Exorbitant Privilege Gained and Lost: Fiscal Implications

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Exorbitant Privilege

Gourinchas, Rey, and Sauzet (2019): "Being the hegemon confers a specific ability to issue large amounts of nominally safe liabilities (dollar securities), which are happily absorbed by the rest of the world. Thus, the view is that, in case of a deficit, the United States does not have to take restrictive measures, so that the dollar is not an impartial means of international exchange. This is the essence of the exorbitant privilege."

Our paper: How do we weigh this exorbitant privilege with the concerns about fiscal sustainability in the U.S.?
We study three centuries of fiscal history and estimate the fiscal backing of the Dutch, U.K., and U.S. government debt.

There is a unique hegemon who dominates the supply of safe assets.

When a country plays this role, its government debt enjoys a lower yield relative to other sovereign debt—convenience yields.

We conduct a fiscal valuation exercise.

The hegemon issues more government debt than what is warranted by its own fiscal fundamentals, even after we account for seigniorage revenues.

When the hegemon’s relative fundamentals deteriorate, this extra fiscal capacity is eventually withdrawn—exorbitant privilege lost.
More Concretely

- **U.K.** had quasi-monopoly as world’s safe asset supplier in 19th century
  - London was the world’s financial center and gilts accounted for more than 1/2 of the world’s traded securities in 1815.
  - Gilts traded at much lower yields *(Hall, Payne, Sargent, and Szőke, 2021).*
  - In the two centuries before WW-I, only 3/4 of U.K. debt was backed by future surpluses.

- **During the Interbellum years, U.K.** in fiscal crisis:
  - The U.K. abandoned the gold standard at the start of WW-I, briefly returned to it in 1925, only to permanently abandon it in 1931.
  - Financial repression during and after WW-I; Restructuring of U.K. loans.
  - Gilts started trading at higher yields than foreign bonds.

- **After WW-II, the U.K.** yielded its leading position to the U.S.
  - The U.K. debt no longer earned convenience yields,
  - Debt has always been more than fully backed by our estimate of government surpluses.
In Contrast

- Before WW-I, the U.S. had to finance its debt at a much higher rate relative to the U.K.
  - The U.S. government debt was more than fully backed by its primary surpluses.
- After WW-II, the U.S. became the world’s safe asset issuer.
  - Its debt enjoyed a significant convenience yield relative to other bonds.
  - The market value of its debt well exceeded its fiscal backing.
Related Literature

- **Fiscal capacity of the government** (Bassetto and Cui, 2018; Blanchard, 2019; Furman and Summers, 2020; Mehrotra and Sergeyev, 2021; Mian, Straub, and Sufi, 2021; Brunnermeier, Merkel, and Sannikov, 2022; Liu, Schmid, and Yaron, 2020; Reis, 2021) - Jiang et al. (19,20,21,22,23a,23b)

- **Special role of the dollar** as the reserve currency and the U.S. as the world’s safe asset supplier (see Gourinchas and Rey, 2007; Caballero, Farhi, and Gourinchas, 2008; Caballero and Krishnamurthy, 2009; Maggiori, 2017; He, Krishnamurthy, and Milbradt, 2018; Farhi and Maggiori, 2018; Gopinath and Stein, 2018; Krishnamurthy and Lustig, 2019; Choi, Kirpalani, and Perez, 2022; Mukhin, 2022)

- Special role for **Treasurys providing insurance**: (Bassetto and Cui, 2018; Chien and Wen, 2019; Angeletos, Collard, and Dellas, 2020; Brunnermeier, Merkel, and Sannikov, 2022; Reis, 2021)

- U.S. Treasurys are **expensive relative to other bonds** (Krishnamurthy and Vissing-Jorgensen, 2012; Bai and Collin-Dufresne, 2019; Fleckenstein, Longstaff, and Lustig, 2014; Du, Im, and Schreger, 2018; Jiang, Krishnamurthy, and Lustig, 2021; Koijen and Yogo, 2019; Di Tella, Hébert, Kurlat, and Wang, 2023)
U.K. Market Value of Debt/GDP

The chart illustrates the percentage of GDP represented by debt, with key historical events marked. These include:

- The Seven Years War (1756-1763)
- The American Revolutionary War (1775-1783)
- The French Napoleonic Wars (1792-1815)
- The Crimean War (1853-1856)
- The War of Sixth Coalition (1806-1815)
- The Boer War (1899-1902)
- The UK Pound Sterling Crisis
- The WW-I
- The WW-II
- The Global Financial Crisis

The data is presented for two categories:

- Marketable Debt (Ellison-Scott)
- Marketable + Non-Marketable (Bank of England)
Pre-WWI: Barro-Gallatin tax smoothing for wars (Barro, 1979; Aiyagari, Marcet, Sargent, and Seppälä, 2002)

- Consistent primary surpluses in peacetime and temporary, large deficits in wartime
- Primary surpluses are 2.38% on average and acyclical w.r.t. business cycles
U.K. Cumulative Real Return: 1729 – 2020
Measuring Fiscal Backing
Pricing the Entire Government Bond Portfolio

- Government debt is backed by current and future primary surpluses
- Government budget constraint:
  \[ D_t = \sum_{h=0}^{H} Q_{t-1}^{h+1} P_t^h = T_t - G_t + \sum_{h=1}^{H} Q_t^h P_t^h \]
- Iterate forward on budget constraint + impose no-arbitrage:
  \[ D_t = \mathbb{E}_t \left[ \sum_{j=0}^{T} M_{t,t+j}(T_{t+j} - G_{t+j}) \right] + \mathbb{E}_t [M_{t,t+T}D_{t+T}] \]
- Define Fiscal Backing (FB) as the present value of primary surpluses
  \[ FB_t = \mathbb{E}_t \left[ \sum_{j=0}^{\infty} M_{t,t+j} T_{t+j} \right] - \mathbb{E}_t \left[ \sum_{j=0}^{\infty} M_{t,t+j} G_{t+j} \right] = P_t^T - P_t^G \]
- \( FB = D_t \) under TVC \( \mathbb{E}_t [M_{t,t+T}D_{t+T}] \to 0 \) as \( T \to \infty \)
Campbell-Shillerized Measurement of Fiscal Backing

- Fiscal backing = PV(Surpluses)

\[
FB_t = P_t^T - P_t^G = T_t \exp(pd_t^T) - G_t \exp(pd_t^G),
\]

where \(pd_t^T = \log(P_t^T / T_t)\) and \(pd_t^G = \log(P_t^G / G_t)\).

- Log-linearize the tax and spending claim return equations and iterate forward (Jiang, Lustig, Van Nieuwerburgh, and Xiaolan, 2019):

\[
pd_t^T = \frac{\kappa_0^T}{1 - \rho_T} + \mathbb{E}_t \left[ \sum_{j=1}^{\infty} \rho_T^{j-1} \Delta \log T_{t+j} \right] - \mathbb{E}_t \left[ \sum_{j=1}^{\infty} \rho_T^{j-1} r_{t+j}^T \right],
\]

\[
pd_t^G = \frac{\kappa_0^G}{1 - \rho_G} + \mathbb{E}_t \left[ \sum_{j=1}^{\infty} \rho_G^{j-1} \Delta \log G_{t+j} \right] - \mathbb{E}_t \left[ \sum_{j=1}^{\infty} \rho_G^{j-1} r_{t+j}^G \right],
\]

where \(\rho_T, \rho_G, \kappa_0^T, \kappa_0^G\) depend on the mean of their respective log p/d ratios.
Measuring Fiscal Backing at Steady State

Steady-state $FB/Y$:

$$\frac{FB}{Y} = \frac{T}{Y} \exp(pd^T_0) - \frac{G}{Y} \exp(pd^G_0),$$

$$pd^T_0 = -\frac{(y^S_0(1) + yspr^S_0 + rp^T_0) - (x_0 + \pi_0)}{1 - \rho_T} + \frac{\kappa^T_0}{1 - \rho_T'},$$

$$pd^G_0 = -\frac{(y^S_0(1) + yspr^S_0 + rp^G_0) - (x_0 + \pi_0)}{1 - \rho_G} + \frac{\kappa^G_0}{1 - \rho_G}.$$

Determinants:

1. Steady-state surplus: $(T - G)/Y$
2. Discount rate component of $pd_0$: the short rate ($y^S_0(1)$), the yield spread ($yspr^S_0$), and the risk premium ($rp^i_0$)
3. Cash flow component of $pd_0$: GDP growth $(x_0 + \pi_0)$, since $T$ and $G$ are co-integrated with output
Upper Bound on Steady-State Fiscal Backing

- We expect \( r_{p0}^T \geq r_{p0}^Y \geq r_{p0}^G \). Why?
  - At business cycle frequency, spending/GDP is counter-cyclical and tax/GDP is pro-cyclical: \( \beta(T_{t+1}) \geq \beta(Y_{t+1}) \geq \beta(G_{t+1}) \). More so after WW-II.
  - In long run, tax and spending are cointegrated with output:
    \( \beta(T_{t+\infty}) = \beta(Y_{t+\infty}) = \beta(G_{t+\infty}) \).

- Assuming \( r_{p0}^T = r_{p0}^Y = r_{p0}^G \) then delivers an **upper bound** on Fiscal Backing:
  \[
  \frac{FB}{Y} \leq \frac{1}{(y_0^S(1) + yspr_0^S + r_{p0}^Y) - (x_0 + \pi_0)} \left( \frac{T}{Y} - \frac{G}{Y} \right) \equiv \frac{FB^{UB}}{Y}
  \]

1. Countries with higher GDP growth \( x_0 \) and lower real rates \( y_0^S(1) - \pi_0 \) have higher \( pd_0^Y \) and FB (Blanchard, 2019)
2. Countries with higher risk premium \( r_{p0}^Y \) and slope of the yield curve \( yspr_0^S \) have lower \( pd_0^Y \) and FB
Measuring the GDP Risk Premium

- Risk premium on GDP claim is risk premium on total wealth portfolio
- Total wealth return commonly proxied as the unlevered stock return
- Implementation: leverage is 0.46 in U.K. and 0.56 in U.S.

<table>
<thead>
<tr>
<th></th>
<th>equity RP vs Rf</th>
<th>corporate bond RP vs Rf</th>
<th>LT bond vs Rf</th>
<th>unlevered equity RP vs. Rf</th>
<th>unlevered equity RP vs. LT bond</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>United Kingdom</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1870-2020</td>
<td>5.64%</td>
<td>1.45%</td>
<td>0.96%</td>
<td>3.68%</td>
<td>2.73%</td>
</tr>
<tr>
<td>1946-2020</td>
<td>7.89%</td>
<td>2.27%</td>
<td>1.53%</td>
<td>5.42%</td>
<td>3.88%</td>
</tr>
<tr>
<td><strong>United States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1870-2020</td>
<td>6.33%</td>
<td>1.35%</td>
<td>0.69%</td>
<td>3.51%</td>
<td>2.82%</td>
</tr>
<tr>
<td>1946-2020</td>
<td>7.56%</td>
<td>1.79%</td>
<td>1.45%</td>
<td>4.49%</td>
<td>3.80%</td>
</tr>
</tbody>
</table>

- Based on this evidence, we fix GDP risk premium vs. LT bond, $r_{p_0}^Y$, at 3% per year
What About Convenience Yields?

- Measure convenience yields from CIP violations in govt. bond markets (see Jiang, Krishnamurthy, and Lustig, 2021)

- During gold standard, no FX movement, interest rate differentials are violations of CIP

![Graph showing short rate vs. long rate percentage per year from 1880 to 1970. The x-axis represents years from 1880 to 1970, and the y-axis represents percentage per year ranging from -3 to 3. The graph includes a line for short rate and a dashed line for long rate. The source is Jordà-Schularick-Taylor Macrohistory database.]

Average of 15 countries on gold standard vs. U.K. Source: Jordà-Schularick-Taylor Macrohistory database.

- Gilts earned a convenience yield $\lambda_0$ of 100 basis points per year in 1873–1931
Upper Bound on Fiscal Backing at Steady State

- With seigniorage revenue from convenience yields (Jiang, Lustig, Van Nieuwerburgh, and Xiaolan, 2019),

\[
D_t = \mathbb{E}_t \left[ \sum_{j=0}^{\infty} M_{t,t+j} T_{t+j} \right] + \mathbb{E}_t \left[ \sum_{j=0}^{\infty} M_{t,t+j} D_{t+j} (1 - e^{-\lambda t+j}) \right] - \mathbb{E}_t \left[ \sum_{j=0}^{\infty} M_{t,t+j} G_{t+j} \right]
\]

- Upper bound

\[
\frac{FB}{Y} \leq \frac{1}{(y_0^s (1) + yspr_0^s + rp_0^Y) - (x_0 + \pi_0) \left( \frac{T}{Y} + \frac{Seign}{Y} - \frac{G}{Y} \right)}
\]

- Seigniorage revenue \( Seign = \lambda \times D \): convenience yield times debt outstanding

- U.K. seigniorage revenue averages 0.34% of GDP for 1729–1946
### Steady-State Fiscal Backing Pre-WW-I

<table>
<thead>
<tr>
<th></th>
<th>UK: 1729-1914</th>
<th>US: 1793-1914</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x_0$</td>
<td>1.58</td>
<td>4.08</td>
</tr>
<tr>
<td>$\pi_0$</td>
<td>0.16</td>
<td>0.77</td>
</tr>
<tr>
<td>$y_0^s$</td>
<td>4.88</td>
<td>4.50</td>
</tr>
<tr>
<td>$\exp(pd_0^Y)$</td>
<td>20.68</td>
<td>39.06</td>
</tr>
<tr>
<td>$s_0$</td>
<td>2.38</td>
<td>0.46</td>
</tr>
<tr>
<td>$\lambda_0$</td>
<td>0.69</td>
<td>0</td>
</tr>
<tr>
<td>Seign./$Y$</td>
<td>0.29</td>
<td>0</td>
</tr>
<tr>
<td>$FB/Y$</td>
<td>55.73</td>
<td>17.79</td>
</tr>
<tr>
<td>$D/Y$</td>
<td>86.45</td>
<td>11.91</td>
</tr>
<tr>
<td>$FB/D$</td>
<td>64.46</td>
<td>149.30</td>
</tr>
</tbody>
</table>

- Quantity dimension of exorbitant privilege
Dynamic Measure of Fiscal Backing

- Allow for dynamics in (i) expected tax revenue and spending growth rates, and (ii) in the expected return on the GDP claim

- Dynamics of Fiscal Backing governed by:

\[
\frac{FB_t}{Y_t} = \frac{T_t}{Y_t} \exp(CF^T_t - DR^T_t) - \frac{G_t}{Y_t} \exp(CF^G_t - DR^G_t)
\]

\[
CF^T_t = \mathbb{E}_t \left[ \sum_{j=1}^{\infty} \rho_T^{j-1} \Delta \log T_{t+j} \right], \quad DR^T_t = \mathbb{E}_t \left[ \sum_{j=1}^{\infty} \rho_T^{j-1} r^T_{t+j} \right]
\]

- Use VAR to construct cash flow and discount rate terms

\[
z_t = \Psi z_{t-1} + u_t,
\]

- State \( z_t \) includes inflation, short rate, yield spread, real GDP growth, stock dividend/GDP growth and level, stock p/d ratio, tax/GDP growth and level, spending/GDP growth and level

- Impose cointegration between spending, taxes and output

- Regime shift: we estimate separate VARs for pre-WW-II and post-WW-II samples.
Robustness: consolidation of colonial government balance sheets strengthened our conclusion.
## Average Fiscal Backing Pre-WW-I and Pre-WW-II

<table>
<thead>
<tr>
<th>Table: Pre-WW-I</th>
<th></th>
<th>Table: Pre-WW-II</th>
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</thead>
<tbody>
<tr>
<td>exp($pd^0_Y$)</td>
<td>20.68</td>
<td>39.06</td>
</tr>
<tr>
<td>s_0</td>
<td>2.38</td>
<td>1.97</td>
</tr>
<tr>
<td>( \lambda_0 )</td>
<td>0.69</td>
<td>0</td>
</tr>
<tr>
<td>Seign./Y</td>
<td>0.29</td>
<td>0</td>
</tr>
<tr>
<td><strong>FB/Y</strong></td>
<td>60.18</td>
<td>20.18</td>
</tr>
<tr>
<td><strong>D/Y</strong></td>
<td>86.45</td>
<td>11.91</td>
</tr>
<tr>
<td><strong>FB/D</strong></td>
<td>69.61</td>
<td>169.36</td>
</tr>
<tr>
<td>( \rho(FB/Y, D/Y) )</td>
<td>0.78</td>
<td>0.13</td>
</tr>
</tbody>
</table>
U.K. and U.S. Fiscal Backing: Post-WW-II

(a) U.K.

(b) U.S.
### U.S. and U.K. Fiscal Backing After WW-II

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>( \lambda_0 )</td>
<td>0</td>
<td>0.56</td>
</tr>
<tr>
<td>Seign./( Y )</td>
<td>0</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Steady-state at ( z = 0 )</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( FB/Y )</td>
<td>73.31</td>
<td>9.40</td>
</tr>
<tr>
<td>( FB/D )</td>
<td>137.24</td>
<td>22.93</td>
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<tr>
<td><strong>Sample Averages</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( FB/Y )</td>
<td>82.12</td>
<td>13.20</td>
</tr>
<tr>
<td>( D/Y )</td>
<td>53.42</td>
<td>40.99</td>
</tr>
<tr>
<td>( FB/D )</td>
<td>153.73</td>
<td>32.20</td>
</tr>
<tr>
<td>( \rho(FB/Y, D/Y) )</td>
<td>0.80</td>
<td>-0.17</td>
</tr>
</tbody>
</table>
The provincial governments of the Dutch Republic had local monopoly as safe asset suppliers in 17th and part of 18th century.

- Financial revolution: Dutch provinces issue bonds, tapping into new investor base of emerging upper class (C’t Hart, 1993; Schultz and Weingast, 2003)
- Amsterdam was the world’s financial center. Dutch Florin was reserve currency
- Political participation by debtholders: more fiscal discipline (North and Weingast, 1989)
- Yields on annuities issued by Holland 1.5% lower than those on British consols

After 1815, fiscal crisis in the Netherlands

- Wars lost
- Debt overhang and restructuring
- World’s financial center moved to London
The Book Value of Outstanding Debt to GDP

Book value of debt issued by the province of Holland from 1601 to 1794 and the central Dutch government over the sample period from 1817–1914.
Dutch Fiscal Cash Flows
### The Dutch Experience: 17th/18th Century vs. 19th Century

<table>
<thead>
<tr>
<th></th>
<th>1601 – 1794 (Province of Holland)</th>
<th>1817 – 1914 (The Netherlands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda_0 ) \text{ Seign.}/Y</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2.38</td>
<td>0</td>
</tr>
<tr>
<td>( FB/Y )</td>
<td>Steady-state at ( z = 0 )</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>61.58</strong></td>
<td><strong>61.06</strong></td>
</tr>
<tr>
<td><strong>Sample Averages</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( FB/Y )</td>
<td><strong>71.19</strong></td>
<td><strong>60.53</strong></td>
</tr>
<tr>
<td>( D/Y )</td>
<td><strong>118.89</strong></td>
<td><strong>65.72</strong></td>
</tr>
<tr>
<td>( FB/D )</td>
<td>59.88</td>
<td>92.10</td>
</tr>
<tr>
<td>( \rho(FB/Y, D/Y) )</td>
<td>0.94</td>
<td>0.64</td>
</tr>
</tbody>
</table>
The Dutch Experience

(a) Holland

Market value of debt falling after 1800. Debt restructuring after 1815.

(b) Netherlands
Conclusion

- Investors concentrate extra fiscal backing in the world’s safe asset supplier beyond what is warranted by its fundamentals and convenience yields.

- When the safe asset supplier’s relative fundamentals deteriorate, that extra fiscal backing is withdrawn by bond investors who then focus only on the country’s fundamentals.

- Implications for today’s hegemon
U.K. Real Rates: 1729 – 2020
Figure: Fiscal Capacity: Consolidating Colonial Government Finance
Figure: Fiscal Capacity with Convenience Yields: U.K. 1729 – 1946


