.352)
Constant	0.0282***(0.00725)	0.0527***(0.00915)	0.0531***(0.00913)	0.0452***(0.00751)
Observations	14	14	14	14
R-Squared[++]	0.7370	0.3593	0.3520	0.4945

[*] $p < 0.05$, [**]$p < 0.01$, [***]$p < 0.001$

[++] A measure of the correlation coefficient that does not depend on a linear estimation, is the squared correlation between observed and in-sample forecast values. This is the version of R-Squared in the table. White robust standard Errors in Parentheses.

Table 6
Change in real seigniorage.

	(1) ΔSeigniorage (Burdekin/Weidenmier)	(2) ΔSeigniorage (Lerner)
Currency reform(joint effect)	−0.187***(0.0337)	−0.0785***(0.0110)
Lagged currency reform (joint effect)	0.145***(0.0290)	0.0739***(0.0124)
War News	−0.128**(0.0284)	−0.0606**(0.0138)
Casualties	−0.0451*(0.0199)	−0.0247(0.0180)
Constant	0.0582(0.0546)	0.0312(0.0416)
R-Squared	0.880	0.787
Observations	14	14

[*] $p < 0.05$

[**] $p < 0.01$

[***] $p < 0.001$ Standard Errors in Parentheses.

the initial effect is not statistically significantly different from 0. We also find that in the case of the second reform, the coefficient estimate for the war news variable had the expected sign and is statistically significant at the 95% level. Like the first and third reforms, our findings indicate that the casualties variable is not statistically significant.

Like the Burdekin and Weidenmier series, the coefficient estimate for the joint currency reform variable for the Lerner series is negative and statistically significant at the 99.9% level, and the coefficient estimate for the lagged joint currency reform variable is positive and similarly significant, which again indicates that the rate of monetary expansion in the South was below that which would have maximized the revenue from seigniorage. Unlike the Burdekin and Weidenmier series, however, the casualties variable is not statistically significant for the joint specification. Another difference between the two series is that in the case of the third currency reform, both the initial and lagged effect are statistically significant at the 99.9% level. Finally, in the case of the first and second currency reforms, we find that the coefficient estimate for the casualties variable has the expected sign and is statistically significant at the 95% level. Overall, the analysis of the Lerner series is consistent with our previous findings and again suggests that the South was operating on the inelastic section of the money demand curve.

We also employed a Prais–Winsten (PW) procedure to remove the effect that the autocorrelation may have had on our estimates. This procedure is essentially a data transformation wherein each observation is multiplied by $\sqrt{1 - \theta^2}$, where θ represents the fraction of autocorrelation. Subtracting θ from 1 combined with the monotonic square and root transformations captures the fraction of each observation unaffected by the prior period. In other words, we apply a weight to each variable to eliminate the deterministic process effect that may bias our results. Table 6 reports the results of the PW procedure.

Using the PW procedure for both series, the initial and lagged joint effect of the currency reforms are statistically significant at the 99.9% level. For each series, the coefficient estimate for the initial joint reform variable is negative whereas the estimate for the lagged joint reform variable is positive. In other words, the results generated by the PW procedure confirm our previous results that the rate of monetary expansion in the Confederacy was below that which would have maximized the revenue from seigniorage. Finally, our findings also indicate that the coefficient estimate for the war news variable has the expected sign and was statistically

Table 7
Percent-change in real seigniorage.

	(1) %ΔSeigniorage (Lerner)
Currency reform(Joint effect)	−0.852*(0.271)
Lagged currency reform (joint effect)	−0.405(0.508)
War news	−0.163(0.320)
Casualties	0.0231(0.0729)
Constant	−3.403*(1.205)
R-Squared	0.589
Observations	13

* $p < 0.05$, **$p < 0.01$, ***$p < 0.001$Standard Errors in Parentheses.

significant at the 99% level for both series, while the casualties variable was only found to be statistically significant at the 95% level for the Burdekin and Weidenmier series.

What do our findings imply about the magnitude of the currency reforms' effect on seigniorage revenue? To answer this question, we performed a logarithmic transformation of each series both to address the issue of non-stationarity present in each series and estimate the size of the reduction in real seigniorage in percentage terms. Even after the transformation, the Burdekin & Weidenmier series still exhibited evidence of a non-stationary process, thus our analysis of the magnitude of the reforms' effect on the flow of seigniorage is limited to the Lerner series.[27] Moreover, because the observation for 1864:3 is negative, we were forced to drop that observation from our regression. Doing so biases our results significantly because this observation is associated with the final, and most substantial reform. Thus, the coefficient estimate will be biased upward (note that we expect the sign of the estimate to be negative), i.e., it will understate the magnitude of the reforms' effect on the flow of seigniorage.

Using the PW procedure, we regressed the natural logarithm of the Lerner series on the reform and lagged-reform variables as well as on the war news and casualties variables. The results are reported in Table 7. Our findings indicate that the currency reforms reduced the flow of seigniorage by approximately 57%.[28] Note, that in absolute value terms this estimate is a lower-bound, or best-case assessment of the reforms' effect due to the missing observation discussed in the previous paragraph. Also note, that this finding refers to a reduction in the flow of seigniorage rather than the cumulative amount, which is equal to the summation of the flows. Because the effect of the currency reforms on the flow of seigniorage would have had a compounding effect on the total amount of seigniorage collected, the cumulative effect of the currency reforms was likely much larger than 57%, but it is impossible to say by precisely how much. What is clear, however, is that the currency reforms had an economically significant effect on the South's most effective source of revenue.

6. Conclusion

The political economy of the Confederacy has been a fertile source of scholarship for economic historians and political scientists alike. We have extended the scope of this literature by examining the political factors that influenced the rebel government's efforts to reform the currency and analyzing how the flow of seigniorage responded to these efforts. Our findings indicate that the primary determinant influencing a legislator's support for the final currency reform was whether he represented an area that was either occupied or disrupted by the advancing Union forces. We argue that this factor bifurcated the Confederate Congress into two groups – those that represented districts where graybacks were no longer circulating, and those that represented the interior of the Confederacy where graybacks were still in use. While the constituencies represented by both groups would benefit from a reduced rate of monetary expansion, those for whom graybacks remained part of their asset portfolios, i.e., those located in the Confederacy's interior, would suffer a loss from the partial repudiation of the outstanding currency. We also find that the rebel government's efforts to reform the currency reduced the flow of seigniorage by at least 57%, suggesting that despite being highly inflationary, the South was operating on the inelastic section of their money demand curve. In other words, our results suggest that the rate of monetary expansion in the Confederacy was below that which would have maximized the revenue from seigniorage, which lends support to Schwab's (1901, p. 69) and Godfrey's (1978, p. 37) claims about the South's mismanagement of the currency.

Our analysis in this paper does have several limitations, however. First, the lack of roll call voting records for the first two reforms prevents us from examining whether the political factors that influenced the final reform in 1864 were similarly influential in 1862 and 1863. Second, the limited amount of both monetary and voting data is insufficient to allow for any formal causality testing. Thus, our findings are only suggestive. Moreover, we cannot say with certainty that the reforms themselves were exogenous to changes in seigniorage; although, we think that the motivation behind the reforms was driven more by the political factors that we identified than it was by a concern with maximizing the revenue from seigniorage. Indeed, while it is clear that Confederate policymakers understood the implications of the quantity theory of money, we were unable to find any evidence indicating that they possessed

---

[27] Details are available from the authors upon request.

[28] Because the estimated magnitude in Table 7 is greater in absolute terms than 1, the interpretation of the coefficient estimate is as follows: $\%\Delta Seigniorage = 100 \times (e^{-0.852} - 1)$ Thus, the percent change is equal to 57.344%.

a theoretical understanding of seigniorage similar to that presented in this paper. Third, the extremely limited amount of monetary data prevents us from estimating a money demand function directly. We cannot rule out the possibility that the long-run demand for money shifted over the course of the war, nor can we be certain that the demand for Confederate Treasury notes would have remained invariant to increased rates of monetary expansion; however, the evidence from the literature on the demand for money indicates that even during periods of high and volatile inflation the long-run demand for money is stable.[29] Nonetheless, the demand for graybacks may have contracted significantly had the rebel government made no effort to control inflation. Consequently, there is no way to be sure that a more consistent effort to fund the war though inflation would not have caused the demand for Confederate Treasury notes to contract.

These limitations aside, our analysis has important implications for the study of the Confederacy. Prior to becoming President of the United States, Abraham Lincoln famously remarked that "A house divided against itself, cannot stand." Perhaps ironically, one of the implications of our research is that it was the bifurcation of the Congress into two groups brought on by the Union's advance into the Confederacy that contributed to the adoption of the disastrous currency reforms, which Secretary Trenholm (1864), Memminger's successor, described in the following way:

> However patriotically intended, it is not to be denied that the measures adopted by Congress for the reform of the currency had the unhappy effect of inspiring the public mind with feelings of fear and distrust as to the course that would ultimately be pursued in relation to that part of the public debt that is represented by the Treasury notes. Apprehensions of ultimate repudiation crept like an all-pervading poison into the minds of the people, and greatly circumscribed and diminished the purchasing power of the notes…it must now be universally admitted that the policy was erroneous.

In 1865, General Robert E. Lee (*War of the Rebellion: Armies,* 1880, p. 1143) reported that "insufficient food and non-payment of the troops have more to do with the dissatisfaction than anything else." Echoing Lee's comments, Robert Kean, chief clerk of the Confederate Bureau of War, believed that the primary cause of the South's defeat was the lack of financial resources necessary to properly compensate and equip its soldiers, which in turn led to desertion and demoralization (Younger, 1957, pp. 243–244). Following the final currency reform in 1864, Confederate forces suffered critical losses including the fall of Atlanta, which likely contributed to Lincoln's reelection. Had the South won these battles and McClellan become President, history may have taken a drastically different course. It is impossible to say whether the South would have won these battles had the Confederate Congress not adopted the reforms. But, to the extent that these battles were lost due to a demoralized army, we do not consider it unreasonable to conclude that at the very least the conflict may have lasted longer than it did had the South pursued a more expansionary monetary policy.

References

Alexander, T.B., Beringer, R.E., 1972. The Anatomy of the Confederate Congress. Vanderbilt University Press, Nashville, TN.

Bailey, M.J., 1956. The welfare cost of inflationary finance. J. Polit. Econ. 64 (2), 93–110.

Ball, D.B., 1991. Financial Failure and Confederate Defeat, First edition University of Illinois Press, Urbana.

Barro, R.J., 1974. Are government bonds net wealth? J. Polit. Econ. 82 (6), 1095–1117.

Blanchard, O., Fischer, S., 1989. Lectures on Macroeconomics. The MIT Press, Cambridge, Mass.

Brown, W.O., Burdekin, R.C.K., 2000. Turning points in the U.S. civil war: a British perspective. J. Econ. Hist. 60 (1), 216–231.

Burdekin, R.C.K., Langdana, F.K., 1993. War finance in the Southern confederacy, 1861-1865. Explor. Econ. Hist. 30 (3), 352–376. doi:10.1006/exeh.1993.1015.

Burdekin, R.C.K., Weidenmier, M.D., 2001. Inflation is always and everywhere a monetary phenomenon: Richmond vs. Houston in 1864. Am. Econ. Rev. 91 (5), 1621–1630.

Burdekin, R.C.K., Weidenmier, M., 2003. Suppressing asset price inflation: the confederate experience, 1861–1865. Econ. Inq. 41 (3), 420–432. doi:10.1093/ei/cbg018.

Cagan, P., 1956. The monetary dynamics of hyperinflation. In: Friedman, M. (Ed.), Studies in the Quantity Theory of Money. The University of Chicago Press, pp. 25–117.

Capers, H.D., 1893. The Life and Times of C. G. Memminger. Everett Waddey CO., Publishers, Richmond, VA.

Choudhry, T., 1995. High inflation rates and the long-run money demand function: evidence from cointegration tests. J. Macroecon. 17 (1), 77–91. doi:10.1016/0164-0704(95)80004-2.

Cutsinger, B.P., Ingber, J.S., 2018. Seigniorage in the Civil War South. Inter-University Consortium for Political and Social Research Retrieved from doi:10.3886/E107141V2.

Davis, G.K., Pecquet, G.M., 1990. Interest rates in the civil war South. J. Econ. Hist. 50 (1), 133–148. doi:10.2307/2123441.

Ekelund, R.B., Jackson, J.D., Thornton, M., 2010. Desperation votes and private interests: an analysis of confederate trade legislation. Public Choice 144 (1–2), 199–214. doi:10.1007/s11127-009-9511-2.

Frenkel, J.A., Taylor, M.P., 1993. Money demand and inflation in Yugoslavia 1980–1989. J. Macroecon. 15 (3), 455–481. doi:10.1016/0164-0704(93)90004-6.

Gentry, J.F., 1970. A Confederate success in Europe: the Erlanger loan. J. South. Hist. 36 (2), 157–188. doi:10.2307/2205869.

Godfrey, J.M., 1978. Monetary Expansion in the Confederacy. Arno Press.

Grossman, H.I., Han, T., 1996. War Debt, moral hazard, and the financing of the confederacy. J. Money Credit Bank. 28 (2), 200–215. doi:10.2307/2078023.

Honohan, P., 1996. Does it matter how seigniorage is measured? Appl. Financ. Econ. 6 (3), 293–300.

Jenkins, J.A., 1999. Examining the bonding effects of party: a comparative analysis of roll-call voting in the U.S. and confederate houses. Am. J. Polit. Sci. 43 (4), 1144–1165. doi:10.2307/2991821.

Jenkins, J.A., 2000. Examining the robustness of ideological voting: evidence from the Confederate House of Representatives. American Journal of Political Science 44 (4), 811–822. doi:10.2307/2669283.

Journal of the Congress of the Confederate States of America, 1861–1865. (1904) (Vol. 6).

Korosteleva, J., 2007. Maximizing seigniorage and inflation tax: the case of Belarus. East. Eur. Econ. 45 (3), 33–50.

Lerner, E.M., 1954. The monetary and fiscal programs of the confederate government, 1861–65. J. Polit. Econ. 62 (6), 506–522.

Lerner, E.M., 1955. Money, prices, and wages in the confederacy, 1861–65. J. Polit. Econ. 63 (1), 20–40.

---

[29] See Choudhry (1995), who finds evidence of a stationary long-run money demand function during inflationary episodes in Argentina, Israel, and Mexico.

Lerner, E.M., 1956. Inflation in the confederacy, 1861–65. In: Friedman, M. (Ed.), Studies in the Quantity Theory of Money. University Of Chicago Press, Chicago, pp. 163–175.

Loviscek, A.L., 1996. Seigniorage and the Mexican financial crisis. Q. Rev. Econ. Financ. 36 (1), 55–64. doi:10.1016/S1062-9769(96)90029-0.

Mankiw, N.G., 1987. The optimal collection of seigniorage: theory and evidence. J. Monet. Econ. 20 (2), 327–341. doi:10.1016/0304-3932(87)90019-5.

Martis, K.C., 1994. The Historical Atlas of the Congresses of the Confederate States of America 1861–1865, First Edition Macmillan Library Reference, New York.

McCandless, G.T., 1996. Money, expectations, and the U.S. civil war. Am. Econ. Rev. 86 (3), 661–671.

McCormick, R.E., Tollison, R.D., 1981. Politicians, Legislation, and the Economy: An Inquiry into the Interest-Group Theory of Government, 1981 edition Hingham, Mass: Springer, Boston.

McGuire, R.A., Van Cott, T.N., 2002. The Confederate constitution, tariffs, and the Laffer relationship. Econ. Inq. 40 (3), 428–438.

Memminger, C.G., 1863a. Report of the Secretary of the Treasury. VA: Parrish & Willingham Confederate Imprints, Richmond *December 7, 1863*.

Memminger, C.G., 1863b. Report of the Secretary of the Treasury. VA: Parrish & Willingham Confederate Imprints, Richmond *January 10, 1863*.

Mises, L.von, 1981. The Theory of Money and Credit, 5th edition Liberty Fund Inc., Indianapolis.

Morgan, J.F., 1985. Graybacks and Gold: Confederate Monetary Policy. W S Coker, Pensacola, Fla.

Pecquet, G., 1987. Money in the trans-Mississippi confederacy and the confederate currency reform act of 1864. Explor. Econ. Hist. 24 (2), 218–243. doi:10.1016/0014-4983(87)90013-1.

Pecquet, G., Davis, G., Kanago, B., 2004. The emancipation proclamation, confederate expectations, and the price of southern bank notes. South. Econ. J. 70 (3), 616–630. doi:10.2307/4135334.

Phylaktis, K., Taylor, M.P., 1993. Money demand, the Cagan model and the inflation tax: some Latin American evidence. Rev. Econ. Stat. 75 (1), 32–37. doi:10.2307/2109623.

Pollard, E.A., 1866. Southern History of the War. Charles B. Richardson, New York.

Razaghian, R., 2004. Financing the Civil War: The Confederacy's Financial Strategy. Social Science Research Network, Rochester, NY (SSRN Scholarly Paper No. ID 621761)Retrieved from https://papers.ssrn.com/abstract=621761.

Romer, D., 2011. Advanced Macroeconomics, 4th edition McGraw-Hill Education, New York.

Sargent, T.J., 1982. The end of four big inflations. In: Hall, R.E. (Ed.), Inflation: Causes and Effects. University of Chicago Press, pp. 41–98.

Schwab, J.C., 1901. The Confederate States of America, 1861–1865: A Financial and Industrial History of the Civil War. Schribner and Sons, New York/London.

Todd, R.C., 1954. Confederate Finance. GA.: University of George Press, Athens.

Trenholm, G.A., 1864. Letter from the Secretary of the Treasury to Governor Bonham of South Carolina. Richmond Dispatch.

Turner, P., Benavides, G., 2001. The demand for money and inflation in Mexico 1980–1999: implications for stability and real seigniorage revenues. Appl. Econ. Lett. 8 (12), 775–778.

War of the Rebellion: Armies. (1880) (Vol. 46). Washington, D.C.: Government Printing Office.

Weidenmier, M.D., 2000. The market for confederate cotton bonds. Explor. Econ. Hist. 37 (1), 76–97. doi:10.1006/exeh.2000.0732.

Weidenmier, M.D., 2002. Turning points in the U. S. civil war: views from the grayback market. South. Econ. J. 68 (4), 875–890. doi:10.2307/1061497.

Yearns, W.B., 2010. The Confederate Congress. University of Georgia Press, Athens, Ga.

Younger, E. (Ed.), 1957. Inside the Confederate Government: The Diary of Robert Garlich Hill Kean. New York: Oxford University Press.