VICTORY OR REPUDIATION? THE PROBABILITY OF THE SOUTHERN CONFEDERACY
WINNING THE CIVIL WAR

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ABSTRACT

Historians have long wondered whether the Southern Confederacy had a realistic chance at winning the American Civil War. We provide some quantitative evidence on this question by introducing a new methodology for estimating the probability of winning a civil war or revolution based on decisions in financial markets. Using a unique dataset of Confederate gold bonds in Amsterdam, we apply this methodology to estimate the probability of a Southern victory from the summer of 1863 until the end of the war. Our results suggest that European investors gave the Confederacy approximately a 42 percent chance of victory prior to the battle of Gettysburg/Vicksburg. News of the severity of the two rebel defeats led to a sell-off in Confederate bonds. By the end of 1863, the probability of a Southern victory fell to about 15 percent. Confederate victory prospects generally decreased for the remainder of the war. The analysis also suggests that McClellan's possible election as U.S. President on a peace party platform as well as Confederate military victories in 1864 did little to reverse the market's assessment that the South would probably lose the Civil War.

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Victory or Repudiation?
The Probability of the Southern Confederacy Winning the Civil War

Historians have long debated whether the Southern Confederacy had a realistic chance at winning the Civil War. Many scholars have spent years studying why the Union won the war and or/why the South lost the conflict (Beringer, 1991; Donald, 1961). A large number of historians have suggested that the Confederacy had little chance of winning the Civil War given the Union's superior manpower and industrial base (Davis, 1996; Foote, 1990). Foote, for example, argues that the North "fought that war with one hand behind its back" and could have easily deployed more men and resources to defeat the Confederacy (Ransom, 2005, p. 75).

Another line of thought points to Confederate military defeats at Gettysburg or Antietam when Britain was poised to recognize the South as key turning points of the war. Other scholars argue that the 1864 National Election was a key event when George McClellan unsuccessfully ran for President of the United States on a peace party platform (McPherson, 1967; Brown and Burdekin, 2001; Ransom, 2005).[1] Although there is a longstanding debate among academics, historians, and the popular press over the Southern Confederacy's chances of winning the Civil War, we are unaware of any study that has estimated the probability of a Confederate victory using contemporary financial market data.[2]

To provide some insight into this question, we introduce a new empirical methodology for estimating the probability of winning a civil war or revolution. The

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[1] Ransom (2005) has written a counterfactual history of the Southern Confederacy assuming that McClellan was elected President of the United States on a peace party platform.

[2] Roll (1971) estimates the probability that the United States would return to the gold standard using Greenback and gold bonds. Other studies of Civil War financial markets have examined the effect of war and political news on exchange rates and bond prices to identify events seen as important to contemporaries of the Civil War (Willard et al, 1996: Brown and Burdekin, 2000; Davis and Pecquet, 1990; Weidenmier, 2002).

methodology modifies a standard cash flow model used to price sovereign debt by imposing two identifying restrictions. First, we assume that the probability of debt reimbursement (for the Southern Confederacy) is equal to the probability of victory. Second, we assume that bond market investors would receive nothing in the event of a (Confederate) defeat. The second assumption greatly simplifies the analysis and makes it possible to calculate victory probabilities within a fairly narrow range.

We apply this new methodology to estimate the probability of a Confederate victory during the American Civil War using a unique dataset of Southern gold bonds in Amsterdam. The Confederacy issued a small number of gold bonds in 1863 that actively traded on the Dutch market until the end of the war. Unlike Southern investors who could only invest in government paper bonds, Dutch investors could buy rebel gold bonds that did not contain currency risk and/or invest their funds in "risk-free" British consols.[3] A third market perspective on Confederate victory prospects may also be the best way to determine whether the South had a fighting chance since many bondholders in the South may have purchased war bonds for patriotic reasons. As a result, financial data from Southern markets might bias empirical estimates of the probability of a Confederate victory.

Our empirical analysis suggests that the Amsterdam market gave the Confederacy about a 42 percent chance of victory before the battle of Gettysburg/Vicksburg. News of the severity of the Confederate defeats led to a sell-off in rebel bonds and the probability

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[3] Burdekin and Weidenmier (2001) show that currency risk is not perfect correlated with war (default) risk during the Civil War using a natural experiment created by the implementation of the Confederate Currency Reform Act of 1864 that took effect at two different times in the Eastern and Western Confederacy. Bordo and Kydland (1995) argue that the gold standard was a contingent rule where countries would temporarily suspend specie convertibility to print money for war finance. Following the end of the war, a country would return to the gold standard. The assumption in our paper is that the Confederate government would honor its external debt in gold following the end of the war or at least until it was clear that defeat was inevitable (assuming the South successfully seceded from the United States).

of a Southern victory declined to about 15 percent by the end of 1863. Southern victory prospects generally declined for the remainder of the war suggesting that European financial markets placed little credibility in the view that George McClellan might be elected President of the United States on a peace party platform in 1864. Overall, the analysis suggests that European investors believed that the South had a realistic chance at winning the Civil War prior to the battle of Gettysburg. Thereafter, financial markets considered a Southern victory a low probability event.

We begin the analysis with a brief discussion of Confederate debt operations in Europe. This is followed by a discussion of the data and model used to estimate the probability of a Confederate victory. We then estimate the probability of a Confederate victory and employ a series of robustness checks to test the sensitivity of the empirical results. We examine the effect of war news and political events on the probability of a Southern victory. The last section concludes with a discussion of the results as well as the application of the new methodology to other historical revolutions and civil wars.

II. Confederate Debt Operations in Europe

During the first two years of the war, the South believed that cotton was "King" and that a self-imposed cotton embargo would draw England and France into the war. They thought that European powers, especially England, were dependent on Confederate cotton to operate their textile mills. Although the Confederacy enjoyed considerable power in the world cotton market, many British textile mills were overstocked with Southern cotton early in the war because of a bumper crop in 1860 (Irwin, 2001). The

failure of "King Cotton Diplomacy" also meant that the Confederate government lost an opportunity to purchase military supplies in Europe with cotton during the early stages of the war (Owsley, 1985; Ball, 1991).

By the end of 1862, Confederate revenues from money, debt, and taxes began to fall with rising inflation. A European loan could raise specie to buy guns and ships in Europe to support Confederate armies in the field. Raising funds in Europe was a difficult prospect for the Confederacy, however, as their uncertain military prospects made it difficult to find an investment banker who would underwrite a foreign loan. Rothschild and Baring, two of the leading financial firms in Europe, refused to market war debt for a new pro-slavery government at war with the United States (Sexton, 2006).

One solution to the Confederacy's financing needs was to sell bonds on European capital markets. After negotiations with several second tier investment banking firms, the Confederacy managed to float two small bond issues in Europe: (1) cotton bonds that traded primarily in England and (2) domestic gold bonds sent to the Amsterdam Stock Exchange. Issued in March 1863 by Erlanger and Company, the cotton bonds were a sterling denominated debt instrument that paid investors 7 percent interest semi-annually. As shown by Burdekin and Brown (2000) and Weidenmier (2000), the war bonds fluctuated in response to war and political news. Although the debt instrument actively traded on British financial markets, pricing the sovereign bond is complicated by an option clause that allowed investors to convert the security into cotton on demand within 60 days. Since an active market for cotton futures did not exist during the Civil War, and since one would need to estimate the probability of successfully running the blockade, the

value of the option cannot easily be estimated using Black-Scholes. This means that it is very difficult to use the cotton bonds to estimate the probability of a rebel victory.

The rebel government dispatched several agents to Europe in the summer of 1862 to sell domestic Confederate bonds in Europe to raise gold (foreign exchange) for war finance. Schroeder and Company, a German investment banking firm, sold and marketed the debt obligation for the Confederate government. Issued under the Acts of August 19, 1861[4], the war bonds paid an 8 percent coupon in specie with maturities ranging from 10 to 20 years. Coupon payments were paid semi-annually on January 1st and July 1st (Davis and Pecquet, 1990; Todd, 1954; Dinger, 1868).[5] Ball (1991) and Sexton (2006) estimate that the Southern Confederacy shipped more than 14 million gold dollars in domestic bonds to Europe during the war.

The Confederate government initially turned down offers to sell the war bonds at 60 percent of par value in December 1862 and mid-January 1863 to European investors. The offer price was actually set by some British citizens who had privately purchased some Confederate bonds directly from the Southern government and were reselling the war debt on the secondary market (Fenner, 1969). James Spence, a Confederate agent, promised Emile Erlanger that he would keep the gold bonds off the market until after the cotton bonds had been floated on European exchanges. Evidently, Erlanger and the Confederate government did not want to saturate the European market with Confederate debt (Fenner, 1969). As a result, the gold bonds did not appear on the Amsterdam market

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[4] A later series was issued under the Acts of February 20, 1863. It shares similar features but for a time option clause.
[5] It can easily be shown that the Confederate bonds sold in Amsterdam were gold denominated. Letters between rebel agents in Amsterdam and the Confederate Treasury Secretary discuss the funds raised from the sale of domestic war bonds in terms of the amount of foreign exchange the bond sale raised for war finance. The Confederate bonds in Amsterdam generally traded for more than twice the price of the domestic paper version of the bond. Moreover, there was not an active market for Confederate paper money in Europe during the Civil War since European governments did not recognize the South.

until early August 1863. European investors purchased only a small fraction of the war bonds shipped abroad, however, given the Confederacy's poor fiscal position and its on-going war with the United States. Although the exact number of rebel bonds sold in Amsterdam is unclear, correspondence between Confederate agents in Europe and the Treasury Secretary Memminger indicate that the Southern government sold at least 63,000 gold dollars (par value) of Confederate war bonds in Amsterdam from the summer of 1863 through the winter of 1864 (Fenner, 1969).[6] The number of Confederate gold bonds sold in Europe is higher than 63,000 gold dollars given that the Southern government also privately sold a portion of the 1862 debt issue to British citizens (Fenner, 1969). According to Venendael (1996, p.14), there were rumors that Rotterdam investors purchased a large number of Confederate bonds from England in 1864 after their price had fallen dramatically.

The *Amsterdamsch Effectenblad*, a leading Dutch financial newspaper, first began quoting Confederate bond prices August 1, 1863. The bonds initially sold at 47 percent of par (par = 100 gold dollars) in sizes of 50, 100, 500, and 1,000 gold dollars. Over the next several weeks, trading in the debt security appears to have significantly increased and Dutch newspapers began quoting prices almost every day by October 1863. The *Amsterdamsch Effectenblad* reported almost 500 price quotations for Confederate bonds between August 1863 and the end of the war in May 1865. The *Beurzen Courant*, a

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[6] Correspondence between Confederate agents in Europe and the rebel Treasury Secretary Memminger also indicate that about $3,000 of the gold bonds sold in Amsterdam were five-year securities with an option to convert to 5-30 year bonds. The *Amsterdamsch Effectenblad* quoted prices for the convertible debt instrument in 1864 (Veenendael, 1996). Given the small number of convertible bonds sold in 1864, we focus the analysis on the larger and more liquid bond issue purchased by Dutch investors in the summer and fall of 1863.

newspaper from neighboring Belgium, also tracked movements in the war debt and reported price quotations of Confederate bonds in Amsterdam.

The large number of price quotes reported in the financial press suggests that the war bonds actively traded on the Amsterdam market. Although data on trading volume are not available, the *Amsterdamsch Effectenblad* often reported the number of different transactions prices for the war bonds until the debt issue moved from the curb market to the official stock list in early 1864. The Dutch financial paper reported trades at 52 different prices in October 1863, 24 different prices in November 1863, and 35 different prices in December 1863. By nineteenth century standards, this was a liquid market for a sovereign debt issue, especially considering the small number of Confederate bonds sold on the Amsterdam exchange. Dinger, a contemporary observer, wrote that Confederate bonds traded almost every day on the Dutch market (Dinger, 1868, p. 374; 1873, p. 600).[7] Trading volume appears to have briefly tapered off after a couple of news reports surfaced that counterfeit rebel bonds were trading on the Amsterdam exchange. Indeed, it seems unlikely that counterfeiters would go to the trouble of printing bogus Confederate bonds unless the war debt actively traded on the Dutch market.[8]

Figure 1 shows the time series of all available debt prices for the rebel security from the summer of 1863 until May 1865. The vertical lines and accompanying text denote important military events during the Civil War. Confederate defeats are denoted by a solid vertical line while Southern victories are shown by a dashed line. The Confederate war bonds appeared on the Amsterdam market shortly after news of costly

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[7] Bosch (1948), a Dutch historian, also noted that Confederate bonds traded daily on the Dutch market.
[8] Records of the Amsterdam Stock Exchange (1863-1865). The issue of counterfeited bonds was raised several times by the Dutch stock brokers, this eventually lead the head of the stock exchange to write several letters to Confederate representatives (John Slidell, James Mason and the Confederate Secretary of the Treasury).

Southern defeats at Gettysburg and Vicksburg had largely been capitalized in Civil War asset prices in Europe. Confederate debt prices in Amsterdam continued to fall in August and early September 1863. War debt prices fell from their initial issue price of 47 gold dollars in early August to a price of 31 in late September when news of the Confederate victory at Chickamauga briefly reversed the downward trend in bond prices. For the remainder of the war, Confederate bond prices generally declined. The one exception is the increase in Confederate debt prices in the late summer of 1864 when bond prices increased from a value of 10 gold dollars to about 15 gold dollars in July probably following news of rebel victories at the Wilderness and Spottsylvania. The temporary reversal of the downward trend may reflect the effect of Lee's victories in Northern Virginia in the summer of 1864 that created an expectation in European financial markets that George McClellan might be elected President on a peace party platform. News of the Confederate defeat at Atlanta in early September further diminished McClellan's chances at winning the Presidential election. By November 1864, Confederate bond prices declined and traded for less than 8 gold dollars. Rebel bond prices continued to fall for the remainder of the war and traded for less than one pound sterling by the first week of May 1865, a few weeks before the last Confederate field army surrendered to Union forces in Texas.

III. Empirical Analysis

A. Baseline Model

To estimate the probability of a Southern victory, we employ a standard discounted cash flow model to price Confederate bonds that traded on the Amsterdam Stock Exchange. Merrick (2001) shows that the value of a bond, V_0, can written as:

$$V_0 = \sum_{t=1}^{N} (P_t \times f_t \times C_t) + P_n \times f_n \times F_n + \sum_{t=1}^{N} (p_t \times f_t \times R) \qquad (1)$$

where C_t is the coupon payment on date t, N is the maturity date, F_n is the principal repayment at maturity, R is the recovery value of the debt obligation in the case of default, P_t is the adjusted probability of a timely payment of cash flows on date t, p_t is the adjusted default probability between date t-1 and date t and f_t is the risk-free present value factor. The model is estimated under the assumption of risk-neutrality given that an investor could easily hedge against a decline in Confederate bonds by buying long-term Union bonds that also traded on the Amsterdam market.[9]

To estimate the probability of a Confederate victory, we make three assumptions in the baseline model. First, bondholders would receive nothing in the event of a Confederate defeat. The identifying restriction is motivated by three factors: (1) the Confederate government would cease to exist in the event of a defeat, (2) the war bonds traded for less than one gold dollar at the end of the war (May 1865), and (3) we were unable to find any reports in the Dutch financial press during the war indicating that investors believed that the United States government might honor the Southern bonds in the event of a Confederate defeat.[10] In addition, we make two other assumptions in the

[9] Risk neutrality is a common assumption in finance that is often used to price options. Empirical studies that have dropped the risk-neutrality assumption have generally found that it has a limited impact on default probabilities (Hull, Predescu, and White, 2004).

[10] The behavior of Dutch bondholders after the war is quite different than the actions of investors in Confederate cotton bonds. After Lee surrendered to Union forces in mid-April 1865, cotton bondholders

baseline model: (1) the Confederacy would faithfully repay and service their Dutch bonds in the event of a victory and (2) that European investors could not, *ex ante*, forecast the end of the Civil War.[11] Finally, we calculate the probability of a rebel victory assuming that the war bonds had a maturity length of 10-years given that the *Amsterdamsch Effectenblad* reported only one price for the different Confederate bond issues that traded on the Dutch market --the maturity varied from 10-20 years--. By using rebel bonds with the shortest maturity (10-year), we can estimate the (upper bound) probability of a rebel victory.[12]

If we assume that bondholders received nothing in the event of a Confederate defeat, then the recovery value of the Confederate debt obligation can be set equal to zero in equation (1). The cash flow model can be rewritten as follows:

$$V_0 = \sum_{t=1}^{N} (P_t \times f_t \times C_t) + P_n \times f_n \times F_n \qquad (2)$$

formed a committee to seek repayment of the defaulted rebel debt from the United States government. However, financial markets appear to have placed a very low probability on the possibility of a US government sponsored bailout given that the debt instrument traded for only five pounds sterling (five percent of par) at the end of the war. To quell expectations of an American bailout during the Civil War, the United States government issued several statements denouncing the idea that it would honor Confederate debts in the event of a rebel defeat (*Economist*, 1864, 1865). Indeed, the United States passed the 14th Amendment in 1866 that explicitly stated that the United States government would not honor rebel war debts.

[11] Below, we discuss relaxing the baseline assumptions to check the robustness of the empirical results.

[12] Assuming a 20-year maturity for the Confederate bonds does not qualitatively affect the empirical results.

If we use YTM_{BRI}, the yield to maturity of the British consol, as a proxy for the rate of return of the risk-free asset and if one considers that for each date t, bondholders assign a constant probability of default in the future, then $P_n = P_t$ and equation (2) may be rewritten as:

$$V_0 = (\sum_{i=1}^{T} \frac{C_i}{(1+YTM_{BRI})^i} + \frac{F_n}{(1+YTM_{BRI})^N}) \times p_{confvic} \qquad (3)$$

and $Pconfvic = \dfrac{V_0}{\sum_{i=1}^{T} \frac{C_i}{(1+YTMBRI)^i} + \frac{F_n}{(1+YTMBRI)^N}} \qquad (4)$

where p_{confiv} represents the probability of debt repayment and thus, by assumption, the probability of a Confederate victory.

The cash flow model is complicated by the fact that the Confederacy missed its first interest payment (and all others) on the debt obligation beginning in January 1864[13]. The treatment of past unpaid coupons --which depended on negotiations between the Confederate government and its foreign bondholders after the war -- could significantly alter the market's assessment of a Southern victory. To address this issue, we compute the probability of a Southern victory under three different post-war scenarios: (1) the Confederacy defaults on unpaid coupons, but faithfully repays future coupons and the principal of the debt obligation until maturity, (2) the Confederacy resumes honoring its debt, never defaults until maturity, and also honors past unpaid coupons and (3) the Confederacy resumes honoring its debt, never defaults until maturity, honors past unpaid coupons, and pays interest on the unpaid coupons. Although Scenario 3 was probably unlikely, it provides a lower bound estimate on the probability of a Confederate victory.

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[13] It is unclear whether the Confederacy actually defaulted on its first coupon payment in January 1864. The 1865 coupons were never repaid (see Dinger 1868, p. 375).

B. Probability of a Confederate Victory

The probability of a rebel victory before the battle of Gettysburg/Vicksburg is calculated using a price of 60 gold dollars, the price offered by European investors to buy rebel bonds in December 1862 and mid-January 1863. European investors gave Johnny Reb approximately a 42 percent chance of victory. The probability of a Confederate victory would have been even higher if the bonds did not actively trade at this point of the war and there was a liquidity premium built in the price of the debt security.

Figure 2 shows the probability of a Confederate victory given by the three different post-war scenarios using the daily bond price data taken from the Amsterdam market. The probability of a Southern victory averaged 10 percent for the entire sample period. The time series of victory probabilities possess very similar trends and fluctuations for the three post-war scenarios. Confederate victory prospects were greatest, approximately 34 percent, at the beginning of the sample in early August 1863. By the end of November 1863, the probability of a Confederate victory in European financial markets had fallen to less than 20 percent. The time series of victory probabilities generally declined for the remainder of the war. The analysis provides little empirical evidence to support the hypothesis that European investors believed that George McClellan might be elected President of the United States on a peace party platform in 1864. The only support for this hypothesis can be found in a brief period during the summer of 1864 when rebel victory prospects increased from about 7 to 11 percent in July when Confederate victories at the Wilderness and Spottsylvania slowed the Union advance on Richmond and Early's Southern army came within miles of the

Union capital. News of the fall of Atlanta in late September and early October 1864 sent Confederate bonds into deep default with the price of the debt issue less than the bond's coupon. By the late summer of 1864, European investors believed that Confederate defeat was inevitable and that there was little chance for a military reversal or political settlement to the war that would result in an independent Southern Confederacy.

Although Figure 2 provides some perspective on the evolution of Confederate victory probabilities, the analysis does not identify the largest changes in Southern victory prospects. To provide some perspective on this question, Panels A and B of Table 1 report the five largest (absolute) weekly increases and decreases in the probability of a Confederate victory. We use the *Nieuwe Amsterdamsche Courant*, one of the main Dutch newspapers, to identify events that may have led to large changes in the South's chances of winning the war. Table 1 shows that the Confederate defeat at Chattanooga led to a five percentage point decline in the probability of a Southern victory in late December 1863. The second largest decline, 3.91 percentage points, was associated with news that British diplomats had been expelled from Richmond in late September 1863. The dismissal of British representatives from the Confederate capital probably reduced the chances that her Majesty's government would recognize the South. England's refusal to recognize the Confederacy ultimately led the South's British representative James Mason to sail for France in the fall of 1863. News of Mason's departure for the European continent in financial markets also reduced the probability of a Confederate victory by more than three percentage points. The event probably signaled to financial markets that the Confederate government had given up hope of obtaining recognition from England. In addition, the probability of a Confederate victory declined

when news broke out that the United States government had sent a circular to its embassies in Europe that the South had little chance of winning the Civil War. The fifth largest decline in Confederate victory prospects (2.92 percentage points) was associated with two news items: (1) the fall of Charleston[14] and (2) the announcement by the Republican Party that it would support Lincoln's view that the South should not be offered a peace agreement.

Panel B of Table 1 lists the five largest increases in the probability of a Confederate victory. The largest increase in Confederate victory prospects, a 5 percentage point increase, coincided with rumors of peace negotiations in December 1863. The second largest increase in the probability of a Confederate victory, 2.8 percentage points, occurred following news that the South had 20,000 sympathizers in England who were working to secure recognition of the South by European governments. Confederate victory prospects also increased by 2.6 percentage points following a Southern attack on St. Albans, Vermont from Canada. The military action temporarily raised fears that England and the United States might go to war with each other. The time series of Confederate victory probabilities also briefly reversed its downward trend after news of a Confederate victory north of Richmond in the summer of 1864 and rumors of Grant's removal as Commander of the Union army. Overall, the largest absolute changes in the probability of a Confederate victory seem to correspond more closely with political news about European recognition/intervention as opposed to war news. This result might reflect that fact that European financial markets viewed political intervention as the only

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[14] According to the *Nieuwe Amsterdamsche Couran* dated September 15th, 1863, Charleston was still resisting somewhat but its fate was settled following the destruction of Fort Sumter. In fact Charleston would resist up till 1865.

means by which the Confederacy might win the war given that the probability of winning the war had fallen to less than 15 percent by the end of 1863.

C. Robustness Checks: Altering the Baseline Assumptions

Although the baseline model provides some insight into the evolution of Southern victory prospects during the Civil War, one could argue that several of the assumptions employed in the cash flow model are unrealistic. For example, suppose that Confederate bond investors expected that the United States government might partially bailout bondholders in the event of a Confederate defeat (even though we cannot find historical evidence to support this hypothesis). If we allow for a 10 percent bailout of Confederate bonds, this scenario actually lowers the probability of victory given that the "true price" of the Confederate debt obligation is actually lower in the presence of an expected bailout[15].

Another possibility is that the Confederate government could have partially defaulted on its bonds or placed a moratorium on interest payments in the post-war period (assuming a military victory). Indeed, several Southern states, including Mississippi and Louisiana defaulted on their sovereign debts during the 1840s. European investors held a significant portion of these debt obligations (English, 1996). Most Southern states

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[15] Indeed, as stated by equation (1), $V_0 = \sum_{t=1}^{N}(P_t \times f_t \times C_t) + P_n \times f_n \times F_n + \sum_{t=1}^{N}(p_t \times f_t \times R)$, if

bondholders assign a constant probability of default in the future, then $P_n = P_t$ and equation (1) may be

rewritten as $Pconfvic \times \left[\sum_{t=1}^{N}(f_t \times C_t) + f_n \times F_n\right] = V_0 - \sum_{t=1}^{N}(p_t \times f_t \times R)$ From this equation, we can

show that if $R > 0$, then the probability of a confederate victory is lower than if we assume a complete default in which $R=0$.

eventually came to an agreement with foreign bondholders and repaid their debts so that they could regain access to international capital markets. By the late 1850s, many Southern states had established a solid bond market reputation. Interest rates for long-term Southern bonds (Louisiana, Tennessee, and Virginia) traded approximately 100 to 150 basis points above the yield offered on United States government securities in the New York market. Interest rates on long-term Southern debt issues were also about 50 basis points lower than the yields offered on many of the highest quality railroad bonds (*Commercial and Financial Chronicle*, 1856-1859). Nevertheless, as shown in Figures 3 and 4, incorporating a 10 or 20 percent hair cut in the baseline model or allowing for a five-year moratorium on interest payments has little effect on the probability of a Confederate victory. The long dated nature of the Confederate war bonds means that the debt security derived most of its value from the post-war period and is generally not very sensitive to changes in the contract terms of the debt obligation.

Investors may have also believed that the Civil War would end in one-, two-, or three years from the time that they purchased Confederate bonds. Under this assumption, the probability of a Confederate victory significantly increases only if the war lasts for a period of time that exceeds the maturity length of the bonds. This is unlikely and most contemporaries of the Civil War clearly did not believe that the Southern Confederacy could fight a long and protracted war given the Union's superior manpower and industrial military complex. Indeed, the Confederate government seems to have understood that they could not win a long conflict as shown by General Lee's attempt to win a decisive victory by charging entrenched Union positions at the battle of Gettysburg (Catton, 1989; Churchill, 1972).

Another potential shortcoming of the analysis is that the risk preferences of Confederate bond investors may have changed during the war. We might expect purchasers of Confederate bonds in the secondary market to be less risk-averse (or have risk-loving preferences) as the price of the war debt fell to very low levels with news of Southern battle defeats. The skewness of bond returns suggests that this might have been the case. The distribution of Confederate bond returns became more negative toward the end of the war. Fortunately for our analysis, less risk-averse investors (or investors with risk-loving preferences) reduces the probability of a Southern victory and does not qualitatively affect the upper bound probability estimated from the baseline model.

The only way to significantly alter the 42 percent probability of a Confederate victory prior to the battle of Gettysburg is to assume that the Confederate government received a very large haircut or that the contract terms of the debt obligation were significantly altered after the war. It is even harder to conceive of a scenario where the probability of a Confederate victory in 1864 would be high enough for one to make the argument that European investors believed that George McClellan had a chance of being elected President of the United States on a peace party platform. Overall, investors in 1863 appear to have given the Confederacy about a 40 percent chance of winning the war prior to Gettysburg. After the costly battle defeat, Confederate victory prospects generally declined for the remainder of the war and European financial markets considered Southern defeat a high probability event.

V. Conclusion

Did contemporaries of the American Civil War believe that the Southern Confederacy had a fighting chance at winning the Civil War? We introduce a new methodology for estimating the probability of a (Confederate) victory during a period of civil war or revolution by imposing a couple of identifying restrictions on a standard cash flow model used to price sovereign debt obligations. Using a new dataset of Confederate gold bonds in Amsterdam, we find that European investors gave the South about a 42 percent chance of winning the war in early 1863 prior to the battle of Gettysburg. The chances of a Confederate victory may have been even higher given that we do not have data on gold bonds prior to the battle of Antietam. The analysis suggests that contemporary financial markets believed that the South had a reasonable chance of winning the Civil War. News of the severity of Confederate defeats at Gettysburg/Vicksburg, followed by a military defeat at Chattanooga, led to a sell-off in rebel bonds and the probability of a Southern victory fell to about 15 percent by the end of 1863. Confederate victory prospects generally declined for the remainder of the war. The empirical results are robust to several changes in the baseline model including assumptions about the resumption of interest payments following the end of the war or incorporating a small haircut.

We also use the analysis to assess the belief held by some historians that the United States was growing tired of the war in 1864 and might elect George McClellan President on a peace party platform to end the conflict. The empirical analysis provides little support for this hypothesis. The probability of a Confederate defeat declined for

much of 1864, falling from a maximum of 12 percent in January to 6 percent on the eve of the national election in October. At this point of the war, the Confederate bonds were in deep default and the bond's coupon was greater than its quoted price. Confederate victories at Spottsylvania and the Wilderness in the summer of 1864 also did little to change the view in European financial markets that the Confederacy was headed for defeat.

Although this study has focused on the American Civil War, the methodology employed in this paper could easily be applied to several other historical or modern day episodes to provide some insight into the evolution of victory probabilities during a period of civil war/revolution. The methodology might be particularly interesting to apply to a communist revolution given that Marxist regimes generally repudiate a country's debt obligations and do not recognize international capital markets. For example, it might be interesting to know the evolution of victory (defeat) probabilities during the Spanish Civil War, the Cuban Revolution of the 1960s, or the Chinese Civil War during the 1930s and 1940s.[16] Another possibility is to use the technique to estimate the probability that the thirteen colonies would win the American Revolution. The methodology could also be extended to estimate the probability of a victory by Germany during World War I or the Nazis during World War II. Applying the methodology to the world wars would be more complicated given that it is not clear whether the recovery value of the war bonds would be zero in the event of a defeat. We leave these items for future research.

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[16] Another possibility would be to apply the methodology to the Russian Revolution. However, Oosterlinck and Ureche-Rangau (2005) and Landon-Lane and Oosterlinck (2006) show that there was a peso problem with Russian after the Bolsheviks had ceased control of the country and repudiated the czar's external debt obligations. Many foreign investors wrongly believed that France or another foreign power might "bail-out" bond market investors.

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Table 1

Panel A. Five Largest (Absolute) Weekly Declines in Confederate Victory Probabilities

Date	Percentage Points	Major News Item(s)
Dec 11-18, 1863	-5.00	The Confederate army is defeated at Chattanooga.
Nov.6- 13, 1863	-3.91	Expulsion of British consuls from Richmond. Prime Minister Palmerston reaffirms British neutrality.
Sept. 25- Oct 2, 1863	-3.40	England refuses to recognize the Confederacy. Unable to secure recognition from the British government, Confederate envoy, James Mason, leaves England and travels to France.
Sept. 4- 11, 1863	-3.27	The United States government sent a letter to European governments through the foreign office arguing that the Confederacy has no chance of winning the war. The circular discusses the Union's superior economic and military capabilities.
Sept. 11-18, 1863	-2.92	News from the fall of Charleston. The Republican Party has decided that no peace offer should be made to the Confederacy and supports Lincoln in this respect.

Panel B. Five Largest (Absolute) Weekly Increases in Confederate Victory Probabilities

Date	Percentage Points	Major News Item(s)
Dec 18- 25, 1863	4.09	Rumors of peace negotiations in New York
Jan. 1- 8, 1864	2.77	The Confederate government reports that it has nearly 20,000 sympathizers in Europe that will help the South secure recognition from foreign governments.
Dec 30, 1864-Jan.6, 1865	2.57	News of the Confederate raid on St Alban's Vermont from Canada.
Feb. 19 - 26th 1864	2.11	Lee defeats Meade in a short battle south of the Rapidan. The siege of Charleston's has been lifted.
June 24- July 1 1864	1.90	Rumors that Grant will be replaced as Commander of the Army of the Potomac given the large number of casualties on his advance towards Richmond.

Figure 1
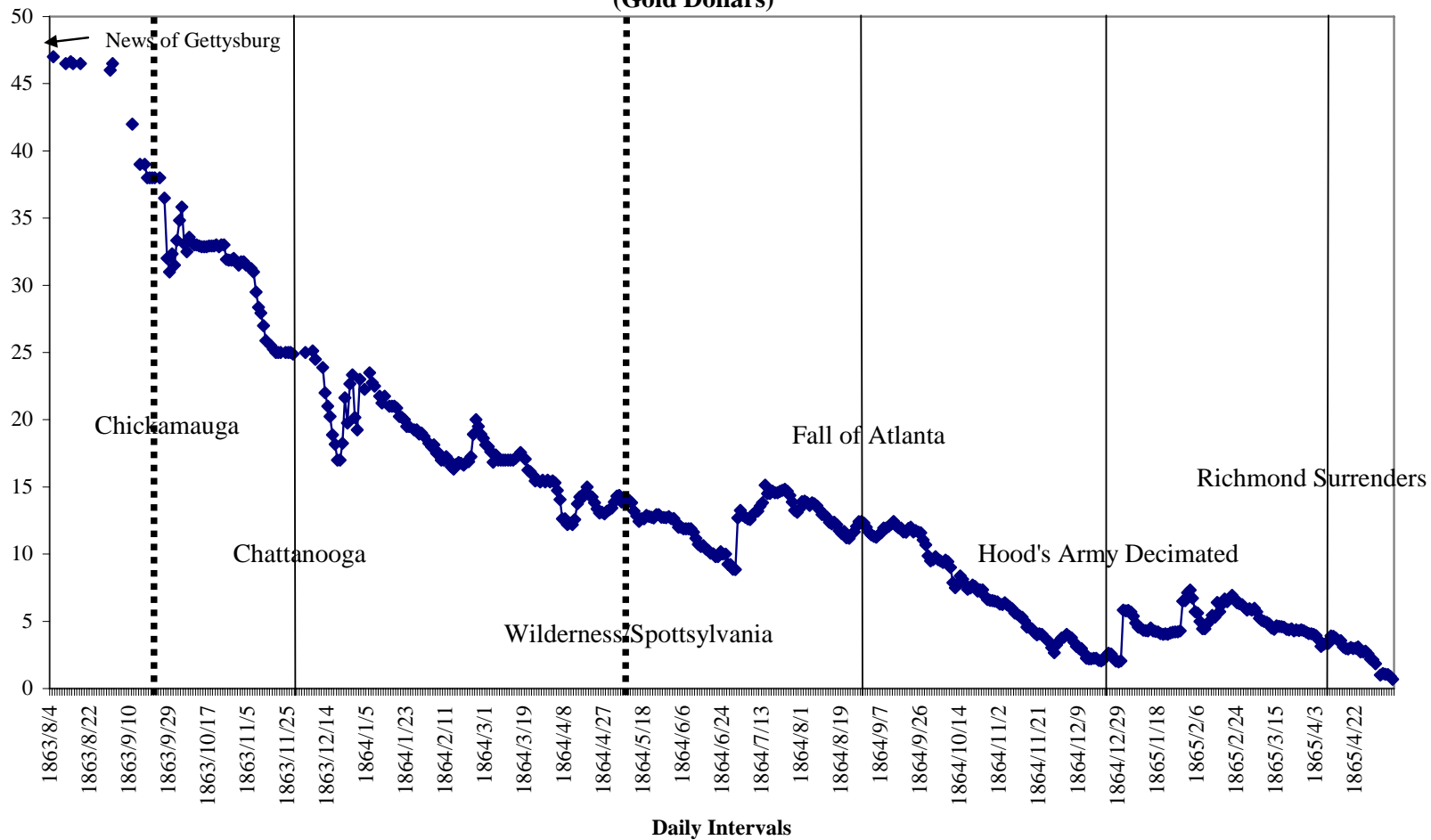**Confederate Bond Prices in Amsterdam**
August 1863 - May 1865
(Gold Dollars)

Figure 2
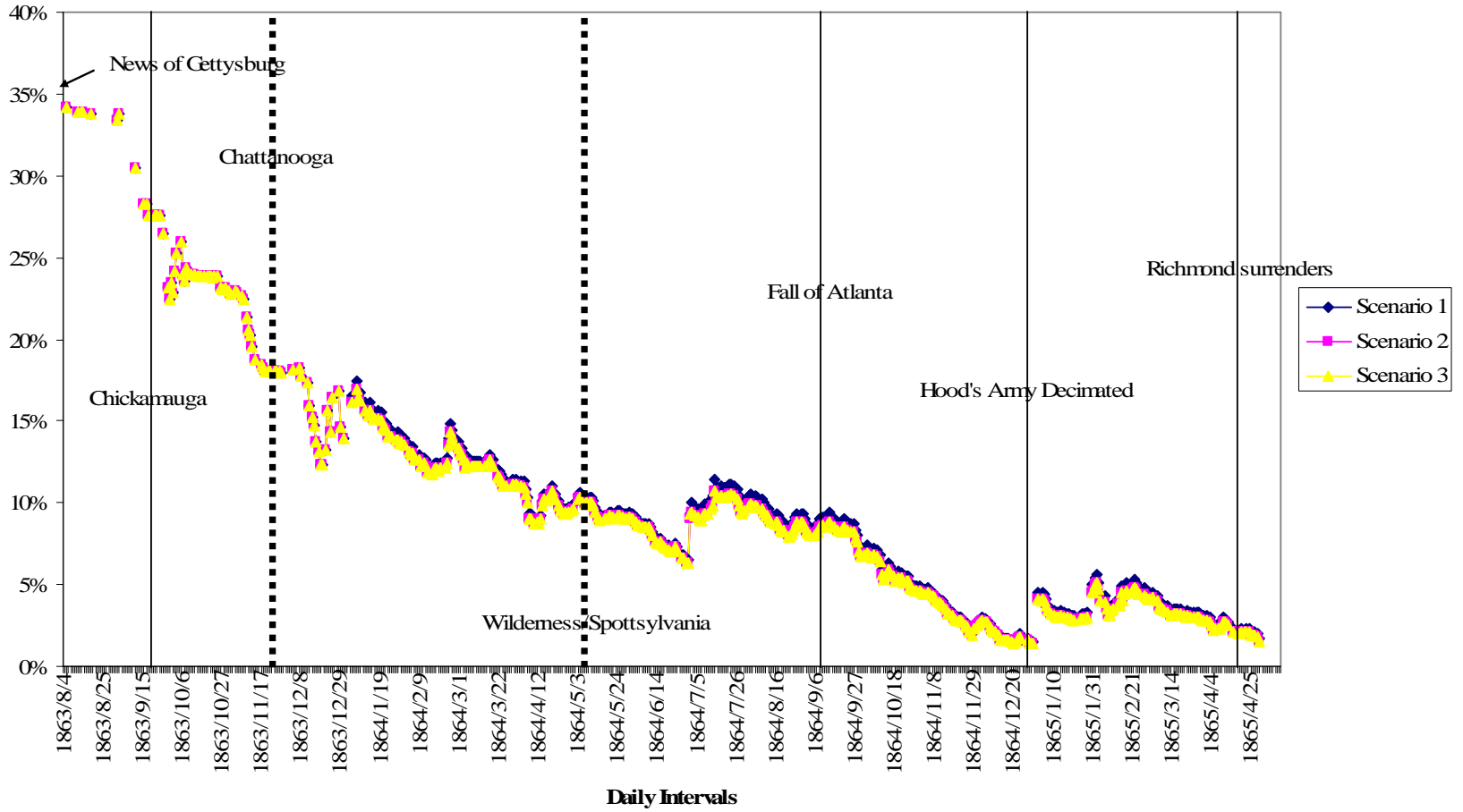**Probability of a Confederate Victory**
August 1863-April 1865

Figure 3
Probability of a Confederate Victory
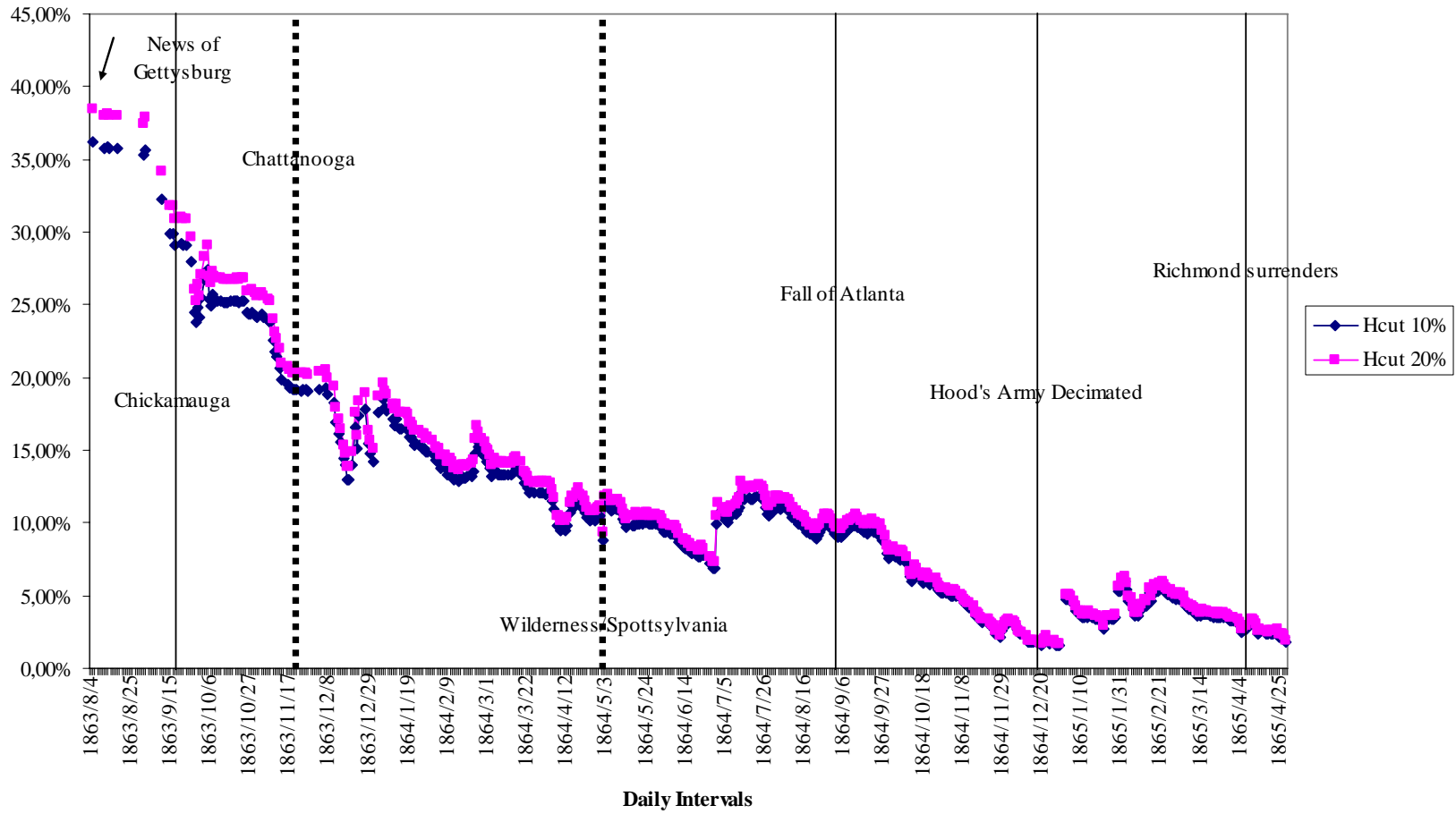**August 1863-April 1865**

Figure 4
Probability of a Confederate Victory
August 1863-April 1865
5-Year Moratorium