

Thursday, May 19, 2005

## **Capitalizing Patriotism: The Liberty Bonds of World War I**

Preliminary: Comments are welcome.

Hugh Rockoff  
Department of Economics Rutgers University and NBER  
New Brunswick NJ  
08901  
[Rockoff@Econ.rutgers.edu](mailto:Rockoff@Econ.rutgers.edu)

## **Abstract**

The outbreak of World War I presented the U.S. Treasury with the classic problem of war finance: to what extent should the government rely on taxes, borrowing, or creating new money? Although taxes were raised substantially, tax revenues fell far short of expenditures, and recourse was had to five bond issues, the famous Liberty Bonds, to finance the bulk of the war expenditures. The Secretary of the Treasury, William Gibbs McAdoo, hoped to create a broad market for the Liberty Bonds and to hold down interest rates on them, by following an aggressive policy of “capitalizing patriotism.” He called on everyone from Wall Street bankers to the Boy Scouts to volunteer for the campaigns to sell the Liberty bonds. He recruited the nation’s best known artists to create posters depicting the contribution to the war effort to be made by buying bonds and he organized giant bond rallies featuring Hollywood stars such as Douglas Fairbanks, Mary Pickford, and Charlie Chaplin. It appears, however, that these efforts enjoyed only limited success. Nominal interest rates were kept down mainly by making the bonds tax exempt and by making sure that a large proportion of the debt was purchased directly or indirectly by the Federal Reserve, turning the Federal Reserve into an engine of inflation.

## 1. The Liberty Bonds<sup>1</sup>

When World War I began the Secretary of the Treasury, William Gibbs McAdoo, turned to the record of Lincoln's Secretary of the Treasury, Samuel Chase, for lessons on how to finance a major war.<sup>2</sup> McAdoo believed that Chase had made a major error in turning over the marketing of the government's securities to a private firm, Jay Cooke and Company. McAdoo would make no such mistake. He expected bankers, insurance executives, and ordinary citizens to donate their services to the government. While he acknowledged that Jay Cooke and Company had succeeded to some degree in marketing the bonds to middle class Americans, McAdoo thought that he could push Cooke's policy much further. Indeed, Britain and Germany had already issued bonds to the accompaniment of noisy "drives" to sell bonds, especially to middle class and working class investors, Noyes (1926, 181-2).

McAdoo crisscrossed the country on an exhausting speaking tour urging the public to express its support for the war by buying bonds, and he arranged rallies at which movie stars such as Douglas Fairbanks, Mary Pickford, and Charlie Chaplin

---

<sup>1</sup> I must thank my colleagues, Michael Bordo, Kim Oosterlinck, and Eugene White for numerous helpful discussions of war finance. I must also thank the participants in a session at the American Economic Association meetings in Fall 2004, and in particular my discussant Paul Rhode, and the chair of the session Gavin Wright, for their comments. Martha Olney patiently explained the 1917-1919 survey of family saving and Dissaving to me. Sung Won Kang provided able research assistance and thoughtful suggestions. They are not responsible for the remaining errors, confusions, and misleading statements.

<sup>2</sup> David M. Kennedy (2004, 100) suggests that McAdoo turned to Chase's experience, rather than to that of our European allies and enemies, because of "an almost instinctual sense of the uniqueness of American society." This may well account for the direction in which his thoughts initially ran, but in most areas he rejected Chase's methods in favor of those being followed in Europe.

exhorted the crowd to buy bonds. (Kennedy 1980, 105). In the closing week of the campaign for the fourth Liberty loan \$4,800,000 was raised from an audience at Carnegie Hall who heard Enzo Caruso and other stars of the day perform (Noyes 1926, 185). McAdoo also enlisted leading artists such as Howard Chandler Christy and Charles Dana Gibson to paint posters urging the purchase of bonds.

Three examples of the famous Liberty Bond Posters are reproduced below. The first two rely on emotional appeals. The second in particular may be the sort of thing that Senator Warren G. Harding had in mind when he complained about the hysterical nature of the campaign.<sup>3</sup> The third poster adds an appeal to self interest. The Boy Scouts were enlisted under the slogan “Every Scout to Save a Soldier.” Even the names of the bonds reflected the emphasis on patriotism. While one of the most popular Civil War issues was known prosaically as the 5-20 (callable after 5 years, redeemed at 20), the World War I debt consisted of four “Liberty bonds,” and a final issue of “Victory bonds” after the armistice. The campaign attempted to create strong social pressures to buy bonds. When, for example, the Comptroller of the Currency learned that a national bank charter had been granted to six applicants from a “certain western state” who had between them bought only \$200 worth of Liberty bonds, the charter was revoked. (Whittlesey 1950, 175). But how effective were the campaigns? What price, to put it differently, were investors willing to pay to help make the world safe for democracy?

We are unlikely to witness anything like the Liberty Bonds again. True, there was a brief flurry of interest in issuing war bonds after the 9/11 attacks. Both houses of

---

<sup>3</sup> Some of the posters were far more lurid in their depiction of the Germans.

Congress passed legislation that would have created “Freedom Bonds.” The administration, however, although sympathetic with sentiment behind the legislation, was opposed to issuing freedom bonds because the United States was in a recession. Encouraging saving, the administration believed, would be counterproductive. The Treasury did inscribe a variation of its standard EE Savings Bonds as “Patriot Bonds.”<sup>4</sup> But interest in Freedom bonds or Patriot bonds seems to have faded quickly. The broader question, however, of whether social pressures can be used to supplement or substitute for financial incentives is a hardy perennial. The campaign to sell the Liberty Bonds provides a unique natural experiment in which to determine the strengths and limits of non-pecuniary social pressures.

## **2. Taxes, Bonds, or Greenbacks?**

As American involvement in World War I approached, the Treasury faced the usual problem of war finance. There are three ways to finance a war – taxes, borrowing, and printing money. How much should the Treasury rely on each? There was general agreement that printing money was wrong because it would produce inflation.<sup>5</sup> The Civil War, and the experience in other wartime economies, had revealed the danger of relying on the printing press. Printing money was regarded at best as a stopgap to be used until an

---

<sup>4</sup> See *The New York Times*, October 26, 2001, p. C7, and December 2, 2001, p. BU6.

<sup>5</sup> Some economists of the day would have made a sharp distinction between loans financed by money creation and loans financed by sales to the general public. But Wilson and McAdoo seem to have believed that loan finance in general was inflationary. Wilson warned against the inflationary dangers from relying entirely on loan finance in his war message of April 2, 1917, Noyes (1927, 197-8).

appropriate means of finance could be put in place. But the choice between borrowing and taxes was far from obvious.

It would take us too far afield to go over all the arguments made within the Administration, within Congress, and in the press that may have influenced the choices finally made. However, we can get a good sense of how contemporaries viewed the issues if we look at the debate that raged among the economists of the day over the best method to finance the war.

The first point to note is that the economists of 1917, although they tried to think through the issues from first principles, were acutely aware that they were the heirs to a tradition, what might be called the classical or English tradition, which favored taxes over borrowing. As originally set out by David Hume and Adam Smith the case for taxes was political rather than economic. Hume put it this way. (Hume, 1970 [1752], 91-2).<sup>6</sup>

According to modern policy war is attended with every destructive circumstance; loss of men, encrease of taxes, decay of commerce, dissipation of money, devastation by sea and land. According to ancient maxims, the opening of the public treasure, as it produced an uncommon affluence of gold and silver, served as a temporary encouragement to industry, and atoned, in some degree, for the inevitable calamities of war.

It is very tempting to a minister to employ such an expedient, as enables him to make a great figure during his administration, without overburthening the people with taxes, or exciting any immediate clamours against himself. The practice, therefore, of contracting debt will almost infallibly be abused, in every government. It would scarcely be more imprudent to give a prodigal son a credit in every banker's shop in London, than to empower a statesman to draw bills, in this manner, upon posterity.

In the *Wealth of Nations* Adam Smith (1979 [1776], 919-20) reiterated Hume's argument and put the argument, as usual, in a particularly telling way, thus establishing the classical economist's presumption in favor of taxation.

---

<sup>6</sup> Although Hume's essay first appeared in 1752, the second paragraph was not included until an edition published in 1770.

The ordinary expense of the greater part of modern governments in time of peace being equal or nearly equal to their ordinary revenue, when war comes they are both unwilling and unable to increase their revenue in proportion to the increase of their expense. They are unwilling for fear of offending the people, who, by so great and so sudden an increase of taxes, would soon be disgusted with the war; and they are unable from not well knowing what taxes would be sufficient to produce the revenue wanted. The facility of borrowing delivers them from the embarrassment which this fear and inability would otherwise occasion. By means of borrowing they are enabled, with a very moderate increase of taxes, to raise, from year to year, money sufficient for carrying on the war, and by the practice of perpetually funding they are enabled, with the smallest possible increase of taxes, to raise annually the largest possible sum of money.

In this justly famous passage Smith goes on to explain how borrowing encourages war by hiding the true costs of war.

In great empires the people who live in the capital, and in the provinces remote from the scene of action, feel, many of them, scarce any inconveniency from the war; but enjoy, at their ease, the amusement of reading in the newspapers the exploits of their own fleets and armies. To them this amusement compensates the small difference between the taxes which they pay on account of the war, and those which they had been accustomed to pay in time of peace. They are commonly dissatisfied with the return of peace, which puts an end to their amusement, and to a thousand visionary hopes of conquest and national glory from a longer continuance of the war.

David Ricardo expanded the case against borrowing, focusing on the more narrowly economic costs. Ricardo began by pointing out that the real cost of a war was the shift of resources from productive uses to war making, and that this cost would be the same whether the money was acquired through borrowing or taxation. He went on to point out some of the economic consequences of hiding the costs of war by borrowing. First, taxpayers might not realize that their wealth had been reduced because of the increase in future taxation and might therefore not undertake sufficient saving to restore the capital stock.

If the expenses of a war be 40 millions per annum, and the share which a man would have to contribute to that annual expense were £100, he would endeavour, on being at once called upon for his portion, to save speedily the £100 from his income. By the system of loans, he is called upon to pay only the interest on this £100, or £5 per annum, and considers that he does enough by saving this £5 from his expenditure, and then deludes himself with the belief that he is as rich as before. (Ricardo, 1965 [1821], 163).

In this case Ricardo's taxpayer does not behave in the ultra-rational way required by "Ricardian Equivalence." But after the war, the reality of a long period of high taxes begins to sink in. And the nation that has financed its war with borrowing faces a new cost.

...it becomes the interest of every contributor [taxpayer] to withdraw his shoulder from the burthen, and to shift this payment from himself to another; and the temptation to remove himself and his capital to another country, where he will be exempted from such burthens, becomes at last irresistible, and overcomes the natural reluctance which every man feels to quit the place of his birth and the scene of his early associations.

John Stuart Mill, as might be expected, took a more moderate approach, but he still emphasized the dangers of borrowing. Indeed, borrowing could be very bad if it absorbed part of the wages fund: then borrowing would be equivalent to a tax on workers. But if the government simply absorbed funds that would have been wasted, or invested abroad, the effect on workers of loan finance would be minimal. The interest rate was the index that would show whether borrowing had been held to a prudent level. Stable interest rates would be a sign that borrowing was merely diverting capital from foreign lending or other uses that did not impinge on labor; a rise in interest rates would be the sign that borrowing had reached an excessive level. (Mill, 1940 [1848], 873-6).

The most convincing nineteenth century American discussion of war financing that I have found is Henry C. Adams (1886). Adams concluded from a careful study of

the War of 1812 and the Civil War that a balance should be struck between taxes and borrowing. Excessive increases in taxes would harm production. But taxes had to be raised enough to provide for the interest on the debt, for some coverage of war expenditures, and for the retirement of the debt after the war. Otherwise, the public credit would be damaged and interest rates would rise substantially. Adams (1918) was still of the same mind when the next major war finally arrived.

On the eve of American entrance into the war, the American Economic Association turned to Oliver M.W. Sprague to discuss the optimal way of financing the war. Sprague at the time was one of America's leading economists: he was the author of the classic *History of Crises under the National Banking Act* and a professor at Harvard. In 1937 he would become President of the American Economic Association. Sprague made a strong case for financing by taxes rather than by borrowing. Borrowing, according to Sprague, was unjust.

The injustice of treating those who furnish the funds for war more generously than those who risk life itself will not be questioned. Consider for a moment the contrast under the borrowing method of war finance of a soldier in receipt of an income of \$2500 before a war and his neighbor who remains at home in continued receipt of a similar amount. The civilian reduces his expenditures in every possible way and subscribes a total of \$4000 to war loans. He is rewarded with a high rate of interest to which his soldier neighbor must contribute his quota in higher taxes if he is fortunate enough to return from the front. (Sprague 1917, 204)

What about the effect of high taxes on production?

Taxation on this onerous scale [sufficient to finance a great war] would virtually eliminate the ordinary economic motives for effort and sacrifice. What would be the effect on production? There is no experience whatsoever on which to base a judgment. I venture to think, however, that no serious difficulties would be encountered when millions of men were fighting in the trenches in a great war in which a people believed that its vital interests were at stake. (Sprague 1917, 208).

In other words, Sprague recognized that high taxes could discourage effort, but thought that this effect could be offset during a war by patriotism. Four economists then commented on Sprague's paper. (Miller, Lutz, Lincoln, Urdahl, and Sprague, 1917). In general, Sprague's discussants were favourable to his proposal. Miller, however, worried that relying entirely on taxes would weaken the "motive to industry." And Urdahl pointed out that the historical evolution of war finance, in fact, had been in the opposite direction: toward greater reliance on borrowing.

At a conference held a few months later (and after passage of the War Revenue Act) one can find more moderate positions. Edwin R.A. Seligman (1918) thought that taxes should be raised, but that possible adverse effects on consumption and investment should be kept in mind. Financing 25 or 35 percent through taxes was about right. Even Sprague (1918) recognized that the war was going to be financed mainly (75 percent?) by debt. But he still believed that it would have been better to finance it 75 percent by taxes. Greater reliance on taxes would have reduced consumption and speeded conversion.

Perhaps the leading American economist of the day, certainly the one that we know best, was Irving Fisher. Fisher (1918) accepted the need for issuing Liberty bonds. But he stressed three points in relationship to them. First people should buy them by reducing their own consumption, not by borrowing from banks. Second, people should hold them, and not resell them unless the need was strong. Third, it was important that poor people invest in bonds so that after the war we wouldn't be in the position of taxing

the poor in order to pay the interest and principal on bonds owned by the rich. The first two points were stressed in the Liberty bond campaigns.<sup>7</sup>

The debates among the economists were echoed by the debates among the public. The socialists thought that all of the war could be financed by the appropriation of all incomes over \$10,000 per year. The *Wall Street Journal*, as might be expected, advocated reducing the income tax exemption from \$4000 to \$1000. The *Journal* thought, however, that considerable reliance should be placed on bonds. It was a matter of equity: “It is not right that the present generation should bear the whole burden of a conflict fought for the freedom of our children’s children.”<sup>8</sup>

McAdoo rejected the extreme view that all of the war should be financed by taxes. He seems to have recognized a trade-off: excessive reliance on taxation would frighten the wealthy and reduce support for the war; excessive reliance on bonds would be inflationary. Given that a trade-off existed, the practical matter became one of naming the optimal percentage to be financed by each. McAdoo, according to his *Memoirs*, initially thought that a 50-50 split was about right. J.P. Morgan, America’s leading investment banker, when questioned by McAdoo, advised financing 20 percent through taxes. Later McAdoo thought that financing 33 percent through taxes would do.

Davis Rich Dewey (1931, 506-7) summed up the outcome of the debate this way.

Some indeed advocated a policy of “pay as you go” and even proposed a conscription of wealth, if necessary to meet the war costs. Others favored a more equal division between taxes and loans. These views, however, did not prevail. There was fear of “frightening capital” and arousing popular

---

<sup>7</sup> In recent years the classical fear of debt finance has eroded further. Following the lead of Robert J. Barro (1987, 1989) economists tend to emphasize the advantages of smoothing taxes over time through the use of debt.

<sup>8</sup> This paragraph including the quotation from the *Journal* is based on Kennedy (2004, 16-17).

discontent which would retard the progress of military and naval plans. Although no exact ratio was formally adopted. There slowly developed an accepted conviction that taxation should provide at least one-third of the costs of the war.

As it turned out, about 25 percent of the war was financed through taxation.

Given that a large share of the expenditures were to be financed through debt, the next question was at what rate of interest? The first reaction of an economist might be to let the market decide the rate. To some extent, as we will see below, this was the policy that was followed. Nevertheless, there seems to have been a determined effort to keep rates down and to disguise increases. I have found no clear statement by the participants of their concerns. However, the objections to allowing rates to rise described by Arthur Cecil Pigou (1941 [1921], 92-4), perhaps the leading economist of the day, may explain the considerations in the back of the minds of policymakers. Pigou noted what he considered to be three decisive objections to allowing rates to increase in wartime. (1) Higher rates, in particular rates that rise above rates in enemy countries, might be seen as a sign of weakness. (2) Higher rates might not stimulate much additional savings, and in any case store up problems for future finance ministers. (3) Higher rates, like loans themselves, may be viewed as inequitable, as allowing the rich to “make a good thing out of war.”

### **3. Issuing the Liberty Bonds**

It is difficult to compare the Liberty bonds with other private and public issues: the volume was huge, and the Liberty bonds had numerous special features designed to enhance their appeal. Some issues were exempt from Federal Income Taxes, some could be used at par to pay Federal Inheritance taxes, although income from them was not

exempt, and perhaps most important, they enjoyed a privileged position as collateral for loans from the Federal Reserve. The key properties of the Liberty Loans are shown in Table 1.

Despite their complex structure, much can be learned from Figure 2, which shows the successive coupons on the Liberty bonds, the rates on AAA industrial bonds (Moody's highest rating), and the rates on municipal bonds.<sup>9</sup> The coupons were chosen by McAdoo in conjunction with his advisors. They represented the yield that McAdoo thought was consistent with the sale of the bonds at par. It is evident at once that McAdoo priced the Liberty bonds to sell as financial investments. The coupon on the Liberty bonds came within a few basis points of the yield on municipal bonds when the Liberty bonds were initially offered. One can see a slight narrowing of the spread between the yield on municipals reflecting the change in the tax status of successive issues. But it is clear, even from the start, that McAdoo did not expect people would buy bonds (at par) that yielded far less than comparable assets.<sup>10</sup> His faith in his ability to capitalize patriotism was hedged by a realization that the market would be interested first in financial returns.

---

<sup>9</sup> Municipal bonds were presumed to be exempt from Federal taxes including the income tax under an 1895 Supreme Court ruling. However, the recent passage of the constitutional amendment authorizing the income tax meant that the question of tax exemption might be revisited. (Bogart, et al, 1919, pp. 86-87).

<sup>10</sup> Benjamin Klein's (1974, 947) estimates of the competitive yield on deposits was 3.85 in 1917, 4.89 in 1918, and 4.48 in 1919; again, figures in line with the coupons on the liberty bonds.

## 4. A Natural Experiment

The price of the Liberty Bonds will reveal a good deal more about the effectiveness of the bond buying campaigns. At the margin the net advantages of holding government bonds must equal, in equilibrium, the net advantages of holding other securities. Thus we can write the following equation.

$$(1) \quad I_l + U(P) + U(S) = I_c$$

where  $I_l$  is the yield of the Liberty bonds.  $U(P)$  is the marginal value to a bond holder of the satisfaction from contributing to the war effort by purchasing a bond, of being patriotic.  $U(S)$  is the marginal value to the bond holder of other advantages of holding government bonds: their greater security, liquidity, tax advantages, and eligibility when held by banks as security for loans from the Federal Reserve. And  $I_c$  is the yield on a private sector alternative, for example AAA rated corporate bonds. Thus, the spread between corporates and governments will tell us something about the sacrifice that the marginal investor was willing to make in the name of patriotism.

The government, of course, can exploit the patriotic motive for buying liberty bonds by issuing more of them and driving  $U(P)$  toward zero. So a finding that  $I_l - I_c$  is small may mean simply that the government has fully exploited the potential of patriotism. For this reason the opening of the war does not provide a good natural experiment with which to test the role played by patriotism.

This is illustrated in Figure 1. In the absence of a patriotic demand, the Treasury could sell the “initial amount” of bonds (each bearing a coupon of, say, 3.5%) at price A. A surge of patriotism, other things equal, would increase demand and lift the price of that

amount of bonds to B. But if the Treasury fully exploits this surge in demand by increasing supply accordingly, the price will remain at A. This is the policy it would follow if it was attempting to prevent increases in interest rates for the reasons laid out by Pigou (or earlier by Mill).

The end of the war, however, provides something closer to a natural experiment. Now patriotism subsides and the demand curve shifts back to the initial level. The amount of bonds outstanding, however, is not reduced and their price falls to C. When it came time after the Armistice to issue the Victory Bonds, according to Gilbert (1970, 136), “the Treasury was told that there could be no further appeals to patriotism and that the problem must be approached in a ‘distinctly cold-blooded fashion.’”

History, of course, is not as neat as these supply and demand curves suggest. There will be additional issues once the war ends, the patriotic motive for holding bonds will not disappear completely, and other events, such as changes in tax rates, will be affecting returns in the bond market. Nevertheless, the response of the bond market to the end of World War I will, I believe, yield some important information about the role of patriotism.

The main reason that the end of the war works so well as a natural experiment is that it marks an abrupt change. Until a few months prior to the Armistice the German army was fighting hard in France, and the issue was still in doubt. In the Civil War or World War II, by way of contrast, enemy forces were in retreat for a long time and therefore transition from uncertainty to certainty about victory occurred slowly.<sup>11</sup>

---

<sup>11</sup> Martin Gilbert (1994, 454 – 96) in two chapters, the “turn of the tide” and “the collapse of the central powers,” provides a balanced and detailed account of August through November 1918.

It is true that there was a political change about the same time: Republicans made strong gains in the fall elections. The main effect of these gains from the point of view of investors, it seems to me, would be to increase the likelihood that high wartime taxes would be cut by reducing the progressivity of the income tax. This is what was done under Treasury Secretary Mellon in the early 1920s.<sup>12</sup> Therefore, this change would also work toward increasing the yields on the Liberty bonds and reducing the spread between yields on non-tax-exempt securities and on the Liberty bonds. A finding that the yield rose or that the spread narrowed would be open to multiple interpretations. But a finding that spread failed to narrow would point even more strongly toward a small role for wartime patriotism, because the effects of the political changes taking place were working in the same direction as the decline in patriotism.

Figure 3 plots the yield on the four Liberty bonds before and after the Armistice, along with the Municipal bond rate. The lowest line plots the yield to maturity on the First Liberty Bonds. The First Liberty bonds fell below par, although only a bit, shortly after they were issued (the period in the chart where the yield rises above 3.50). The fall may have been due in part to the inherent limits of social pressure. When the bonds were offered people could display their patriotism by announcing their purchase and by pointedly asking others how many Liberty bonds they have bought. After the initial offering, it is hard to prevent people from selling bonds and readjusting their portfolio. Few people were likely to go around asking their neighbors how many bonds they had sold. Note our third poster which calls on workers to “Buy Liberty Bonds and *Keep*

---

<sup>12</sup> Gene Smiley and Richard H. Keenh (1995) describe the fight over tax rates in the 1920s.

Them” (my italics). Mainly, however, the fall in the price of Liberty bonds was probably due to the general rise in rates that can be seen in the municipal bond rates.

The major difference that tax exemption could make is shown by the large spreads between the yields of the First Liberty loans and subsequent loans. The First Liberty loans were fully tax exempt. The tax exemption was curtailed on later loans (as shown in Table 1) partly because of criticisms that the tax exemption for the First Liberty Loans was giving the wealthy a way of avoiding taxes.

The real test of patriotism, however, as I noted above, is what happens after the war was won. If people were holding government bonds mainly for patriotic reasons, we would expect them to begin selling them and adjusting their portfolios after the Armistice. If this process was well understood by the market, then prices would adjust immediately. However, the Armistice does not appear to have had a major impact on the price of the Liberty bonds. Instead yields on the Liberty bonds seemed to have been fairly stable for the following year. As noted above, the turn toward the right in the 1918 elections might have created expectations of a reduction in the high wartime progressivity of the income tax. On these grounds one would expect a narrowing of the spread between the yields on the First Liberty bonds, which were fully tax exempt, and the yields on subsequent issues which were only partly exempt. But this does not seem to have happened, suggesting that the likelihood of sharp cuts still appeared low. Figure 3, in other words reveals a calm market; a market that took the end of the war in stride.

Figure 4 takes a longer view. It plots the returns for the First Liberty loan, for a group of municipal bonds, and for the fourth Liberty loan. The rates on all three securities remained stable until the first postwar recession. The yield, moreover, on the First Liberty

Bonds seems to have varied little after this sharp recession, returning to about the level of its initial issue.

Although Figures 3 and 4 seem to show little change in the relative standing of different securities before and after the war, small changes in the spreads between the series are hard to read. For this reason it is useful to look at Figure 5 which plots the spread between the yields on AAA corporates and on the First Liberty loan, and by way of contrast the spread between the yield on BAA corporates and AAA corporates. The spread between the corporates and the Liberty Bond should reflect the patriotism premium and the safety premium – in other words  $U(P) + U(S)$  in equation (1). The spread between the BAA and AAA rates reflects a similar difference in risk, call it  $U(S_a)$ , but no difference in patriotism.

When the war ended in November 1918, and the patriotic motive for holding Liberty bonds, if it was present, must have declined substantially, and we would expect the AAA-First-Liberty-Loan spread to narrow. Some bond holders may have continued to heed the Uncle Sam's plea to keep their bonds; but surely others would have assumed that with the war safely won, they could begin to diversify their portfolio. And consistent with this prediction we see a small and brief decline in the spread.

The spread then rose a bit, the opposite of what we would expect from a decline in the patriotism premium. The increase is clearly associated with the recession of 1920-1921. This recession, although brief, was relatively severe, and the rise in the spread probably reflects a rise in default risks produced by the recession. The onset of the recession, which the National Bureau dates as January 1920 was accompanied by substantial and controversial increases in the discount rate at the Federal Reserve in

December 1919 and January 1920. The increase in January, from 4.75 percent to 6 percent was unprecedented (Friedman and Schwartz 1963, 230-1). There is also a small increase in the AAA-Liberty spread in late 1923, probably associated with the second postwar recession which the National Bureau dates from May 1923 to July 1924. Thus it would appear that whatever narrowing of the AAA-Liberty spread occurred over the long-run was probably due more to a narrowing risk premium – the cause, presumably, of the similar long-run decline in the BAA-AAA spread – rather than of any erosion in a large patriotism premium.

Our conclusions about the effectiveness of the Liberty bond campaigns based on a reading of the charts can be tested more formally. Table 3 shows regressions of the yield of the First Liberty Loan on the yield of a representative group of AAA corporate bonds, the yield of a representative group of municipal bonds, and a dummy variable designed to measure the effect of the end of the war. The AAA rate was included to measure general market conditions. The municipal rate was included to measure the effect of the postwar reductions in tax rates. To measure the impact of the end of the war I tried a variable (Rapid Adjustment) that takes the value zero before November 1918 and the value one from November 1918 forward and a variable (Gradual Adjustment) that starts at .001 in November 1918 and rises at a constant rate until it reaches 1.00 in December 1925. First differencing appears to be needed because unit-root tests (Dickey Fuller) fail to reject the hypothesis that the underlying series have unit roots. The low Durbin-Watsons in the level equations are also signs of time-series problems.

In general the regressions in levels suggest that the campaigns did have an impact: rates rose after the Armistice more than might have been expected on the basis of the

movement of other rates indicating a disappearance of a patriotism premium. However, they also suggest that the premium was small, perhaps 15 to 20 basis points. First differencing the data produces more plausible coefficients on the fundamentals. In particular the AAA rate is positive and significant in both equations. The dummy variables, however, fail to show a postwar effect. I had expected that the Gradual Adjustment variable would pick up something after first differencing the fundamentals, but the coefficient, although positive, is small and not significantly different from zero.

## **5. Sales to Low Income Savers**

The denominations of the bonds suggest that a large percentage was sold to wealthy individuals or institutional investors. Such investors, of course, may well have been motivated by patriotism. But this finding does suggest that McAdoo's attempt to market the Liberty Bonds to working class or middle class investors enjoyed modest success. Table 2 shows a snapshot of the denominational structure of the bonds outstanding on June 30, 1920. The modal bond was the \$1000 bond, which was close to a \$50,000 bond in today's money: possible for a middle class family, but one would think not in large amounts. The smaller denominations, \$50 and \$100, seem more plausible for middle class investors, and constituted about 20 percent of the outstanding debt. This does not mean, however, that all of these bonds were held by middle class investors. A number of large corporations bought these denominations so that they could make dividend payments with them Gilbert (1970, 128).

Perhaps a more successful attempt to sell war bonds in small denominations to the young and poor was modelled on a British program. "War Savings Certificates," were

first issued in January 1918. They sold for \$4.12 (about \$60 in today's money using the CPI) and were worth \$5.00 at maturity in January 1923. The price increased one cent per month until sales were stopped in December 1918. The interest works out to about 4.5 percent. For those who did not have \$4.12 on hand, savings stamps costing \$.25 each could be purchased. Each stamp was pasted on a special board, and when the buyer had enough they could be exchanged for a war savings certificate. The "War Savings Certificate" under various names became a permanent feature of the financial landscape. It was continued after the war, used in World War II, and continued in various guises since then.

The purpose of the war savings certificates in World War I, as in its later reincarnations, was to provide a vehicle for people of limited means, especially young people, to express their patriotism and at the same time to teach them the value of thrift. In American high schools young women were encouraged to knit for the war effort, and young men to buy savings stamps. The program contributed a modest amount to the actual financing of the war. At the end of August 1919, the total amount of debt issued to finance the war amounted to \$26.4 billion. Of this amount \$0.93 billion consisted of war savings certificates, about 3.5 percent of the total (Schultz and Caine 1937, p. 540). It could be argued, however, that the War Savings Certificates represented additional real savings, as opposed to other issues that were partly monetized, and these were real savings that might not otherwise have been available.

We can derive a fairly clear idea of how the portion of bonds purchased by individuals was distributed from a government survey of nearly 13,000 households. This survey was undertaken because of the concern about how families were being affected by

wartime inflation. This survey was coded by Martha Olney (1995) and provides a remarkably detailed account of how a representative sample of urban families spent their money during the war years. Figure 6 shows the cumulative percentage of the total bond issues purchased by the households in the sample when they are arranged by household income. For example, the point plotted above 20%, 7.37% shows that the lowest 20% of the households in the sample by income purchased 7.37% of the total amount of bonds purchased by all households in the sample. The curve shows the strong relationship between income and bond purchases, although it also shows that even the lowest income classes were drawn into the program, as McAdoo hoped, and did purchase some bonds.<sup>13</sup>

The sample coded by Olney, it should be noted, while it was intended to be representative of ordinary Americans, did not include the institutions and very wealthy individuals who bought most of the bonds. This can be seen from the following calculation. The sample of households purchased \$745,746 worth of Liberty bonds.<sup>14</sup> When blown up by an estimate of the total number of households in 1918-1919 one gets a figure of \$1,655,783,620 as the amount purchased by all households. This constituted about 7.72 percent of the total amount of Liberty Bonds sold. Therefore, about 92.3% of the Liberty bonds must have been sold to institutions, such as banks, and to very wealthy individuals who were not included in the sample. The lowest 20 percent of households by income in the sample probably, therefore, purchased about .6 percent of the total issue (7.37 percent x 7.72 percent), a respectable amount, but clearly not a key to the financing the war.

---

<sup>13</sup> The curve includes war stamps with Liberty bonds. Excluding them would not change the visual impact of the figure.

<sup>14</sup> The sample also purchased \$109,196 in War Savings Stamps.

Moreover, showing that relatively poor savers did buy war savings stamps and Liberty bonds, does not prove that patriotism was the overriding motive. Wages were up and the Liberty Bonds offered a good return compared with savings deposits in banks. The Liberty bonds, moreover, could be purchased on an instalment plan. The lowest denomination of the Fourth Liberty Bond (\$50), for example, could be purchased by making a down payment of \$4.00 and then paying \$2.00 per week for 23 weeks.

## **6. How Were Nominal Rates Kept so Low During the War?**

If patriotism played a small role in increasing the demand for bonds, then how were nominal rates kept so stable during the war? Several factors appear to have played a role.

(1) As we have already noted, the bonds were made tax-exempt or partially tax exempt from Federal taxes, which gave investors in high tax brackets a strong financial incentive to buy them.

(2) The issue of new private bonds was curtailed. There was an official government agency, The Capital Issues Committee, which was given the authority to prohibit issues that it considered inappropriate. But chances are that a considerable amount of private investment would have been deferred until after the war in any case because of the uncertainties created by the war.

(3) As Allan H. Meltzer (2003, 88-9) has noted, many bond holders may have expected the price level to return to its prewar level after the war. The bonds contained a gold clause, and it might have been assumed that after the war the world would return to the gold standard and that wartime inflation would be wrung from the system as it was

after the Civil War. In other words, investors in Liberty bonds might reasonably have expected to gain from postwar deflation. Investors who bought bonds on this expectation were in for a disappointment. The price level rose every year from 1914 to 1920. But the price level never returned to the 1914 level. Investors who bought Liberty bonds in 1918 and held them until 1929 experienced a loss from price changes (-2.37 percent per year); investors who bought in 1919 and held until 1929 experienced a small gain from price changes (+.27 percent per year).<sup>15</sup>

(4) The Federal Reserve directly or indirectly monetized a good portion of the new debt. Milton Friedman and Anna J. Schwartz (1963, 216) put it this way.

The Federal Reserve became to all intents and purposes the bond-selling window of the Treasury, using its monetary powers almost exclusively to that end. Although no “greenbacks” were printed, the same result was achieved by more indirect methods using Federal Reserve notes and Federal Reserve deposits.

How much was involved? Between June of 1916 and June of 1919, the Federal Debt increased by \$24.3 billion (from \$1.2 billion to \$25.5 billion). High-powered money (which includes mainly Federal Reserve notes and deposits) increased by \$2.1 billion, according to Friedman and Schwartz (1963, 801-2). So the increase in high-powered money could account only for about 10% of the increase in the Federal debt.

But commercial banks also contributed to the monetization of the debt. They did so by purchasing bonds for their own portfolios and by lending money that borrowers then used to purchase bonds. Generally the banks lent at the coupon rate or at a slight advance over the coupon rate. Obviously, these were relatively secure loans since the Liberty bonds were essentially the collateral for the loan. Since the amount of bonds

---

<sup>15</sup> The price level used in the calculations is the GDP deflator from (Johnston and Williamson, 2002) which is based on Balke and Gordon (1989).

purchased with newly created money was not matched one for one by bonds held by banks, we cannot produce an accurate estimate of how much of the debt was monetized by examining the balance sheets of the banks.

We can get some sense of the upper bound, however, by looking at the increase in the total stock of money and assuming that all of the money that was created was backed directly or indirectly by government bonds. The increases for M1, M2, M3, and M4, from June 1917 to June 1919 were \$7.03 billion, \$10.02 billion, \$10.68, and \$11.46 billion respectively (Friedman and Schwartz 1970, 15-17). These figures imply estimates of the share of the increase in the debt that was monetized ranging from 29 percent (M1) through 41 percent (M2) and 44 percent (M3) to 47 percent (M4). Roughly speaking M1 includes demand deposits in commercial banks, M2 adds time deposits in commercial banks, M3 adds postal savings deposits and mutual savings bank deposits, and M4 adds savings and loan shares. Thus, as we move to more inclusive definitions of money we may be including institutions that were less involved in the process of monetizing government debt. Nevertheless, it would appear that as much as 40 percent of the debt was monetized. For the first year of the war (June 1917 to June 1918) the estimates of the share of the debt monetized range from 35 percent (M1) through 49 percent (M2) and 52 percent (M3) to 64 percent (M4).

Secretary McAdoo argued that his policies, including capitalizing patriotism, had saved taxpayers millions compared with allowing interest rates to rise to market clearing levels (McAdoo 1931, p. 381). The economics of this claim, however, was dubious, even leaving aside the magnitude of the savings. It sounds like a simple saving of resources: like eliminating red tape or firing incompetent workers. In fact, the savings, to the extent

that they were there, were transfers of dubious legitimacy. By persuading factory workers and boy scouts to buy bonds, the government was able to lower the future interest payments paid by the government. Those interest payments would be made from tax revenues, and to the extent that those taxes would have been paid by the wealthy, the net effect was a transfer from the boy scouts to the wealthy. To be sure, this argument assumes that workers and boy scouts would have found some other way of spending their money that would have added more to their welfare. A case could be made that it was really in the interest of workers and boy scouts to save more. Nevertheless, the avowed purpose of the Progressives was to shift the burden of taxation to the wealthy, and the policy of capitalizing patriotism undermined this policy.

This was apparent to many observers when it came to making the bonds tax exempt. In this case it was obvious that what the Treasury gained from lower interest rates, it lost from lower tax revenues. For taxpayers at the margin, that is taxpayers who were indifferent between holding taxable and non-taxable bonds, the gain from exemption would just offset the loss from lower rates. However, for taxpayers in very high tax brackets the gains from tax exemption could be substantial. An example will make this clear. In January 1920 AAA corporate bonds were yielding 5.55 percent, and the First Liberty bonds were yielding 3.60 percent. Therefore, someone in a 35 percent bracket would have been indifferent between the securities as far as after-tax yield was concerned ( $5.55 * [1 - .35] \approx 3.60$ ). The highest bracket in 1920, however, was 73 percent for taxpayers earning more than one million. For them, First Liberty bonds were equivalent to taxable bonds yielding 13.33 percent, higher than the yield on many junk

bonds ( $13.33 * [1 - .73] \approx 3.60$ ).<sup>16</sup> To be sure, there already existed a fairly safe tax-exempt alternative to Liberty bonds: municipal bonds. The municipals might have gained more from the imposition of very high tax rates during the war if the Liberty bonds had been taxable. Taking the sting out of very high tax brackets and punishing municipalities were not, one would think, major Progressive priorities.

## 7. Then Why Do It?

It appears from the foregoing that appeals to patriotism had a relatively small effect on the financing of the war, and that the attempt to conceal the limited effect of patriotism led to the adoption of a tax exemptions that undermined Progressive redistributive priorities. Then why do it? Why enlist everyone from the actress Mary Pickford to the evangelist Billy Sunday to sell bonds? There appear to be a number of reasons.

(1) “Everyone else was doing it.” Germany had been the first, it appears, to use a massive public drive to help sell bonds. In Britain the Treasury mocked the first German drive – it showed how desperate the German’s were – but later adopted similar tactics. Eventually, the German Treasury returned the favor and mocked the circus atmosphere in which bonds were being sold in Britain (Noyes 1970, 181-2). Following suit made a good deal of sense. Presumably the British and the Germans had found the best way to do things. And since the United States had a larger population and a larger economy than the Germans, following the same policies minimized the chance that mistakes would offset these clear cut advantages.

---

<sup>16</sup> U.S. Bureau of the Census (1975, 1095).

(2) It was far from clear ex ante that it wouldn't work. This was a progressive Democratic administration going to war in an era when the belief in the primacy of market forces was under attack. It is hardly surprising that McAdoo, Wilson, and their associates would have believed that patriotism could move mountains. The contrast between the Civil War and World War I is particularly telling on this point. Salmon Chase believed passionately in the cause of the Union, but it did not occur to him that he could expand the market for bonds except by appealing to the self-interest of the buyers. If successful in encouraging savings, the bond campaigns would have reduced the tendency of people to dump private securities to buy war bonds. Capital losses on individual private security holdings, even if not widespread, would have created problems for individual investors and for institutional holders such as banks, trust companies, and insurance companies.

(3) It cost little to stir up patriotism and every little bit extra savings it brought in seemed a plus. The Boy Scouts and other sellers and purchasers of small certificates are a good example. They didn't contribute a lot to the overall financing of the war, perhaps 3.5 percent. Still, every little bit helped.

(4) There was that important but mysterious factor that goes under the name "morale." Buying bonds, and urging others to buy them, allowed people to feel that they were participating in the war effort. The bond rallies and similar forms of support, moreover, were a visible sign to the armed forces, and to one's enemies, of the public's support for the war. Less specific rallies in support of the war might have had similar effects. But rallies at which people pledged to buy bonds may have carried more weight.

(5) The structure of the bond issues, a series of five highly publicized sales of specific amounts, introduced a discontinuity in the significance of the amount sold. If the government offers to sell \$1000 worth of bonds, it would seem to matter little from a purely financial point of view whether the public offers to buy \$999 or \$1001. But in the first case the issue is a failure and in the second case a success. The first case shows a lack of public support for the war, and the second enthusiasm -- the issue has been "oversubscribed." Patriotic rallies that raise demand "only" from \$999 to \$1001 therefore could have a large influence on the how the issue was perceived both domestically and abroad. The investment banker Thomas W. Lamont made this point when he addressed a bond rally.

Germany is watching to see whether we are going to make a mighty effort on the very first step of the war. She is going to gauge our ability to fight in the trenches by the way we take hold of this loan. (New York Times, June 2, 1917, 3)

This aspect of the problem was also on McAdoo's mind. As he noted in his *Memoirs* when recalling his thinking prior to the issue of the first Liberty Loan:

Suppose hundreds of millions of the bonds were left on our hands? The moral effect of such a failure would be equal to a crushing military disaster. It would not only dishearten our own people, but also the nations across the sea whose fortunes were joined to ours; and it would give our enemies new confidence and courage. (McAdoo 1931, 380).

Although McAdoo professed to fear a shortfall of hundreds of millions, it is obvious that any shortfall would have produced a public relations problem. Cheering at bond rallies appears then to have been a bit like cheering at basketball games. Cheering for the home team, part of the "home court advantage," may add only a few points to a team's score. But every little bit helps, and it may mean the difference between winning and losing.

Economists and economic historians are often accused of putting too much weight on conventional pecuniary incentives, and too little on the possibility of accomplishing economic ends through non-pecuniary social pressures. Wars provide natural laboratories in which to test the economist's trust in the primacy of pecuniary motives. The experience of the Liberty Bonds suggests that in the field of national finance the economist's confidence in the primacy of financial incentives is not misplaced.

Table 1. The Properties of the Liberty Bonds and The Results of the Campaigns						
	First Liberty Loan	Second Liberty Loan	Third Liberty Loan	Fourth Liberty Loan	Fifth Liberty (Victory) Loan	
Properties of the Liberty Bonds						
Dated	June 15, 1917	November 15, 1917	May 9, 1918	October 24, 1918	April-May, 1919	
Coupon (percent)	3.50%	4.00	4.25	4.25	4.75	3.75
Callable in (years)	15	10	...	15	3	
Maturity (years)	30	25	10	20	4	
Convertible into subsequent issues that bore a higher coupon	Yes	Yes	No	No	Could be converted into 3.75% notes	No
Exempt from Estate and Inheritance Taxes	No	No	No <sup>a</sup>	No <sup>a</sup>	No <sup>a</sup>	No

Interest Exempt from "Normal" income tax	Yes	Yes	Yes	Yes	No	Yes
Interest Exempt from the Surtax	Yes	Yes (limited to the income on \$5,000 face value of the bonds)	Yes (limited to the income on \$5,000 face value of the bonds)	Yes (limited to the income on \$30,000 face value until 2 years after the war)	Yes	Yes
Exempt from excess profits, and war profits taxes	Yes	No	No	No	No	No
Additional tax exemptions	No	No	No	Interest on the second and third issues exempt on the minimum of 2.5 times the amount of bonds purchased or \$45,000	Interest on the second, third, and fourth issues exempt on the minimum of 3 times the amount of notes purchased or \$20,000	
Common Features	Interest and Principal were payable in gold coin. The bonds lacked the "circulation privilege." In other words, National Banks could not use them as backing for bank notes. Banks could use the bonds, however, as collateral for loans from the Federal Reserve. The bonds could be bought on "instalment plans" extending over several months. The bonds were also exempt from state and local taxes.					
Results						

Offered on	May 14, 1917	October 1, 1917	April 6, 1918	September 28, 1917	April 21, 1919
Amount Offered (billion \$s)	\$2.000	3.000	3.000	6.000	4.500
Amount Subscribed (billion \$s)	\$3.035	4.618	4.177	6.959	5.250
Rate of Over-subscription (percent)	52%	54	39	16.0	16.66
Subscriptions accepted (billion \$s)	\$2.000	3.809	4.177	6.959	4.5
Number of Subscribers (millions)	4.000	9.400	18.377	22.778	11.803
Average Subscription (\$s)	\$759	491	227	306	445
Share of the Issue in denominations of less than \$10,000 (percent)	42%	40	66	52	60

<sup>a</sup>Interest and par value of the principal could be used to pay Federal Estate and Inheritance Taxes provided the bonds were purchased six months prior to death. The bonds were regularly used in this way after the war, although up to 1925 the losses to the Treasury on this account were small, Love (1925).

*Sources:* Schultz and Caine (1937, 533-41); Dewey (1931, 502-510); Gilbert (1970), *passim*; *New York Times*, *passim*.

Table 2. Denominations of the Liberty Bonds Outstanding on June 30, 1920

Denomination	Denomination in 2003 \$s <sup>a</sup>	Amount	Percentage of all bonds outstanding
\$50	\$2,320	\$1,522,839,700	7.87
100	4,640	2,343,647,200	12.11
500	23,198	1,805,738,000	9.33
1,000	46,396	8,028,471,000	41.49
5,000	231,978	1,399,860,000	7.23
10,000	463,956	3,115,310,000	16.10
50,000	2,319,780	255,850,000	1.32
100,000	4,639,560	879,300,000	4.54
<b>Total</b>		<b>19,351,015,900</b>	<b>100</b>

<sup>a</sup> I used the per capita GDP inflator available at [www.eh.net](http://www.eh.net).

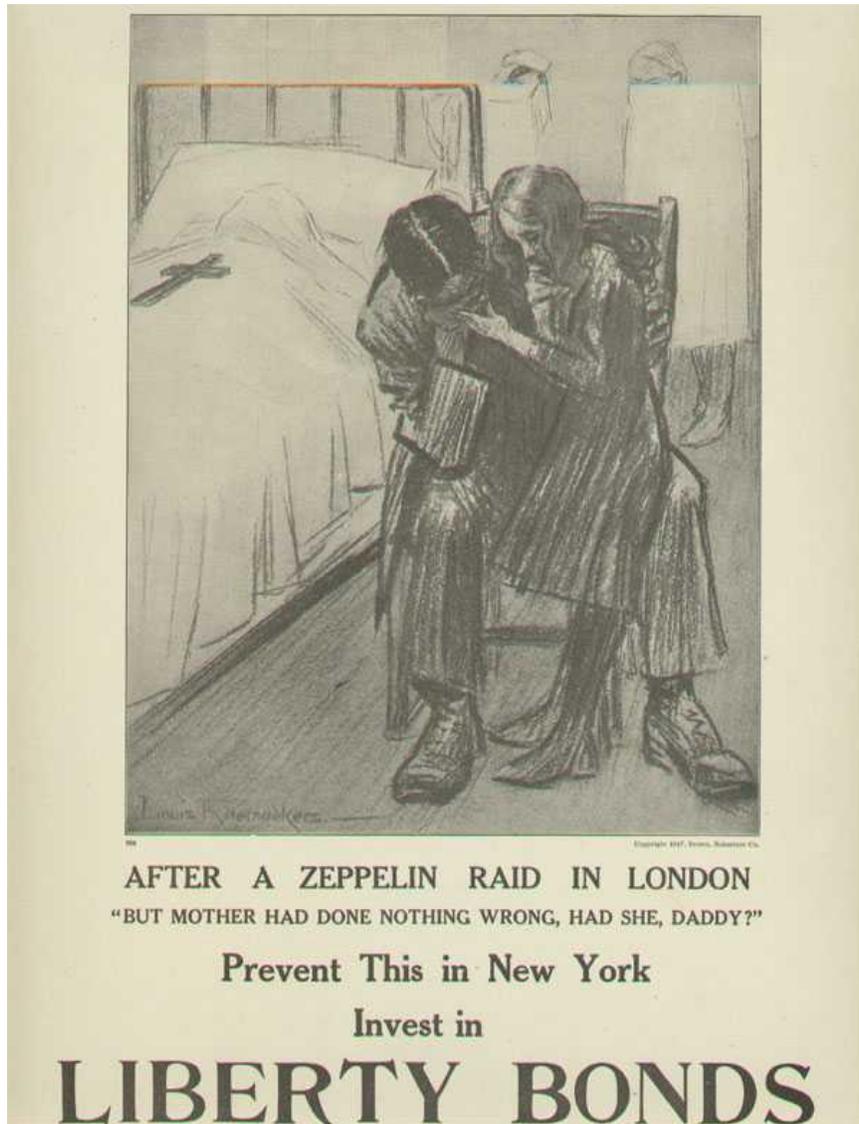
*Source:* Gilbert (1970, 141).

Table 3. Determinants of the Yield on the First Liberty Loan, September 1917 - December 1925

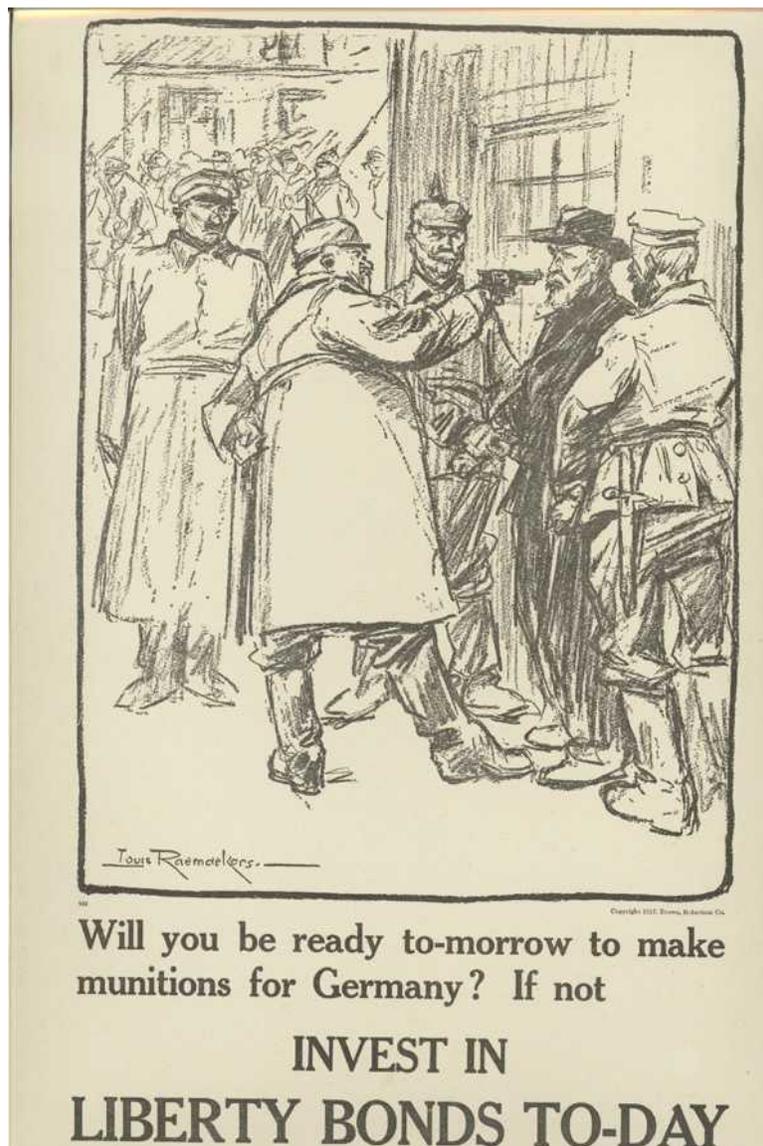
Constant	AAA	Municipals	Rapid Adjustment	Gradual Adjustment	Adjusted R <sup>2</sup>	Durbin-Watson
<i>Levels</i>						
.647 (6.16)	-.142 (-2.35)	.807 (11.10)	.157 (5.98)		.893	.898
.429 (3.27)	.055 (.93)	.643 (9.08)		.212 (4.58)	.879	.741
<i>First Differences</i>						
-.007 (-.36)	.209 (2.08)	.185 (1.64)	.009 (.45)		.126	2.27
-.0007 (-0.08)	.208 (2.07)	.182 (1.62)		.013 (0.41)	.126	2.28

Note: Monthly data; t statistics are shown in parentheses.

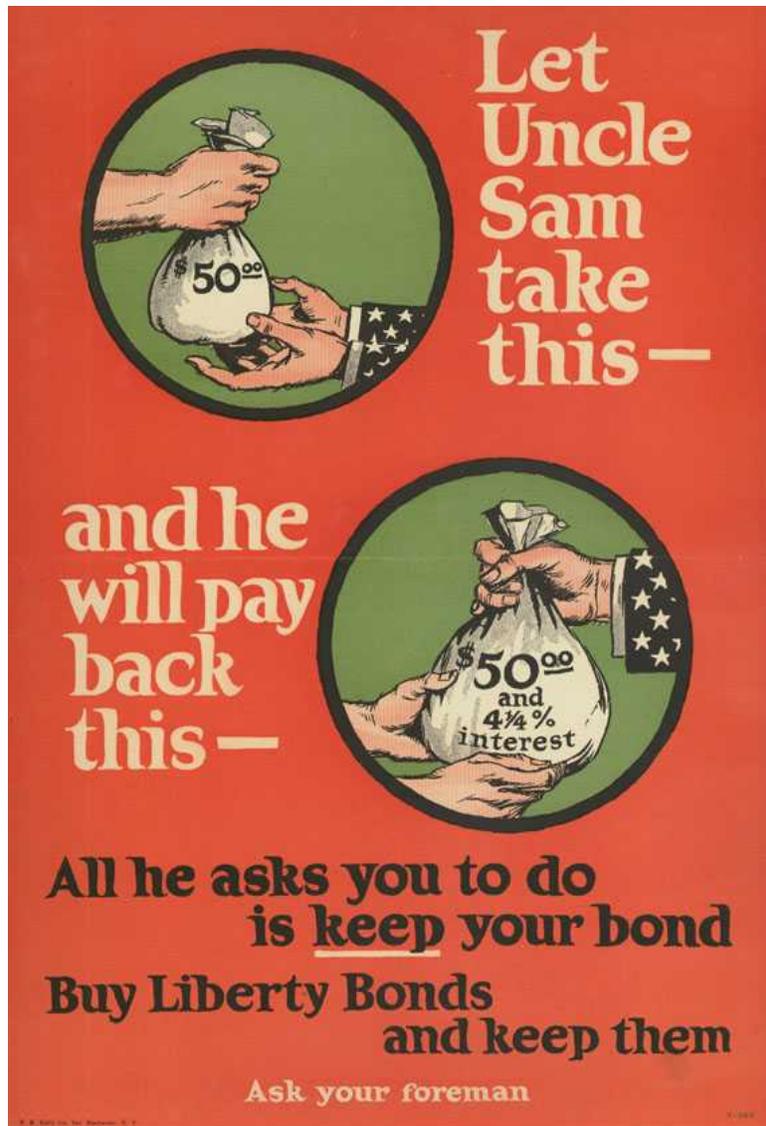
Louis Raemaekers. *After a Zeppelin raid in London: "But Mother Had Done Nothing Wrong, Had She, Daddy?" Prevent this in New York: Invest in Liberty Bonds.* 19" x 12."  
From the Rutgers University Library Collection of Liberty Bond Posters



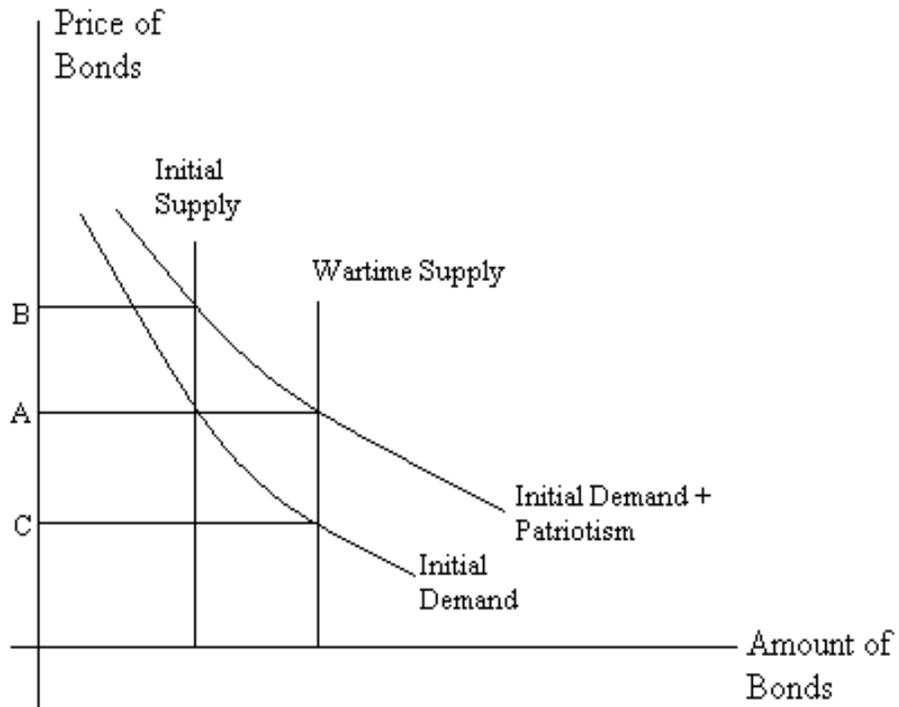
Louis Raemaekers. *Will you be ready to-morrow to make munitions for Germany? If not: invest in Liberty bonds to-day.* [1917?] 19" x 12." From the Rutgers University collection of Liberty Bond Posters.



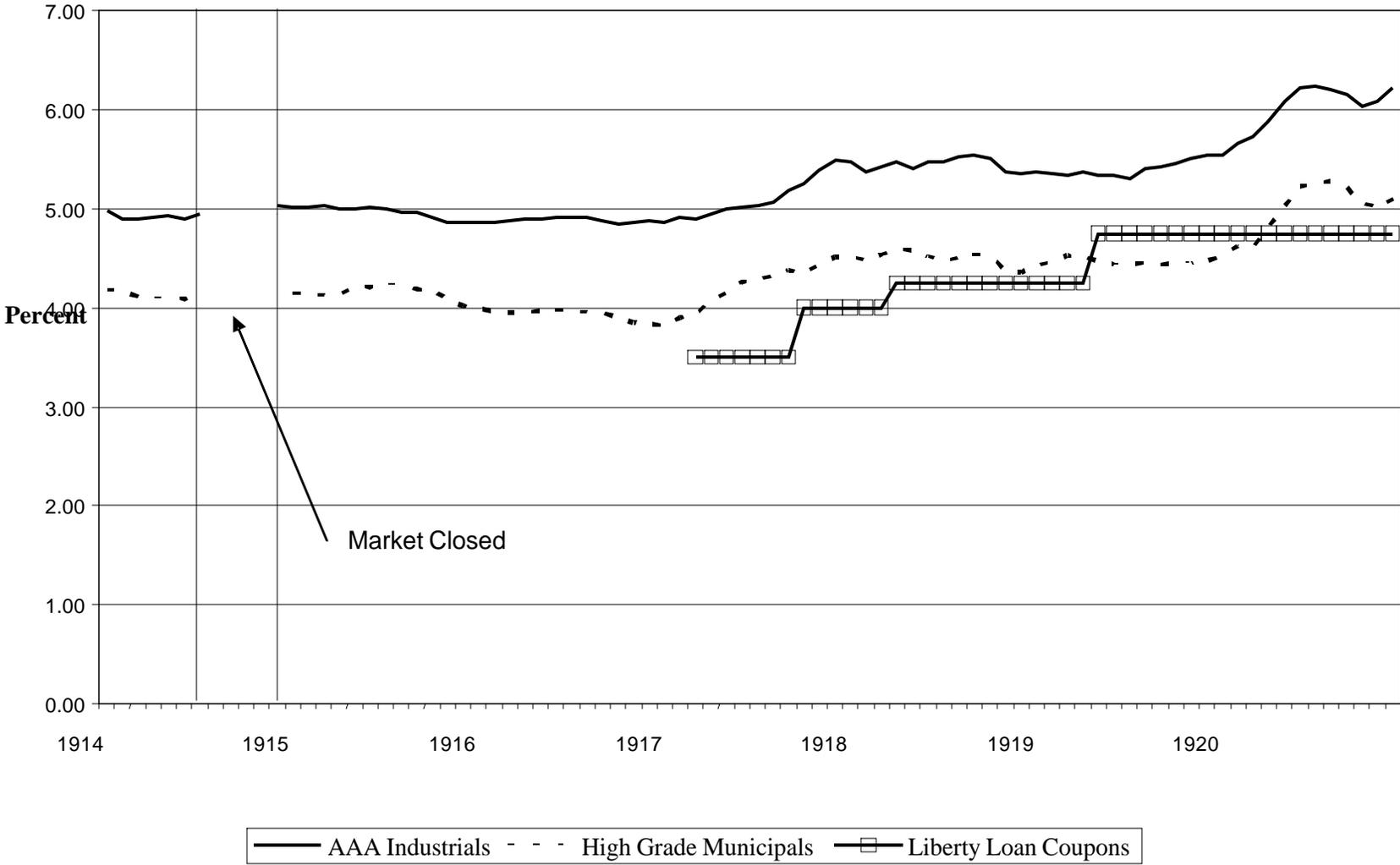
Anonymous. *Let Uncle Sam take this—and he will pay back this—All he asks you to do is keep your bond: Buy Liberty bonds and keep them: Ask your foreman.* [1918]. 17 5/8" x 11 3/4." From the Rutgers University Library Collection of Liberty Bond Posters.



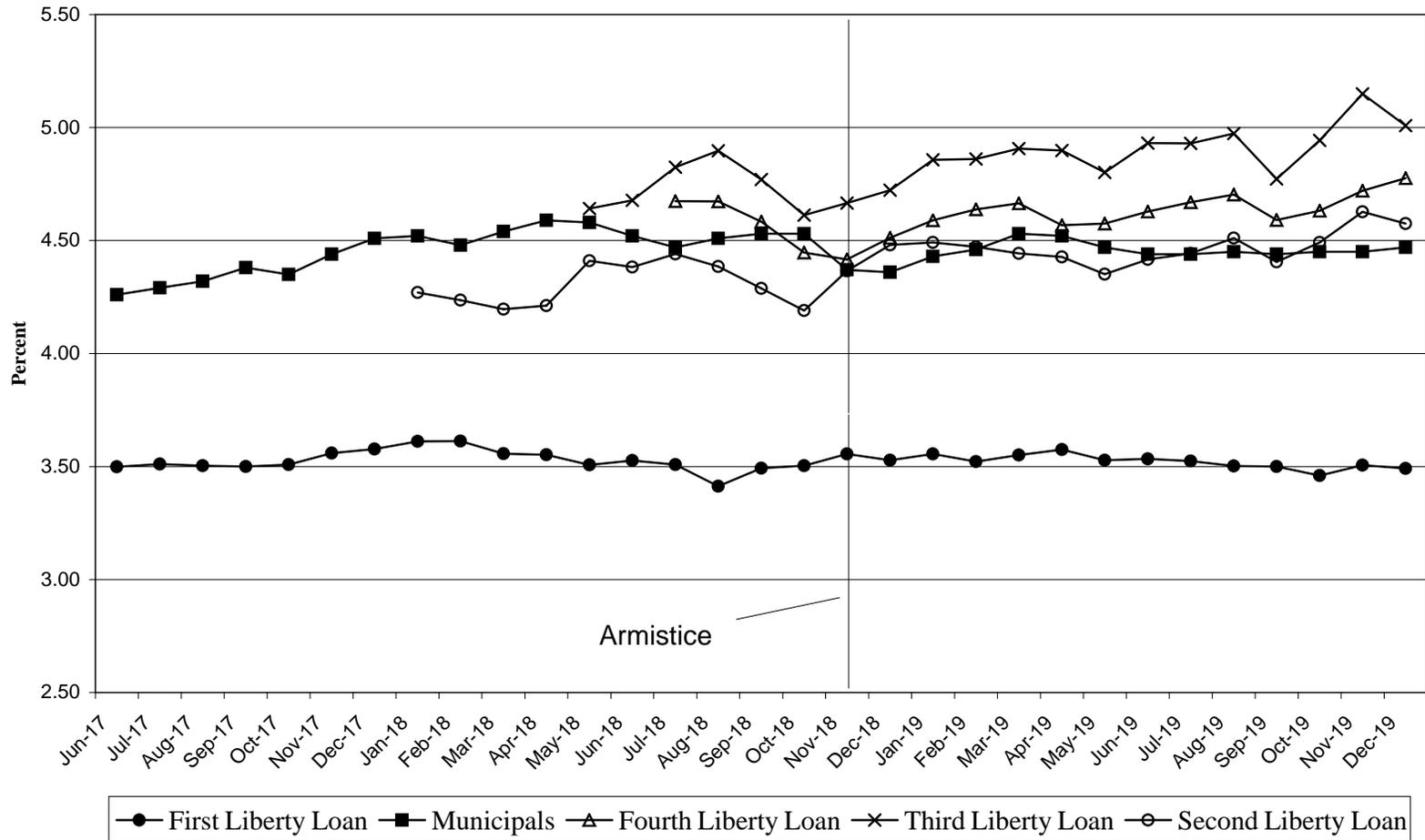
**Figure 1. The Supply and Demand for Liberty Bonds**



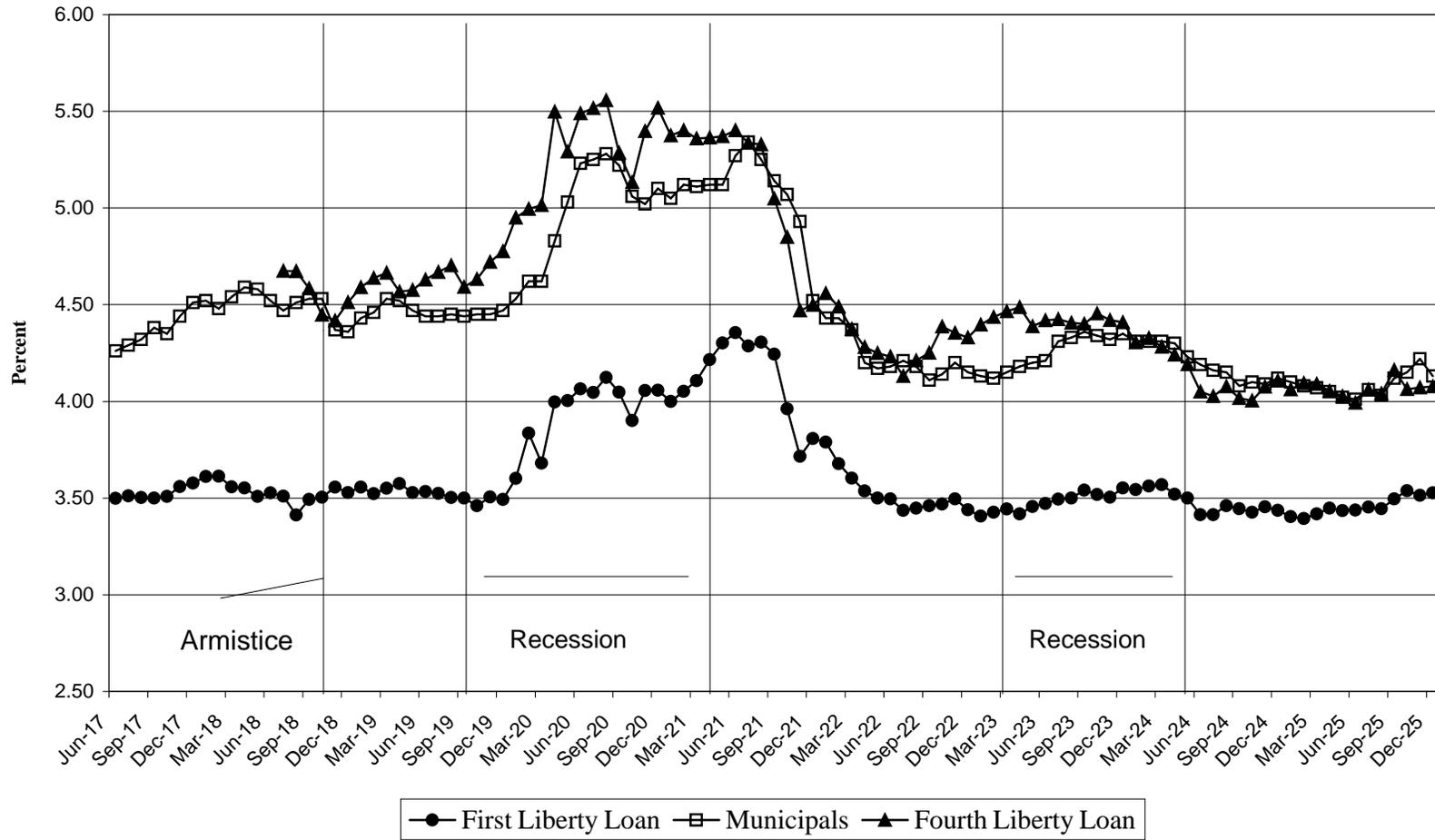
**Figure 2**  
**Coupons on the Liberty Loans**



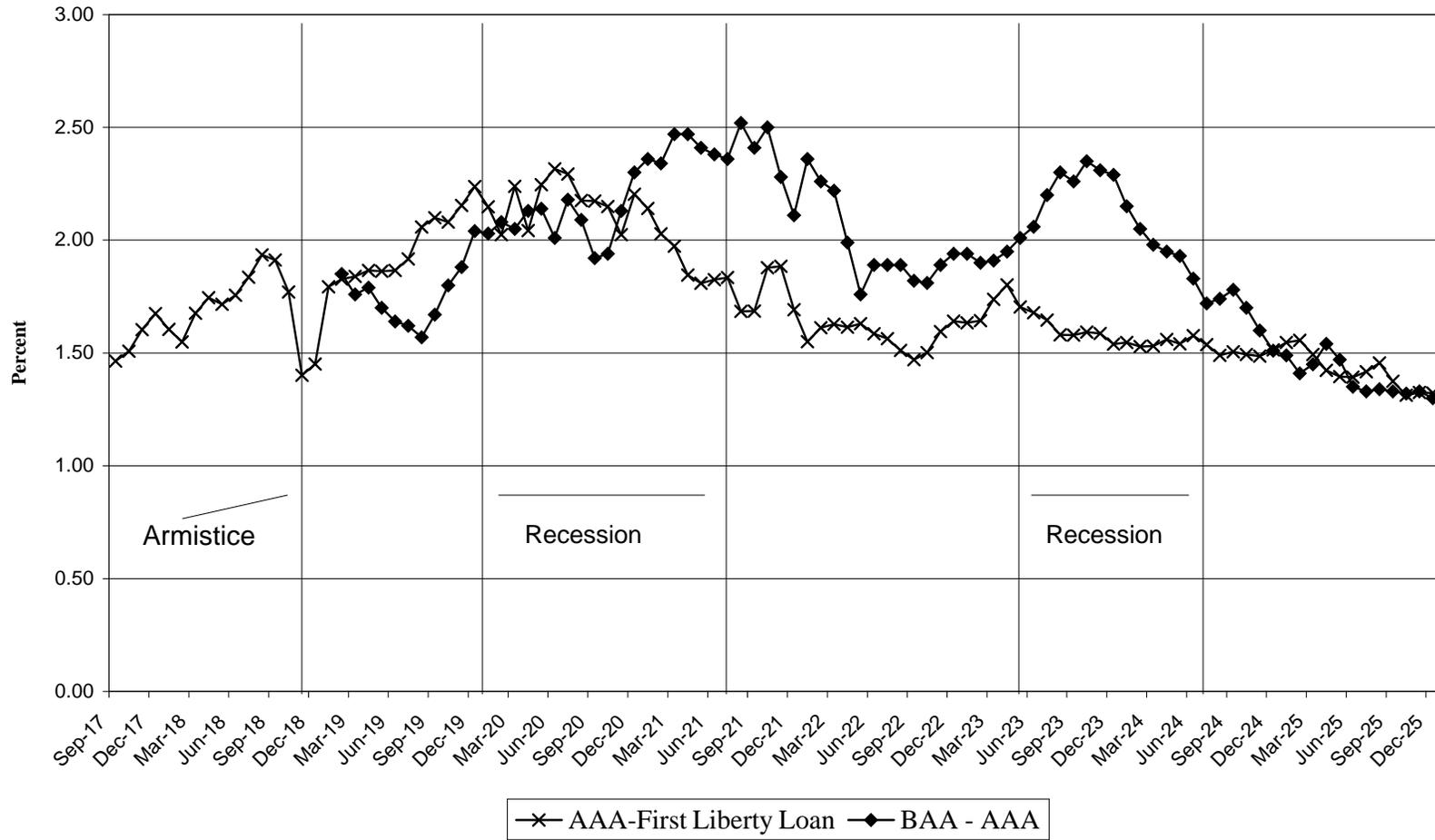
**Figure 3**  
**Yields on Selected bonds, June 1917-December 1919**



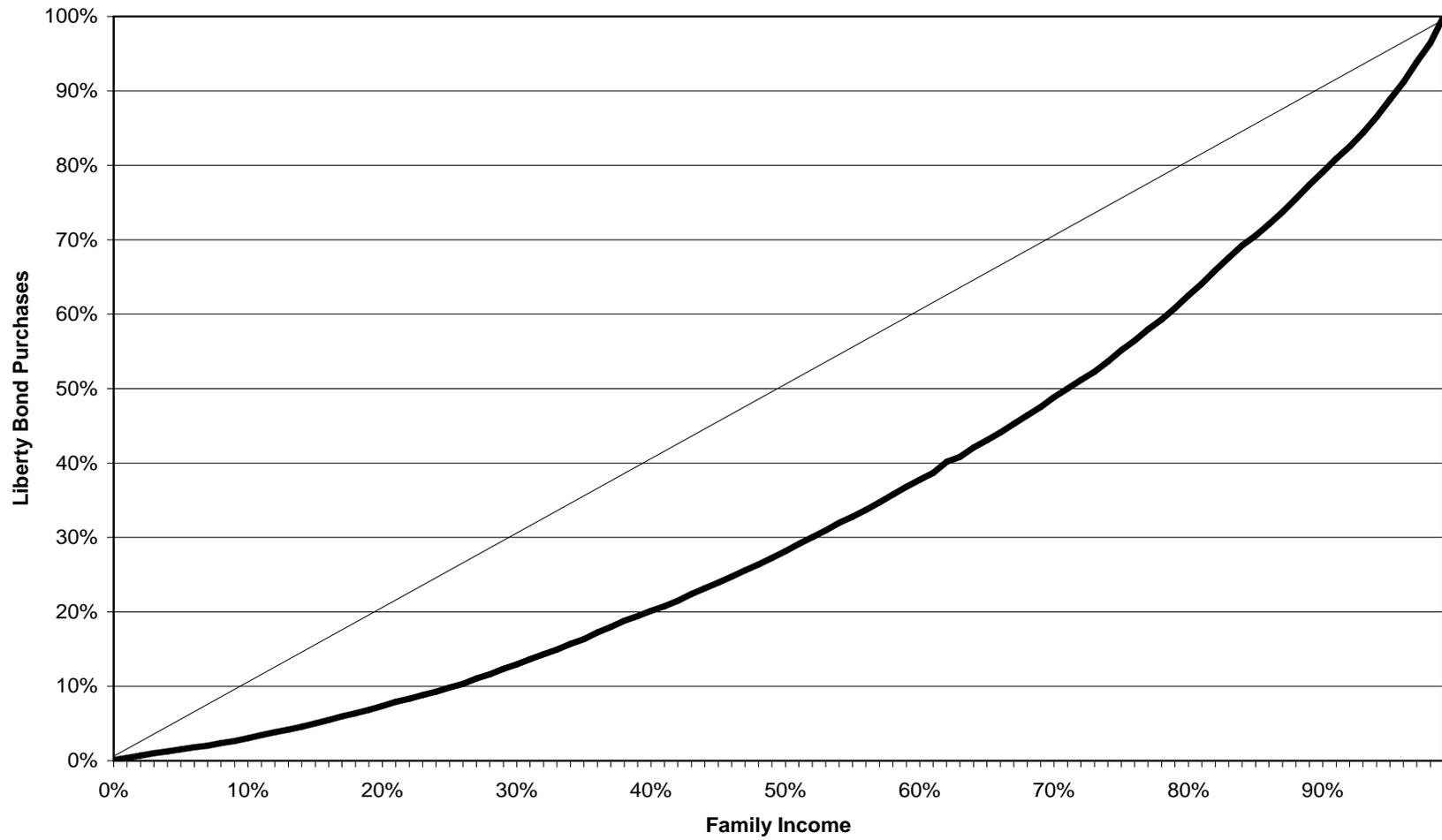
**Figure 4**  
**Yields on Selected bonds, June 1917-December 1925**



**Figure 5**  
**Yield Spreads, September 1917-December 1925**



**Figure 6**  
**The Distribution of Liberty Bond Purchases by Income Class**



## References

Adams, Henry C. "American War-Financiering." *Political Science Quarterly*, Vol. 1, No. 3 (Sep., 1886): 349-385

\_\_\_\_\_. "Borrowing as a Phase of War Financiering." *Annals of the American Academy of Political and Social Science*. 78 (January 1918): 23-30.

Barro, Robert J. 1987. "Interest Rates, Prices and Budget Deficits in the United Kingdom." *Journal of Monetary Economics* 20 (September): 221-48.

\_\_\_\_\_. 1989. "The Neoclassical Approach to Fiscal Policy." In Robert J. Barro, ed., *Modern Business Cycle Theory*. Cambridge, 236-64.

Balke, Nathan S. and Robert J. Gordon. "The Estimation of Prewar Gross National Product: Methodology and New Evidence." *Journal of Political Economy* 97 (February 1989): 38-92.

Dewey, Davis Rich. *Financial History of the United States*. New York: Longmans, Green and Co., 1931.

Fisher, Irving. "How the Public Should Pay for the War." *Annals of the American Academy of Political and Social Science*. 78 (July 1918); 112-117.

Friedman, Milton. "Price, Income, and Monetary Changes in Three Wartime Periods." *The American Economic Review*, Vol. 42, No. 2, Papers and Proceedings (May 1952): 612-625.

Friedman, Milton and Anna J. Schwartz. *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press, for the NBER, 1963.

\_\_\_\_\_. *Monetary Statistics of the United States: Estimates, Sources, Methods*. New York: Columbia University Press, for the NBER, 1970.

Gilbert, Charles. *American Financing of World War I*. Westport, Connecticut: Greenwood Publishing Company, 1970.

Gilbert, Martin. *The First World War*. New York: Henry Holt and Company, 1994.

Hume, David. "Of Public Credit." In Eugene Rotwein, ed. *David Hume: Writings on Economics*. Madison, University of Wisconsin Press, 1970, 90-107. [1752].

Johnston, Louis and Samuel H. Williamson, "The Annual Real and Nominal GDP for the United States, 1789 - Present." Economic History Services, April 2002, URL: <http://www.eh.net/hmit/gdp/>.

- Kennedy, David M. *Over Here: The First World War and American Society*. Oxford: Oxford University Press, twenty-fifth Anniversary issue, 2004; first edition 1980.
- Klein, Benjamin. "Competitive Interest Payments on Bank Deposits and the Long-Run Demand for Money." *The American Economic Review* 64 (Dec., 1974): 931-949.
- Love, Robert A. "The Use of Liberty Bonds in Payment of Estate Taxes." *The American Economic Review*, Vol. 15, No. 2. (Jun., 1925), pp. 275-283.
- Meltzer, Allan H. *A History of the Federal Reserve*. Volume 1, 1913-1951. Chicago: University of Chicago Press, 2003.
- McAdoo, William G. (1931) *Crowded Years: The Reminiscences of William G. McAdoo*. Boston: Houghton Mifflin Company.
- Mill, John Stuart, *Principles of Political Economy*, edited by Sir W.J. Ashley. London: Longmans, Green and Co., 1940. Mill's *Principles* was first published in 1848, and then revised six times between 1849 and 1871.
- Miller, E. T., H. L. Lutz, Edmond E. Lincoln, T. K. Urdahl, and O. M. W. Sprague. "Loans and Taxes in War Finance: Discussion." *The American Economic Review*, Vol. 7, No. 1, Supplement, Papers and Proceedings of the Twenty-ninth Annual Meeting of the American Economic Association. (Mar., 1917), pp. 214-223.
- Noyes, Alexander Dana. *The War Period of American Finance, 1908-1925*. New York : G.P. Putnam's Sons, 1926.
- Olney, Martha L. "Saving and Dissaving by 12,817 American Households, 1917-1919 [Computer file]." Ann Arbor, MI: Inter-university Consortium for Political and Social Research, 1995.
- Pigou, Arthur Cecil. *The Political Economy of War*. New York: Macmillan, 1941. Original edition, 1921.
- Ricardo, David. *The Principles of Political Economy and Taxation*. New York: Everyman's Library, 1965. A reprint of the third edition published in 1821. The first edition was published in 1817.
- Schultz, William J. and M.R. Caine. *Financial Development of the United States*. New York: Prentice-Hall, Inc., 1937.
- Seligman, Edwin R.A. "Loans versus Taxes in War Finance." *Annals of the American Academy of Political and Social Science*. 78 (January 1918); 52-82.

Smiley, Gene and Richard H. Keehn. "Federal Personal Income Tax Policy in the 1920s." *The Journal of Economic History*, Vol. 55, No. 2. (Jun., 1995), pp. 285-303.

Sprague, Oliver M. W. "Loans and Taxes in War Finance." *The American Economic Review*, Vol. 7, No. 1, Supplement, Papers and Proceedings of the Twenty-ninth Annual Meeting of the American Economic Association. (Mar., 1917), pp. 199-213.

\_\_\_\_\_. "The Relationship between Loans and Taxes in War Finance." *Annals of the American Academy of Political and Social Science*. 78 (June 1918); 83-89.

Smith, Adam. *An Inquiry into the Nature and Causes of The Wealth of Nations., Book 5: Revenue of the Sovereign or Commonwealth*. Edited by R.H. Campbell and A.S. Skinner. Oxford, Oxford University Press, 1979 [1776].

Taussig, F.W. "The Financial Situation: A General Survey." *Annals of the American Academy of Political and Social Science*. 78 (January 1918); 1-12.

U.S. Bureau of the Census. *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*. Washington D.C., 1975.

Whittlesey, Charles R. *Readings in Money and Banking*. New York: W.W. Norton, inc., 1950.