Three World Wars: Fiscal-Monetary Consequences

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Tactics

“What a government spends, the public pays for.” J. M. Keynes, 1923.

The US “War on COVID-19” shares these features with World Wars I and II:

- An adverse world-wide shock
- Negative labor supply shocks, in the form of sequestering soldiers away from civilian employment during the two World Wars, and in the forms of lockdown mandates that diverted workers into unemployment and voluntary withdrawals from the labor force during the COVID-19 pandemic
- Extensive government restrictions on domestic and international travel and trade
Patterns: Public Sector

  - largely financed by issuing interest bearing debt and base money
- After World War I and World War II tax revenues remained elevated, so that the government ran primary surpluses for many years.
  - Permanent increases in federal expenditures as fractions of GDP followed both wars.
- As fractions of GDP, the federal government’s responses to the Great Recession of 2008 and the Great Depression of the 1930s were similar.
- The Federal Reserve System supported federal bond prices and expanded its balance sheet
Outlays are net of official interest payments. 1900-2010 annual by fiscal year; 2011-present monthly data aggregated to 6-month periods.
Par Value of U.S. Treasury Debt by Ownership as Percents of GDP: 1900 to 2021

- Federal Reserve
- Govt Agencies and Trust Funds
- Foreign Investors
- Domestic Private Investors

Graph showing the percentage of GDP of U.S. Treasury Debt by ownership from 1900 to 2025.
### Treasury Debt Ownership at Starts and Ends of Wars

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<td>31.51</td>
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<td></td>
<td>+192.91</td>
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<td>Total</td>
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<td>$278.11</td>
<td>$23,223.8</td>
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in billions of nominal dollars
## Treasury Debt Ownership at Starts and Ends of Wars

<table>
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<tr>
<th></th>
<th>World War I</th>
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<th>COVID-19</th>
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<td>+19.887</td>
<td>+237.25</td>
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</tbody>
</table>

in billions of nominal dollars
Federal Reserve Balance Sheet: 1915-1925

(a) Assets

(b) Liabilities
Federal Reserve Balance Sheet: 1938-1960

(a) Assets

(b) Liabilities
Federal Reserve Balance Sheet: 2004-2022

(a) Assets

(b) Liabilities
Par and Market Values of Treasury Debt Held by Private Investors

- **Par Value**: Treasury Debt + Interest-Bearing Reserves + Reverse Repos
- **Par Value**: Treasury Debt + Interest-Bearing Reserves + Reverse Repos - Fed Holdings of Private Assets
- **Par Value**: Treasury Debt
- **Market Value**: Treasury Debt

Graph showing the percentage of GDP for par and market values of debt from 1900 to 2025.
Consolidated Government Budget Constraint

\[ G_t + r_{t-1,t}^B B_{t-1} + (A_t - A_{t-1}) = T_t + (B_t - B_{t-1}) + r_{t-1,t}^A A_{t-1} + (M_t - M_{t-1}) + OM_t \]

where

- \( G_t \) = Government purchases
- \( B_{t-1} \) = Nominal market value of interest bearing government debt held by private investors
- \( r_{t-1,t}^B \) = Nominal value-weighted holding period return on government debt between \( t - 1 \) and \( t \)
- \( A_t \) = Private assets purchased by the Federal Reserve
- \( r_{t-1,t}^A \) = Nominal holding period return on Fed-held private assets between \( t - 1 \) and \( t \)
- \( T_t \) = Taxes
- \( M_t \) = Federal Reserve credit
- \( OM_t \) = Funding by Other Means
Consolidated Government Budget Constraint

\[ G_t + r_{t-1}^B B_{t-1} + (A_t - A_{t-1}) = T_t + (B_t - B_{t-1}) + r_{t-1}^A A_{t-1} + (M_t - M_{t-1}) + OM_t \]

where

\[
\begin{align*}
G_t &= \text{Government purchases} \\
B_{t-1} &= \text{Nominal market value of interest bearing government debt held by private investors} \\
r_{t-1}^B &= \text{Nominal value-weighted holding period return on government debt between } t - 1 \text{ and } t \\
A_t &= \text{Private assets purchased by the Federal Reserve} \\
r_{t-1}^A &= \text{Nominal holding period return on Fed-held private assets between } t - 1 \text{ and } t \\
T_t &= \text{Taxes} \\
M_t &= \text{Federal Reserve credit} \\
OM_t &= \text{Funding by Other Means}
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Consolidated Government Budget Constraint

\[ G_t + r^B_{t-1,t} B_{t-1} + (A_t - A_{t-1}) = T_t + (B_t - B_{t-1}) + r^A_{t-1,t} A_{t-1} + (M_t - M_{t-1}) + OM_t \]

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- \( OM_t \) = Funding by Other Means
 Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

$$
\begin{align*}
\frac{G_t}{Y_t} + \left( r_{t-1,t}^B \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t}^A \frac{A_{t-1}}{Y_{t-1}} \right) + \left( \frac{A_t}{Y_t} - \frac{A_{t-1}}{Y_{t-1}} \right) &= \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right) \\
\text{government spending} &+ \text{net interest payments} &\text{asset purchases} &\text{tax revenue} &\text{debt growth} \\
\text{money growth} &+ \text{other means}
\end{align*}
$$

$$
\begin{align*}
&+ \left( g_{t-1,t} \frac{B_{t-1} - A_{t-1}}{Y_{t-1}} \right) + \left( \pi_{t-1,t} \frac{B_{t-1} - A_{t-1}}{Y_{t-1}} \right) \\
&+ \left( \pi_{t-1,t} + g_{t-1,t} \right) \left( r_{t-1,t}^B \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t}^A \frac{A_{t-1}}{Y_{t-1}} \right) \\
&\quad \text{debt dilution via real GDP growth} &\quad \text{debt default via inflation} &\quad \text{cross-term}
\end{align*}
$$
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

\[
\frac{G_t}{Y_t} + \left( \frac{B_{t-1} - A_{t-1}}{Y_{t-1}} \right) = \frac{T_t}{Y_t} + \left( \frac{B_t - B_{t-1}}{Y_{t-1}} \right)
\]

- **government spending**
- **net interest payments**
- **asset purchases**
- **tax revenue**
- **debt growth**
- **money growth**
- **other means**
- **debt dilution via real GDP growth**
- **debt default via inflation**
- **cross-term**
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, \( Y_t \), and rearranging yields

\[
\frac{G_t}{Y_t} + \left( r_{t-1,t}^B \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t}^A \frac{A_{t-1}}{Y_{t-1}} \right) + \left( A_t \frac{A_t}{Y_t} - A_{t-1} \right) = \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right)
\]

\[ \text{government spending} \quad \text{net interest payments} \quad \text{asset purchases} \quad \text{tax revenue} \quad \text{debt growth} \]

\[ + \frac{M_t - M_{t-1}}{Y_t} + \frac{OM_t}{Y_t} \quad \text{money growth} \quad \text{other means} \]

\[ + g_{t-1,t} \frac{B_{t-1} - A_{t-1}}{Y_{t-1}} + \pi_{t-1,t} \frac{B_{t-1} - A_{t-1}}{Y_{t-1}} \quad \text{debt dilution via real GDP growth} \quad \text{debt default via inflation} \]

\[ + (\pi_{t-1,t} + g_{t-1,t}) \left( r_{t-1,t}^B \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t}^A \frac{A_{t-1}}{Y_{t-1}} \right) \quad \text{cross-term} \]
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

$$\frac{G_t}{Y_t} + \left( r_{t-1,t} B_{t-1} - r_{t-1,t} A_{t-1} \right) \frac{B_{t-1}}{Y_{t-1}} - \frac{A_{t-1}}{Y_{t-1}} = \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right)$$

- **government spending**
- **net interest payments**
- **asset purchases**
- **tax revenue**
- **debt growth**
- **money growth**
- **other means**
- **debt dilution via real GDP growth**
- **debt default via inflation**
- **cross-term**
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

$$\frac{G_t}{Y_t} + \left( \frac{B_{t-1}}{Y_{t-1}} - \frac{A_{t-1}}{Y_{t-1}} \right) \left( r_{t-1,t} - r_{t-1,t} \right) + \left( \frac{A_t}{Y_t} - \frac{A_{t-1}}{Y_{t-1}} \right) = \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right)$$

- government spending
- net interest payments
- asset purchases
- tax revenue
- debt growth
- money growth
- other means
- debt dilution via real GDP growth
- debt default via inflation
- cross-term

$$+ \left( \pi_{t-1,t} + g_{t-1,t} \right) $$
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

\[
\frac{G_t}{Y_t} + \left( r_{t-1,t} B_{t-1} - r_{t-1,t} A_{t-1} \right) \frac{B_{t-1}}{Y_{t-1}} - \frac{A_{t-1}}{Y_{t-1}} = \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right)
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- **Government spending**
- **Net interest payments**
- **Asset purchases**
- **Tax revenue**
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- **Debt default via inflation**
- **Cross-term**
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

\[
\frac{G_t}{Y_t} + \left( r_{t-1,t} B_{t-1} - r_{t-1,t} A_{t-1} \right) Y_t^{-1} = \frac{T_t}{Y_t} + \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}}
\]

\(\text{government spending} + \text{net interest payments} = \text{tax revenue} + \text{debt growth} + \text{asset purchases} + \text{debt dilution via real GDP growth} + \text{debt default via inflation} + \text{other means}
\]

\[\text{money growth} + \text{other means} + \text{cross-term}\]
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, $Y_t$, and rearranging yields

$$\frac{G_t}{Y_t} + \left( r_{t-1,t}^B \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t}^A \frac{A_{t-1}}{Y_{t-1}} \right) + \left( \frac{A_t}{Y_t} - \frac{A_{t-1}}{Y_{t-1}} \right) = \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right)$$

- **government spending**
- **net interest payments**
- **asset purchases**
- **tax revenue**
- **debt growth**
- **money growth**
- **other means**

- **debt dilution via real GDP growth**
- **debt default via inflation**

$$+ \left( \pi_{t-1,t} + g_{t-1,t} \right) \left( r_{t-1,t}^B \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t}^A \frac{A_{t-1}}{Y_{t-1}} \right)$$

**cross-term**
Consolidated Budget Constraint Components as Shares of GDP

Dividing each term by nominal GDP, \( Y_t \), and rearranging yields

\[
\frac{G_t}{Y_t} + \left( \frac{B_{t-1}}{Y_{t-1}} - \frac{A_{t-1}}{Y_{t-1}} \right) r_{t-1,t} + \frac{A_t}{Y_t} - \frac{A_{t-1}}{Y_{t-1}} = \frac{T_t}{Y_t} + \left( \frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \right)
\]

\[
+ \frac{M_t - M_{t-1}}{Y_t} + \frac{OM_t}{Y_t}
\]

\[
+ \frac{gt_{t-1}}{Y_t} + \frac{B_{t-1} - A_{t-1}}{Y_{t-1}}
\]

\[
+ \frac{\pi_{t-1, t} + gt_{t-1, t}}{Y_t} \left( \frac{B_{t-1}}{Y_{t-1}} - \frac{A_{t-1}}{Y_{t-1}} \right)
\]

\[
\text{government spending} \quad \text{net interest payments} \quad \text{asset purchases} \quad \text{tax revenue} \quad \text{debt growth}
\]

\[
\text{money growth} \quad \text{other means}
\]

\[
\text{debt dilution via real GDP growth} \quad \text{debt default via inflation}
\]

\[
\text{cross-term}
\]
Baseline G/Y: a 5-Year Pre-War Average

The graph illustrates the percentage of GDP over time from 1900 to 2025. It highlights significant events such as World War I and World War II, with peaks during these periods. The most recent peak is associated with COVID-19.
Wartime Surges in G/Y: Add Up Spending in Excess of Baseline
## Decomposition of Wartime Revenues

<table>
<thead>
<tr>
<th>War</th>
<th>Start - End</th>
<th>(1) government spending</th>
<th>(2) payouts on net debt</th>
<th>(3) asset purchases</th>
<th>(4) (1)+(2)+(3)</th>
<th>(5) tax revenue</th>
<th>(6) debt growth</th>
<th>(7) money growth</th>
<th>(8) GDP growth</th>
<th>(9) inflation</th>
<th>(10) Other</th>
</tr>
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<tbody>
<tr>
<td>World War I</td>
<td>1917:4 - 1918:11</td>
<td>36.93</td>
<td>0.30</td>
<td>0.16</td>
<td>37.39</td>
<td>7.76</td>
<td>27.79</td>
<td>2.59</td>
<td>0.03</td>
<td>0.68</td>
<td>-1.46</td>
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<tr>
<td>World War II</td>
<td>1941:12 - 1945:8</td>
<td>116.48</td>
<td>2.00</td>
<td>–</td>
<td>118.48</td>
<td>35.80</td>
<td>54.53</td>
<td>11.96</td>
<td>8.99</td>
<td>6.05</td>
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Real Value of $100 Portfolio of Treasury Securities Invested at Starts of Wars

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How US paid for three wars

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<td>67.0</td>
<td>18.5</td>
</tr>
</tbody>
</table>

As percentages of total revenues.
Backup Slides
Pre versus post 1900

- Net international debtor status
- Role of gold standard
  - (Or was it a “gold-exchange standard” a la David Ricardo (1816)?)
- Money versus bonds
  - Paying interest on “money”?
  - Price discrimation
- Delegating and Coordinating Monetary and Fiscal Policies
  - Two Banks of the United States
  - Andrew Jackson and 100% reserve regime
  - Independent Treasury
  - Congress as Consolidator and Coordinator
- Reputation poisoning or building or sustaining?
Three Pre-1900 US Wars

- Independence (1775-1783)
- 1812 (1812-1815)
- Civil War (1861-1865)
Cast of Characters

- Alexander Hamilton
- James Madison
- Andrew Jackson
- Andrew Johnson
- Ulysses S. Grant
Total population, including free and enslaved. During Civil War, population includes Confederacy. Population in Confederacy was 42% of Union population.

Active duty military is total personnel in Army, Navy and Marine Corps. During Civil War, numbers include only Union forces. Confederate forces were roughly half the size of the Union forces.
Outlays are net of official interest payments. During Civil War, GDP includes the Confederacy.
During the Civil War, GDP includes the Confederacy.
Par Value of U.S. Treasury Debt by Ownership as Percents of GDP: 1790 to 1900
Par and Market Values of Treasury Debt Held by Private Investors

Excludes bonds issued to Pacific Railway Companies.
Decomposition of Wartime Revenue

<table>
<thead>
<tr>
<th>War</th>
<th>Start - End</th>
<th>(1).gov’t spending</th>
<th>(2) return on debt</th>
<th>(3) total spending</th>
<th>(4) tax revenue</th>
<th>(5) debt growth</th>
<th>(6) money growth</th>
<th>(7) GDP growth</th>
<th>(8) inflation</th>
<th>(9) other</th>
</tr>
</thead>
<tbody>
<tr>
<td>War of 1812</td>
<td>1812:6 - 1815:2</td>
<td>7.34</td>
<td>-0.20</td>
<td>7.14</td>
<td>-2.35</td>
<td>10.60</td>
<td>0.00</td>
<td>-0.16</td>
<td>0.06</td>
<td>-1.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-32.9</td>
<td>148.5</td>
<td>0.0</td>
<td>-2.2</td>
<td>0.8</td>
<td>-14.2</td>
</tr>
<tr>
<td>Civil War (Union)</td>
<td>1861:4 - 1865:4</td>
<td>31.04</td>
<td>2.10</td>
<td>33.14</td>
<td>2.26</td>
<td>19.74</td>
<td>6.49</td>
<td>1.08</td>
<td>3.95</td>
<td>-0.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.8</td>
<td>59.6</td>
<td>19.6</td>
<td>3.2</td>
<td>11.9</td>
<td>-1.1</td>
</tr>
</tbody>
</table>

For each war, the elements in first row are percents of GDP. Columns (4)-(9) sum to column (3). The numbers in the second row are percentages of the sum of war-related government spending and returns to bondholders (column (3)) accounted for by each term in (4)-(9). Peacetime baseline is the average value five years prior to the war.
Natural Log of Price Level

War of 1812 and Civil War: Warren-Pearson Index; WW-I and WW-II: BLS-CPI
Real Value of $100 Portfolio of Treasury Securities Invested at Starts of Wars
Natural Log of Price Level

Revolution War: Hoover-Taylor Index; War of 1812 and Civil War: Warren-Pearson Index; WW-I and WW-II: BLS-CPI
## How US paid for five wars

<table>
<thead>
<tr>
<th></th>
<th>taxes</th>
<th>bonds</th>
<th>money</th>
</tr>
</thead>
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<td>6.8</td>
<td>59.6</td>
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</tr>
<tr>
<td>World War I</td>
<td>20.8</td>
<td>74.6</td>
<td>7.0</td>
</tr>
<tr>
<td>World War II</td>
<td>30.2</td>
<td>46.0</td>
<td>10.1</td>
</tr>
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<td>COVID-19</td>
<td>3.5</td>
<td>67.0</td>
<td>18.5</td>
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</tbody>
</table>

As percentages of total revenues.
Primary Deficit: 1900-2031

1900-2010 annual by fiscal year; 2011-present monthly data aggregated to 6-month periods.

Deficits: 1775-1900
Consider a “peacetime baseline”

\[
\left( \frac{G}{Y} \right)^{\text{base}} + \left( r_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)^{\text{base}} = \left( \frac{T}{Y} \right)^{\text{base}} + \left( \frac{B}{Y} - \frac{B_{-1}}{Y_{-1}} \right)^{\text{base}} + \left( \frac{M - M_{-1}}{Y_{-1}} \right)^{\text{base}} + \left( \frac{OM}{Y} \right)^{\text{base}} \\
+ \left( g_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)^{\text{base}} + \left( \pi_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)^{\text{base}} \\
+ \left( r_{-1,0} (\pi_{-1,0} + g_{-1,0}) \frac{B_{-1}}{Y_{-1}} \right)^{\text{base}}.
\]
Revenue Decomposition

For each war,

\[
\sum_{t=T_1}^{T_2} \left[ \frac{G_t}{Y_t} - \left( \frac{G}{Y} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ t_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \left( r_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right] = \sum_{t=T_1}^{T_2} \left[ \frac{T_t}{Y_t} - \left( \frac{T}{Y} \right)_{\text{base}} \right]
\]

government spending

\[
\sum_{t=T_1}^{T_2} \left[ \frac{r_{t-1,t}}{Y_{t-1}} - \left( r_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right] = \sum_{t=T_1}^{T_2} \left[ \frac{r_{t-1,t}B_{t-1}}{Y_{t-1}} - \left( r_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right]
\]
nominal return on debt

\[
\sum_{t=T_1}^{T_2} \left[ \left( B_t - B_{t-1} \right) \frac{Y_{t-1}}{Y_t} - \left( B \frac{Y}{Y_{t-1}} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ \left( M_t - M_{t-1} \right) \frac{Y_t}{Y_{t-1}} - \left( M \frac{Y}{Y_{t-1}} \right)_{\text{base}} \right]
\]
explicit tax revenue

\[
\sum_{t=T_1}^{T_2} \left[ \frac{g_{t-1,t}}{Y_{t-1}} - \left( g_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ \frac{\pi_{t-1,t}}{Y_{t-1}} - \left( \pi_{-1,0} \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right]
\]
interest-bearing debt growth

\[
\sum_{t=T_1}^{T_2} \left[ \frac{OM_t}{Y_t} - \left( \frac{OM}{Y} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ r_{t-1,t} \left( \pi_{t-1,t} + g_{t-1,t} \right) \frac{B_{t-1}}{Y_{t-1}} - \left( r_{-1,0} \left( \pi_{-1,0} + g_{-1,0} \right) \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right]
\]
debt dilution via real GDP growth

\[
\sum_{t=T_1}^{T_2} \left[ \frac{OM_t}{Y_t} - \left( \frac{OM}{Y} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ r_{t-1,t} \left( \pi_{t-1,t} + g_{t-1,t} \right) \frac{B_{t-1}}{Y_{t-1}} - \left( r_{-1,0} \left( \pi_{-1,0} + g_{-1,0} \right) \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right]
\]
debt default via inflation

\[
\sum_{t=T_1}^{T_2} \left[ \frac{OM_t}{Y_t} - \left( \frac{OM}{Y} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ r_{t-1,t} \left( \pi_{t-1,t} + g_{t-1,t} \right) \frac{B_{t-1}}{Y_{t-1}} - \left( r_{-1,0} \left( \pi_{-1,0} + g_{-1,0} \right) \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right]
\]
other means

\[
\sum_{t=T_1}^{T_2} \left[ \frac{OM_t}{Y_t} - \left( \frac{OM}{Y} \right)_{\text{base}} \right] + \sum_{t=T_1}^{T_2} \left[ r_{t-1,t} \left( \pi_{t-1,t} + g_{t-1,t} \right) \frac{B_{t-1}}{Y_{t-1}} - \left( r_{-1,0} \left( \pi_{-1,0} + g_{-1,0} \right) \frac{B_{-1}}{Y_{-1}} \right)_{\text{base}} \right]
\]
cross-term

where \( T_1 \) is the first year of the war or the first year of US involvement, and \( T_2 \) is the final year of the war.
We rearrange the government budget constraint

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = r_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - g_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \pi_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - r_{t-1,t} (\pi_{t-1,t} + g_{t-1,t}) \frac{B_{t-1}}{Y_{t-1}}$$

$$+ \frac{G_t - T_t}{Y_t} - \frac{M_t - M_{t-1}}{Y_t}$$

(1)

Note that we have set $A_t = 0.$
### Decomposition of Post-War Changes in Debt/GDP Ratios

<table>
<thead>
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<th>War post-war period</th>
<th>100 × Debt/GDP</th>
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<tbody>
<tr>
<td></td>
<td>(1)</td>
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<td></td>
<td>end of war</td>
<td>15 years postwar</td>
</tr>
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Cumulative Sums of Contributions to Postwar Debt-GDP Changes

(a) Post World War I

(b) Post World War II
Distribution of Prospective Capital Losses

- After World War II, losses that the lifting of price controls and the subsequent inflation imposed on holders of federal bonds fell primarily on private investors.
- Today, a similar-sized inflation would probably hit the Fed’s balance sheet and the Social Security Trust Fund much harder.
US Treasury Debt Service Profiles

(a) 1919

(b) 1946

(c) 2021