Fiscal Monetary Interactions During the Classical Gold Standard and Wartime Suspension Periods

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Gold Standard Overview

- Mixed gold standard was operational through most of the 19th century: fiduciary money was required to be convertible into gold at the fixed price
- During wartime, government expenditure was financed by taxes, seigniorage revenue and increases in public debt
- To reassure the public that the real value of debt will not erode with an inflationary policy, a commitment mechanism is required to constrain the future actions of the monetary authority
  - Bordo and Kydland (1995) argue that the GS provided such a commitment mechanism
Gold Standard Suspensions

Prominent suspensions of the GS in the 19th and early 20th centuries in France and UK:

<table>
<thead>
<tr>
<th>Country</th>
<th>Dates of bimetallic or silver conv.</th>
<th>Dates of suspension</th>
<th>Dates of gold conv.</th>
<th>Dates of suspension</th>
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<tbody>
<tr>
<td>France</td>
<td>17th century?</td>
<td>1793?</td>
<td>1803</td>
<td>1914</td>
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<td></td>
<td>1803</td>
<td>1848-50</td>
<td>1878</td>
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<td></td>
<td>1850</td>
<td>1870-78</td>
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<tr>
<td>UK</td>
<td>1694</td>
<td>1797-1821</td>
<td>1816-21</td>
<td>1847, 1857</td>
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<td></td>
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<td>1866, 1914</td>
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<td>1925</td>
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<td>1931</td>
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Experiences of UK and France during Suspension Periods

- During the Napoleonic Wars, Britain was able to finance its expenditures by a combination of taxes, debt and paper money because 18th century war debt was successfully serviced.
  - The percentage of war-time expenditures financed with bonds rose from 40.5% in the 1793-1815 period to 64.4% during WWI.
- In contrast, France had to rely on taxation due to the loss of credibility: it had defaulted on outstanding debt at the end of the American Revolutionary war, and turned to hyperinflation during the Revolution.
Interest Rates during the Napoleonic Wars

Figure 3
YIELDS ON BRITISH AND FRENCH SECURITIES: 1770–1821

French "Console"  
British 3 Per cents
Price levels during WWI
Inflation during WWI
Short-term Interest Rates during WWI
Long-term Interest Rates during WWI
Debt-to-GDP Ratios during WWI
Nominal Exchange Rates during WWI
Differences between the Gold Standard Suspensions in UK and France

- France loses credibility after the 18th century suspension
- This may make it difficult to raise war financing during the WWI suspension period at low nominal interest rates
- But the two 19th century suspensions may have raised France’s credibility because it went back to gold at the original parity
- **Historical episodes of suspensions and resumptions of the GS provide a unique lens to analyze the interactions between credibility of the fiscal authority and the central bank’s target rules**
Consider the importance of credibility of the fiscal authority as an economy reverts to following the GS after a suspension

- During the GS suspension, the monetary authority is passive, and the fiscal authority is active;
- In the reversion, the fiscal authority becomes passive (From AF/PM to PF/AM)

Following cases are of interest:

- The fiscal authority has perfect credibility (E.g. UK during Napoleonic Wars and WWI)
- The fiscal authority is imperfectly credible (E.g. France during WWI)
  - The economy also has very high steady state debt relative to output (E.g. Italy, Argentina)
Modeling Assumptions

- Households are boundedly rational: they are assumed to use a perceived data generating process (DGP) to form conditional forecasts of the relevant variables (output, inflation, debt, taxes and interest rate)
  - Anticipated utility framework is employed (Marcet and Sargent, 1989); agents have symmetric beliefs
- Updating of beliefs by optimizing agents affects the statistical properties of the variables being forecast
Modeling Credibility

- With a perfectly credible fiscal authority, the households use the correct DGP (relative to the rational expectations model) during the suspension period and the announced reversion period
  - They are still learning about the policy parameters
  - As the economy reverts to the GS after the suspension, government debt no longer enters into the determination of inflation, output and interest rates
- With imperfect credibility, the households use a misspecified DGP during the reversion period
Model Structure

- **Households**
  - Hold long (exponentially maturing) debt and one-period bonds; maximize expected utility

- **Fiscal authority**
  - Active during the suspension of the GS

- **Monetary authority**
  - Follows a Taylor-rule during the operation of the GS (Orphanides, 2003; Taylor, 1999)
  - Current work is considering the effects of fiscal credibility under the Price-level target rule for the central bank

- **Firms**
  - Final goods producers are assumed to follow Calvo pricing
Model Structure

- Output gap

\[
\hat{x}_t = \tilde{E}_t \sum_{j=0}^{\infty} \beta^j \left[ (1 - \beta)\hat{x}_{t+j+1} - \sigma \beta (\hat{\iota}_{1,t+j} - \tilde{E}_t \hat{\pi}_{t+j+1}) + \hat{\tau}_{t+j+1}^n \right] + s_T \left[ \frac{(\hat{\omega}_t - \hat{\pi}_t)}{\beta} - \hat{\tau}_t \right] + \tilde{E}_t \sum_{j=0}^{\infty} \left[ (\hat{\iota}_{1,t+j} - \tilde{E}_t \hat{\pi}_{t+j+1}) - (1 - \beta)\hat{\tau}_{t+j+1} \right] \tag{1}
\]

- Inflation

\[
\hat{\pi}_t = \kappa \hat{x}_t + \tilde{E}_t \sum_{j=0}^{\infty} (\alpha \beta)^j \left[ \kappa \alpha \beta \hat{x}_{t+j+1} + (1 - \alpha) \beta \hat{\pi}_{t+j+1} \right] \tag{2}
\]
Model Structure

- Fiscal authority

\[
\hat{w}_t = \frac{1}{1 - \frac{\bar{\tau}}{\hat{w}}} \left( \hat{w}_{t-1} - \hat{\pi}_{t-1} - \frac{\bar{\tau}}{\hat{w}} \hat{\pi}_{t-1} \right)
\]

\[
+ \left[ \hat{i}_{1,t-1} - \left( \frac{\beta \rho^2}{1 - \rho} \right) \sum_{j=0}^{\infty} (\beta \rho)^j \hat{i}_{1,t+j} \right]
\]

- Lump sum taxes

\[
\hat{\tau}_t = \phi_\tau \hat{w}_t + \log \nu_t.
\]

- Monetary authority

\[
\hat{i}_{1,t} = \bar{i}_t + \phi_x \hat{x}_t + \phi_{\pi} \hat{\pi}_t
\]
Model Structure

- Perceived DGP of households:
  \[ z_t = a_t + b_t z_{t-1} + c_t r_{t-1} + \eta_t, \]  
  \[ z_t \equiv \{ \hat{x}_t, \hat{\pi}_t, \hat{w}_t, \hat{i}_{1,t}, \hat{\tau}_t \}, \quad r_t = (\hat{r}_t^\eta, \hat{i}_t, v_t)' \]

- Under PF/AM, debt \( \hat{w}_t \) and taxes \( \hat{\tau}_t \) do not determine the evolution of output gap, inflation and the interest rate
  - With perfect credibility of the fiscal and monetary authority, the households use the correct perceived DGP
  - With imperfect credibility of the fiscal authority, the households allow for the possibility of the relevant variables depending on debt, i.e., the DGP is misspecified
Model Structure

- Households update their estimates of $\Omega_t = \{a_t, b_t\}$ using a recursive least squares estimator, following Marcet and Sargent (1989):

  $$\Omega_t = \Omega_{t-1} + g^{-1}Y_{t-1}^{-1}q_{t-1}[zt - \Omega'_{t-1}q_{t-1}]'; \quad (7)$$

  $$Y_t = Y_{t-1} + g^{-1}[q_{t-1}q'_{t-1} - Y_{t-1}],$$

  where $q_{t-1} = [1, z_t, r_t]_{t=0}^{t-1}$, and $Y_t$ is the variance-covariance matrix of the coefficients in $\Omega_t$.

- Actual DGP:

  $$z_t = T^0(a_{t-1}) + T^b(b_{t-1})z_{t-1} + T^r(c_{t-1})r_{t-1}$$
Effects of Imperfect Credibility

- If the economy transitions to a PF/AM regime following a sudden increase in the holdings of government debt, and the fiscal authority has imperfect credibility, how do interest rates respond?
- When the fiscal authority is imperfectly credible, when will the model be expectationally stable?
- Parameters:
  - Frequency of price adjustment, $\alpha = 0.75$
  - Discount factor $\beta = 0.99$
  - IES $= 0.2$
  - Average maturity of government debt is 20 quarters
  - Steady state level of debt is set at 40% of the GDP
  - Constant gain $= 0.06$
PF/AM and Imperfect Credibility: Response to a Debt Shock

3-Month Rate

10-Year Rate

Output

Inflation
PF/AM under Imperfect credibility: High Steady State Taxes as a fraction of Output

E-Stability Regions for debt maturity $\rho$ and steady state taxes as a percentage of output in PF/AM regime
Questions

- Is the credibility of the fiscal authority during GS suspension/reversion periods related to agents’ beliefs about whether the government has access to a consistent stream of revenue?
  - The British fiscal authority was able to raise taxes by setting up an incentive-compatible tax revenue system (through the Civil Service)
  - France only had a "tax farm system"; could not rely on a constant source of tax revenue. Did this affect agents’ expectations of government bond prices?

- Can we use historical records to characterize monetary policy during suspensions and fiscal policy during operation of the GS?
  - AF/PM and PF/AM regimes are assumed to operate during suspensions and GS periods respectively in the model
Questions

• Does a commitment to return to the GS constrain the total issuance of debt?
  • At higher levels of debt issuance, does the monetary authority have to change its price (or inflation) target?
  • When should this change in the target rule be communicated to the economic agents?

• Do recurring regimes of active fiscal policy, which may lead to frequent changes in the target rule of the monetary authority, affect the credibility of the central bank?
  • Is the credibility of the monetary authority conditional on the credibility of the fiscal authority?