

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:

Country	Dates of bimetallic or silver conv.	Dates of suspension	Dates of gold conv.	Dates of suspension
France	17th century? 1803 1850	1793? 1848-50 1870-78	1803 1878	1914
UK	1694	1797-1821	1816-21 1925	1847, 1857 1866, 1914 1931

Source: Bordo and Kydland (1995) and White (1995)

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

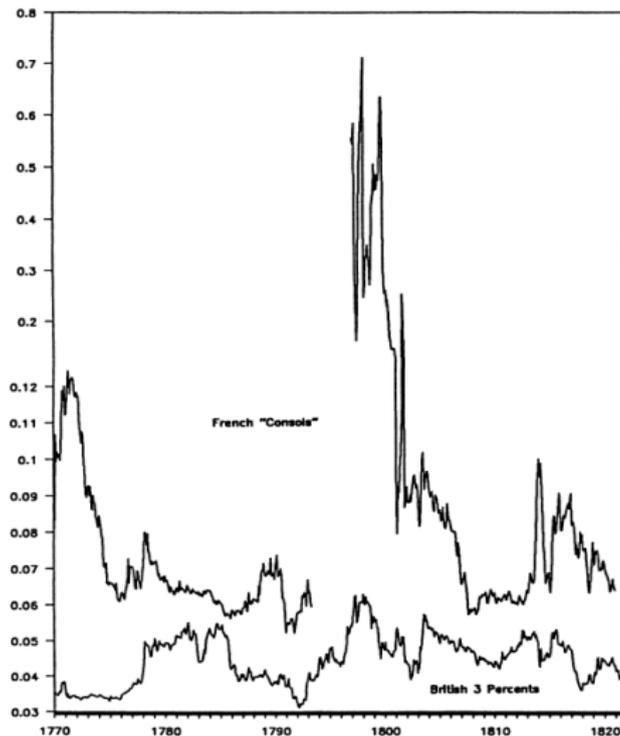
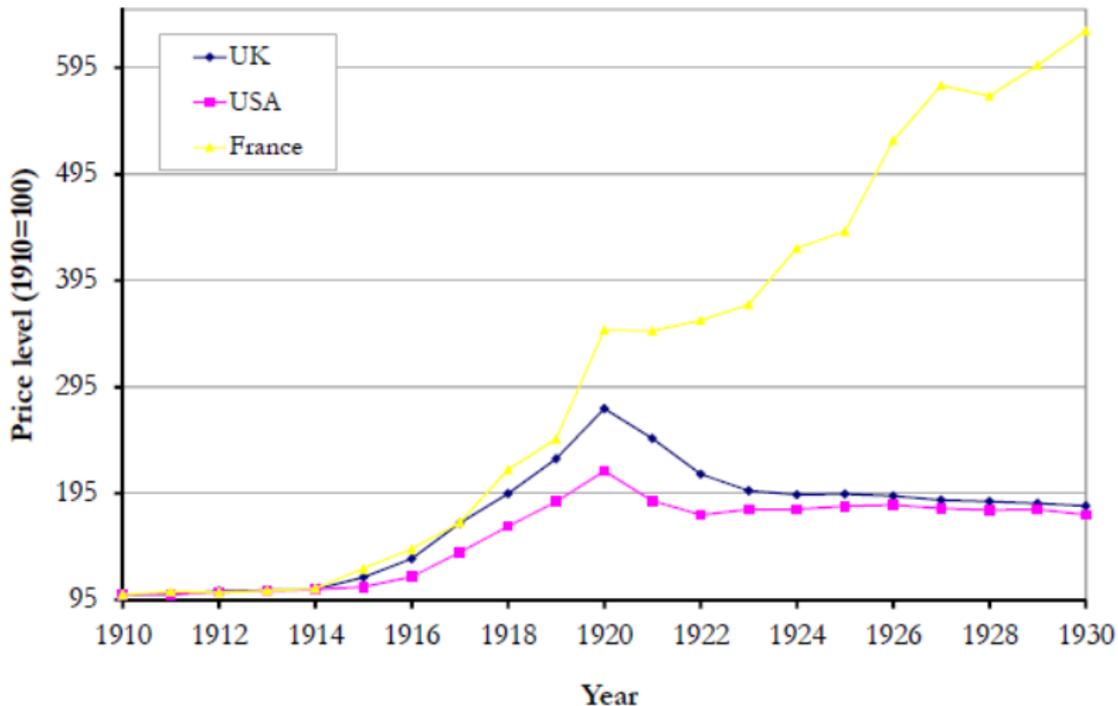
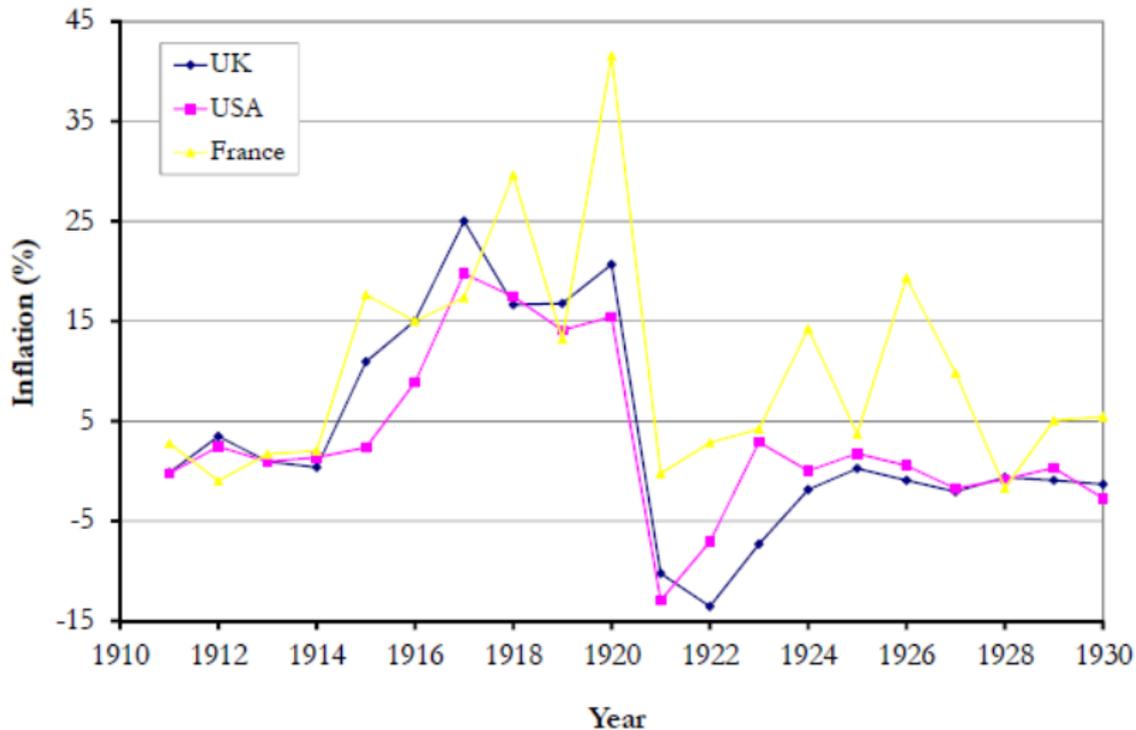


FIGURE 3
YIELDS ON BRITISH AND FRENCH SECURITIES: 1770-1821

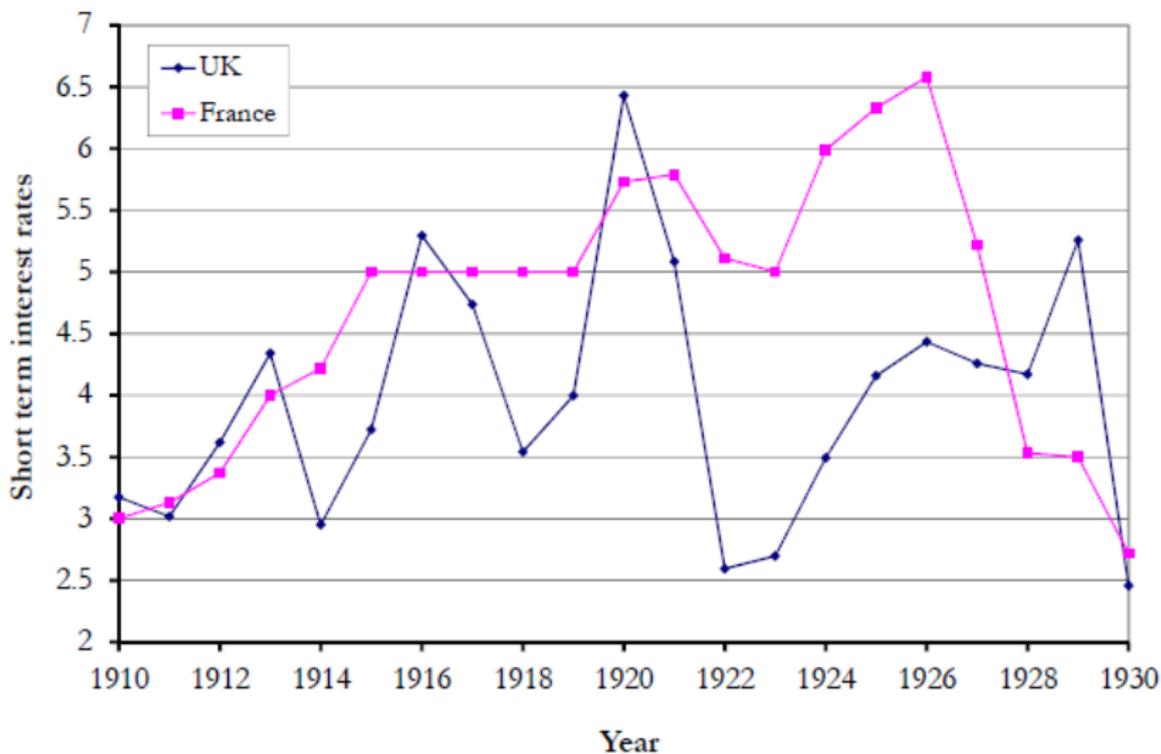
Price levels during WWI



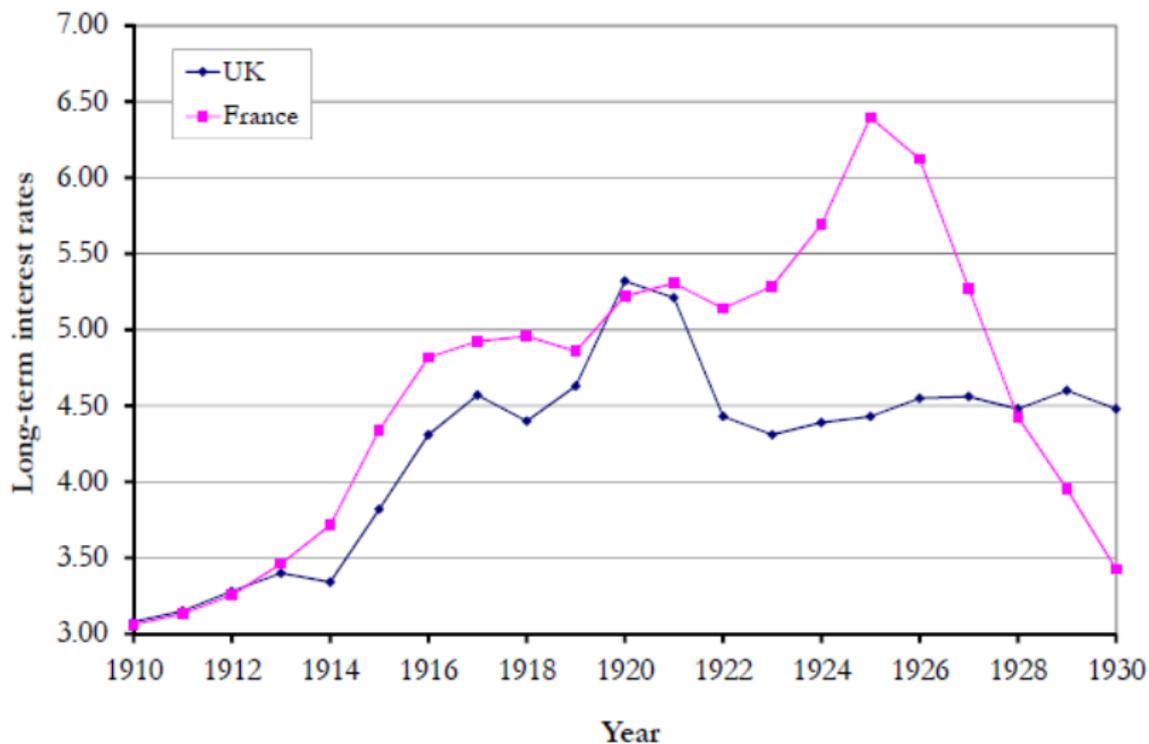
Inflation during WWI



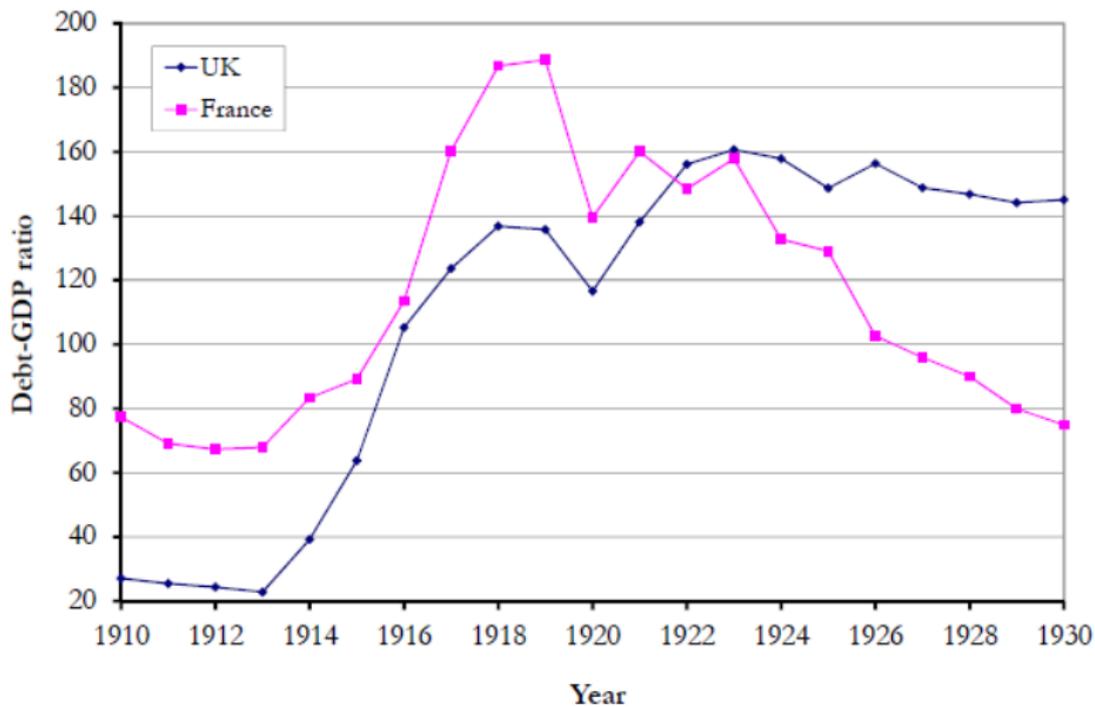
Short-term Interest Rates during WWI



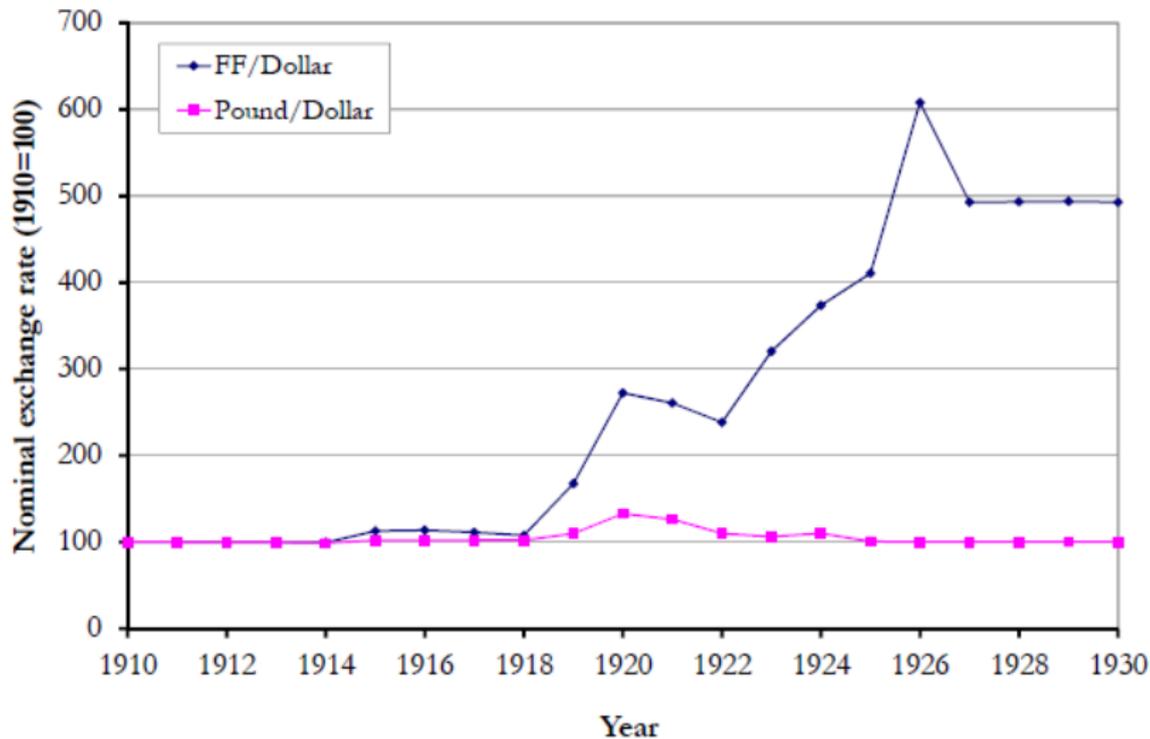
Long-term Interest Rates during WWI



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 resumptios of the GS provide a unique lens to analyze the interactions between credibility of the fiscal authority and the central bank's target rules**

What we do

- 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

$$\hat{x}_t = \tilde{E}_t \sum_{j=0}^{\infty} \beta^j \left[\begin{array}{c} (1 - \beta)\hat{x}_{t+j+1} - \sigma\beta(\hat{i}_{1,t+j} - \tilde{E}_t\hat{\pi}_{t+j+1}) \\ + \hat{r}_{t+j+1}^n \end{array} \right] \quad (1)$$
$$+ {}_{ST} \left[\begin{array}{c} \frac{(\hat{w}_t - \hat{\pi}_t)}{\beta} - \frac{\hat{\tau}_t}{\beta} \\ + \tilde{E}_t \sum_{j=0}^{\infty} [(\hat{i}_{1,t+j} - \tilde{E}_t\hat{\pi}_{t+j+1}) - (1 - \beta)\hat{\tau}_{t+j+1}] \end{array} \right]$$

- Inflation

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

Model Structure

- Fiscal authority

$$\hat{w}_t = \frac{1}{\left(1 - \frac{\bar{\tau}}{\bar{w}}\right)} \left(\hat{w}_{t-1} - \hat{\pi}_{t-1} - \frac{\bar{\tau}}{\bar{w}} \hat{\tau}_{t-1} \right) + \left[\hat{i}_{1,t-1} - \left(\frac{\beta \rho^2}{1 - \rho} \right) \sum_{j=0}^{\infty} (\beta \rho)^j \hat{i}_{1,t+j} \right] \quad (3)$$

- Lump sum taxes

$$\hat{\tau}_t = \phi_{\tau} \hat{w}_t + \log \nu_t. \quad (4)$$

- Monetary authority

$$\hat{i}_{1,t} = \bar{i}_t + \phi_x \hat{x}_t + \phi_{\pi} \hat{\pi}_t \quad (5)$$

Model Structure

- Perceived DGP of households:

$$z_t = a_t + b_t z_{t-1} + c_t r_{t-1} + \eta_t, \quad (6)$$

$$z_t \equiv \{\hat{x}_t, \hat{\pi}_t, \hat{w}_t, \hat{i}_{1,t}, \hat{\tau}_t\}, \quad r_t = (\hat{r}_t^n, \bar{l}_t, \nu_t)'$$

- 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):

$$\begin{aligned}\Omega_t &= \Omega_{t-1} + g^{-1} Y_{t-1}^{-1} q_{t-1} [z_t - \Omega'_{t-1} q_{t-1}]'; & (7) \\ Y_t &= Y_{t-1} + g^{-1} [q_{t-1} q'_{t-1} - Y_{t-1}],\end{aligned}$$

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 Ω_t .

- Actual DGP:

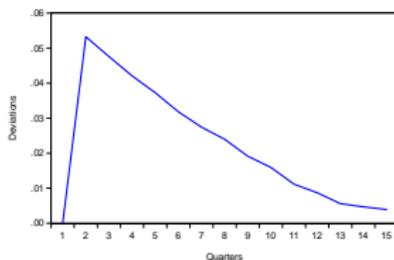
$$z_t = T^0(a_{t-1}) + T^b(b_{t-1})z_{t-1} + T^r(c_{t-1})r_{t-1}$$

Effects of Imperfect Credibility

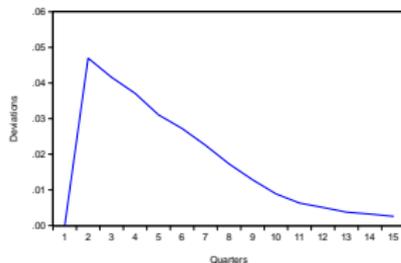
- If the economy transitions to a PF/AM regime following a sudden increase in the holdings of government debt, and the fiscal authority has imperfect credibility, how do interest rates respond?
- When the fiscal authority is imperfectly credible, when will the model be expectationally stable?
- Parameters:
 - 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

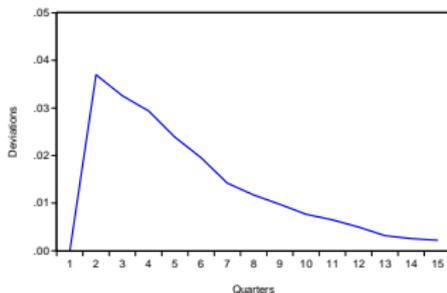
3-MONTH RATE



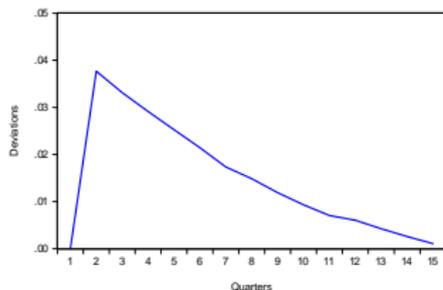
10-YEAR RATE



OUTPUT

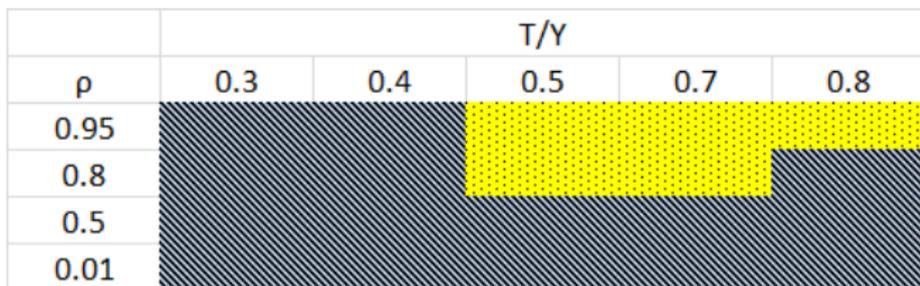


INFLATION



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

E-Stability Regions for debt maturity ρ 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?