THE GREAT WAR

World War 1: ECONOMY
OUTLINE

1. British Blockade of Germany
2. Impact on U.S. Economy
3. Peace Treaty Sows Seeds for World War II
UNTIL IT’S OVER, OVER THERE:
THE U.S. ECONOMY IN WORLD WAR I

NBER WORKING PAPER SERIES

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Cambridge, MA 02138

June 2004
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915</td>
<td>May: A German submarine sinks the Lusitania; 124 Americans are killed and public opinion shifts away from neutrality.</td>
</tr>
<tr>
<td>1917</td>
<td>August: Council of National Defense established to plan and coordinate defense efforts. September: U.S. Shipping Board created to build, lease, and requisition ships. November: Woodrow Wilson is elected President.</td>
</tr>
<tr>
<td>1918</td>
<td>April: The United States enters World War I. June: First Liberty Loan. July: The War Industries Board succeeds the General Munitions Board, and is given the task of increasing production and coordinating the mobilization. August: The Lever Food and Fuel Control Act empowers the President to fix the price and regulate the distribution of food and fuel. Herbert Hoover is appointed Food Administrator and Harry Garfield, Fuel Administrator. The Act also prohibits the importation of distilled liquors or their manufacture from foodstuffs. October: The War Revenue Act authorizes a graduated income tax, corporate profits tax, and sharp increases in postal rates and excise taxes. November: Second Liberty Loan. December: The railroads are placed under Federal administration. William Gibbs McAdoo is in charge.</td>
</tr>
<tr>
<td>1918</td>
<td>* The Prohibition Amendment to the Constitution (the eighteenth amendment) prohibiting the manufacture, sale, or transportation of drinkable alcohol.</td>
</tr>
<tr>
<td>1918</td>
<td>January: An official schedule of maximum prices for steel is established. March: The War Industries Board is reorganized and Bernard M. Baruch is placed in charge.</td>
</tr>
<tr>
<td>Month</td>
<td>Event</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>April</td>
<td>The War Finance Corporation is created to make loans to financial institutions that had extended credits to war industries.</td>
</tr>
<tr>
<td>&quot;</td>
<td>National War Labor Board is created to act as a court of last resort in labor disputes.</td>
</tr>
<tr>
<td>May</td>
<td>Third Liberty Loan</td>
</tr>
<tr>
<td>June</td>
<td>New system for allocating steel is introduced concentrating authority in the hands of the War Industries Board.</td>
</tr>
<tr>
<td>&quot;</td>
<td>The National War Labor Board is established to standardize labor conditions. Felix Frankfurter is placed in charge.</td>
</tr>
<tr>
<td>August</td>
<td>Peak of U.S. Business Cycle</td>
</tr>
<tr>
<td>October</td>
<td>Fourth Liberty Loan</td>
</tr>
<tr>
<td>November</td>
<td>Armistice</td>
</tr>
<tr>
<td>1919</td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>The Prohibition Amendment is declared ratified. It will become effective in January 1920. It will be repealed in 1933.</td>
</tr>
<tr>
<td>February</td>
<td>The War Revenue Act of 1918 takes effect.</td>
</tr>
<tr>
<td>April</td>
<td>Victory Loan</td>
</tr>
<tr>
<td>October</td>
<td>The Volstead Act, which provides a mechanism for enforcing prohibition, is adopted.</td>
</tr>
<tr>
<td>December</td>
<td>President Wilson announces that the railroads will be returned to private ownership in March 1920.</td>
</tr>
</tbody>
</table>
Figure 1
Currency and Payrolls

Average 1916 = 100

United States at War

- Currency Held by the Public
- Factory Payrolls
Table 2. The Labor Force by Sector, 1914-1920

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Public Sector</th>
<th>Private Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Military</td>
<td>Civilian</td>
</tr>
<tr>
<td>1914</td>
<td>37,475</td>
<td>161</td>
<td>1,527</td>
</tr>
<tr>
<td>1915</td>
<td>37,669</td>
<td>169</td>
<td>1,584</td>
</tr>
<tr>
<td>1916</td>
<td>40,126</td>
<td>174</td>
<td>1,620</td>
</tr>
<tr>
<td>1917</td>
<td>41,531</td>
<td>835</td>
<td>1,692</td>
</tr>
<tr>
<td>1918</td>
<td>43,998</td>
<td>2,968</td>
<td>2,092</td>
</tr>
<tr>
<td>1919</td>
<td>42,313</td>
<td>1,266</td>
<td>2,057</td>
</tr>
<tr>
<td>1920</td>
<td>41,497</td>
<td>353</td>
<td>1,961</td>
</tr>
<tr>
<td>change 1914-16</td>
<td>2,651</td>
<td>13</td>
<td>93</td>
</tr>
<tr>
<td>change 1916-18</td>
<td>3,872</td>
<td>2,794</td>
<td>472</td>
</tr>
<tr>
<td>change 1914-18</td>
<td>6,523</td>
<td>2,807</td>
<td>565</td>
</tr>
<tr>
<td>Percent Change 1914-1918</td>
<td>16.05</td>
<td>291.42</td>
<td>31.48</td>
</tr>
</tbody>
</table>

B. Annual Hours per Person Engaged

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Public Sector</th>
<th>Private Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Military</td>
<td>Civilian</td>
</tr>
<tr>
<td>1914</td>
<td>2,688</td>
<td>2,043</td>
<td>2,034</td>
</tr>
<tr>
<td>1915</td>
<td>2,654</td>
<td>2,036</td>
<td>2,027</td>
</tr>
<tr>
<td>1916</td>
<td>2,668</td>
<td>2,034</td>
<td>2,033</td>
</tr>
<tr>
<td>1917</td>
<td>2,665</td>
<td>2,032</td>
<td>2,014</td>
</tr>
<tr>
<td>1918</td>
<td>2,611</td>
<td>2,009</td>
<td>1,984</td>
</tr>
<tr>
<td>1919</td>
<td>2,551</td>
<td>2,009</td>
<td>1,931</td>
</tr>
<tr>
<td>1920</td>
<td>2,584</td>
<td>2,003</td>
<td>1,932</td>
</tr>
<tr>
<td>change 1914-16</td>
<td>-20</td>
<td>-9</td>
<td>-1</td>
</tr>
<tr>
<td>change 1916-18</td>
<td>-57</td>
<td>-25</td>
<td>-49</td>
</tr>
<tr>
<td>change 1914-18</td>
<td>-77</td>
<td>-34</td>
<td>-50</td>
</tr>
<tr>
<td>Percent Change 1914-1918</td>
<td>-3.98</td>
<td>-1.33</td>
<td>-4.84</td>
</tr>
</tbody>
</table>

Source: Kendrick (1961, Table A-VI, p. 306; Table A-X, p. 312).
Table 3. Financing World War I, March 1917-May 1919

<table>
<thead>
<tr>
<th>Source of Finance</th>
<th>Billions of Dollars</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxation and Nontax receipts</td>
<td>7.3</td>
<td>22</td>
</tr>
<tr>
<td>Borrowing from the Public</td>
<td>24</td>
<td>58</td>
</tr>
<tr>
<td>Direct Money Creation</td>
<td>1.6</td>
<td>5</td>
</tr>
<tr>
<td>Indirect Money Creation</td>
<td>4.8</td>
<td>15</td>
</tr>
<tr>
<td>Total Cost of the War</td>
<td>33</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: Direct and indirect money creation is defined in the text. The estimate of indirect money creation is based on the assumption that the total increase in deposits and circulation (notes) of commercial banks were backed directly or indirectly by government securities. This is partly conjectural because some of the items that appeared on bank balance sheets such as "loans to customers" may or may not have been secured by government bonds. The amount shown may be regarded as an upper bound. The figure is based on the increase in M2, which includes time and demand deposits of commercial banks but excludes deposits in mutual savings banks. If the latter are included (they are included in M3) the maximum percentage financed by money creation rises to 21 percent. Including savings and loan shares, the distinguishing feature of M4, would change the results only slightly, and would add a more problematic element because it is doubtful that the increase in savings and loan shares were matched completely, directly or indirectly by government bond holdings.

Source: Friedman and Schwartz (1963, p. 221)
Table 5. Changes in Federal Individual Income Tax Rates, 1913-1929

<table>
<thead>
<tr>
<th>Years</th>
<th>Income Class</th>
<th>$50,000</th>
<th>$100,000</th>
<th>$1,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913-1915</td>
<td>1.5%</td>
<td>2.5%</td>
<td>6.0%</td>
<td></td>
</tr>
<tr>
<td>1916</td>
<td>2.6</td>
<td>3.9</td>
<td>10.3</td>
<td></td>
</tr>
<tr>
<td>1917</td>
<td>10.3</td>
<td>16.2</td>
<td>47.5</td>
<td></td>
</tr>
<tr>
<td>1918</td>
<td>22.0</td>
<td>35.0</td>
<td>70.3</td>
<td></td>
</tr>
<tr>
<td>1919-1920</td>
<td>18.3</td>
<td>31.2</td>
<td>66.3</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>8.3</td>
<td>14.8</td>
<td>23.1</td>
<td></td>
</tr>
</tbody>
</table>

*Note: These are the effective tax rates (percent of income) with 4 exemptions. Income subject to tax excludes certain expenses and interest on tax-exempt bonds.*

*Source: U.S. Bureau of the Census (1975, series Y437, Y438, and Y439, p. 1112)*
Table 7. U.S. Production of Selected Munitions in World War I

<table>
<thead>
<tr>
<th>Munition</th>
<th>Total Production to the end of the war</th>
<th>Peak monthly rate of production</th>
<th>Production in the Peak Month at an Annual Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rifles</td>
<td>3,550,000</td>
<td>271,000</td>
<td>3,252,000</td>
</tr>
<tr>
<td>Machine Guns</td>
<td>226,557</td>
<td>35,000</td>
<td>420,000</td>
</tr>
<tr>
<td>Artillery Units</td>
<td>3,077</td>
<td>410</td>
<td>4,920</td>
</tr>
<tr>
<td>Smokeless Powder (pounds)</td>
<td>632,504,000</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>High Explosives (pounds)</td>
<td>375,566,000</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Rounds of Artillery Ammunition</td>
<td>20,326,000</td>
<td>3,072,000</td>
<td>31,104,000</td>
</tr>
<tr>
<td>Toxic Gas (tons)</td>
<td>10,817</td>
<td>2,726</td>
<td>32,712</td>
</tr>
<tr>
<td>Tanks</td>
<td>799</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Training Planes</td>
<td>9,503</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Training Engines</td>
<td>17,073</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>De Havilland-4 Bombers (shipped)</td>
<td>3,227 (1,885)</td>
<td>1,100</td>
<td>13,200</td>
</tr>
<tr>
<td>Liberty Airplane Engines (shipped)</td>
<td>13,574 (4,435)</td>
<td>3,850</td>
<td>46,200</td>
</tr>
</tbody>
</table>

a. Typically, this is the period from April 1917 to March or April 1919. Production after the armistice was usually limited, reflecting the completion of units in the pipeline.

b. Generally, October 1919.

Source: Ayres (1919, passim)
### Table 8. The Costs of World War I

#### A. Cost of World War I in Comparative Perspective

<table>
<thead>
<tr>
<th></th>
<th>Total Cost (Billions of Current Dollars)</th>
<th>Total Cost (Billions of 1982 Dollars)</th>
<th>As a Percentage of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWI (1917-1918)</td>
<td>32.4</td>
<td>77.9</td>
<td>52.2</td>
</tr>
<tr>
<td>WWII (1941-1945)</td>
<td>366.7</td>
<td>459.7</td>
<td>175.4</td>
</tr>
<tr>
<td>Korea (1950-1953)</td>
<td>49.9</td>
<td>106.3</td>
<td>14.8</td>
</tr>
<tr>
<td>Vietnam (1964-1973)</td>
<td>108.3-136.3</td>
<td>13.2-392.5</td>
<td>10.6-13.3</td>
</tr>
</tbody>
</table>

#### B. Cost of World War I by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions of Dollars</th>
<th>As a Percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1917</td>
<td>6</td>
<td>10.9 (9.7) [5.0]</td>
</tr>
<tr>
<td>1918</td>
<td>16</td>
<td>23.0 (21.1) [17.4]</td>
</tr>
<tr>
<td>1919</td>
<td>9</td>
<td>11.7 (11.5) [9.7]</td>
</tr>
<tr>
<td>1920</td>
<td>1</td>
<td>1.1 (1.1) [2.4]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>46.6 (43.4) [34.5]</td>
</tr>
</tbody>
</table>

**Sources and Notes:**
A. Costs: Edelstein (2000, p. 342). For Vietnam, the larger amount is the total spent on the military, the smaller amount excludes the normal peacetime costs of maintaining the armed forces. GDP was the average of GDP in the first year of the war and the last year from Johnston and Williamson (2002). (B) Expenditures: Clark (1970 [1931], 121). GNP: Balke and Gordon (1989) and Romer (1989). The calculation using Balke and Gordon’s estimates of GNP are shown first, mainly because Robert Gordon was on my dissertation committee, and the calculation using Romer’s estimates follow in parentheses. The third estimate, in brackets, is from Kendrick (1961, table A1, columns 5 and 6, p. 291). These estimates are somewhat lower during the war years primarily because the loans to the Allies are excluded.
QUESTIONS