

# UK: Fiscal Sustainability Analysis

# Fiscal Sustainability Analysis: Some Definitions

**Public Debt**: refers to the total amount of money that a government owes to creditors.

**Debt as % of GDP**: a metric that measures a country's public debt relative to its GDP.

**Primary Deficit/ Surplus**: Primary Deficit (Surplus) refers to the difference between a government's total revenue and its total expenditure, excluding interest payments on existing debt.

# Fiscal Sustainability Analysis: Some Definitions

**(Intertemporal) Government Budget Constraint:** The intertemporal government budget constraint refers to the relationship between a government's current and future revenues and expenditures

**Ricardian Equivalence:** is an economic theory suggesting that government borrowing does not affect the overall level of demand in an economy

# Introduction: Sustainability of Public Finance

In modern Macroeconomics, when we investigate the Sustainability of Public Finance, we focus on the Government's Budget Constraint (G.B.C.), which can be described by the following equation.

$$B_t = (1 + r_t)B_{t-1} + G_t - T_t$$

If the initial Debt  $B_0$  is  $>0$ :

In the future the government should run surpluses to repay its debt.

Notation:

- $B_t$  : Current Public Debt Levels
- $G_t$  : Government Expenditures
- $T_t$  : Tax Revenues

The difference between the Government spending and revenues is the primary deficit (D)

# Introduction: Sustainability of Public Finance

Step1: Divide with the aggregate price level, so we get rid of inflationary effects.

$$\frac{B_t}{P_t} = (1 + r_t) \frac{B_{t-1}}{P_{t-1}} \frac{P_{t-1}}{P_t} + \frac{G_t}{P_t} - \frac{T_t}{P_t}$$

# Introduction: Sustainability of Public Finance

Step2: As we mentioned earlier, the public debt is usually expressed as a percentage of the country's GDP.

$$\frac{B_t}{P_t Y_t} = (1 + r_t) \frac{B_{t-1}}{P_{t-1} Y_{t-1}} + \frac{G_t}{P_t Y_t} - \frac{T_t}{P_t Y_t}$$

# Parameter Z: Equilibrium outcome of the Economy

By expressing the Government Budget Constraint as a percentage of nominal GDP and accounting for interest payments, inflation, and the real GDP growth rate, the following relationship holds:

$$b_t = \frac{(1 + r_t)}{(1 + \pi_t)(1 + \gamma_t)} b_{t-1} + d_t$$

$$\text{Let: } 1 + z_t = \frac{(1 + r_t)}{(1 + \pi_t)(1 + \gamma_t)}$$

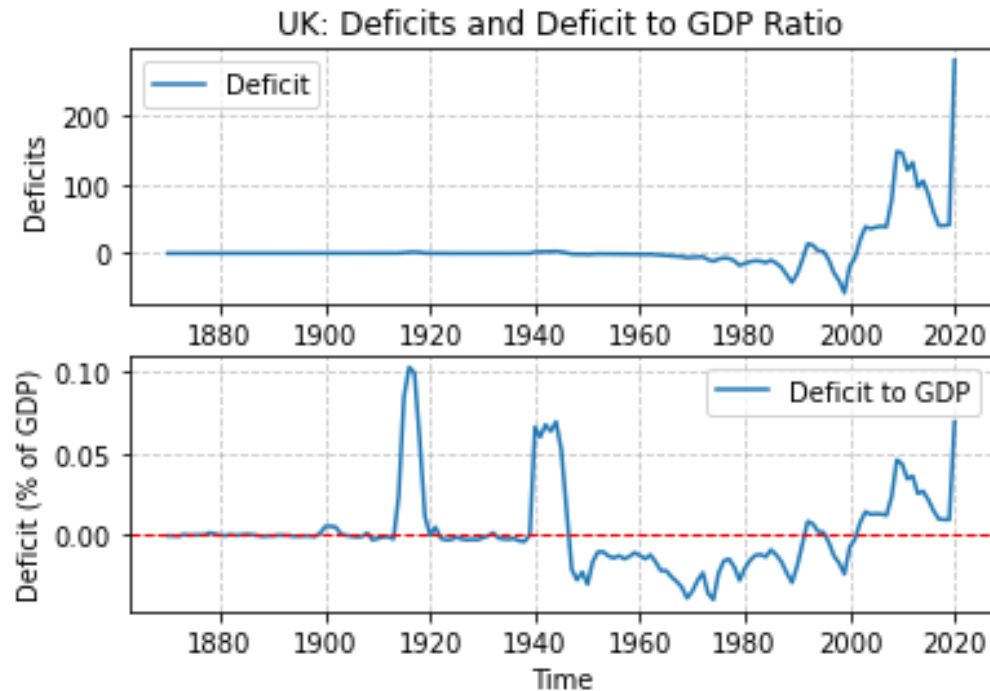
# Specific Measures about UK



- Before 1920: Clear downward trend
- Spike during the 2 world wars (1914, and 1940), reaching a peak of over 250% in 1945
- Downwards trends continued, with notable surges during the 2008 financial crisis and the 2020 pandemic.
- In 2020: UK's Debt-to-GDP levels are 100.44%



# Deficits and Deficits as % of GDP



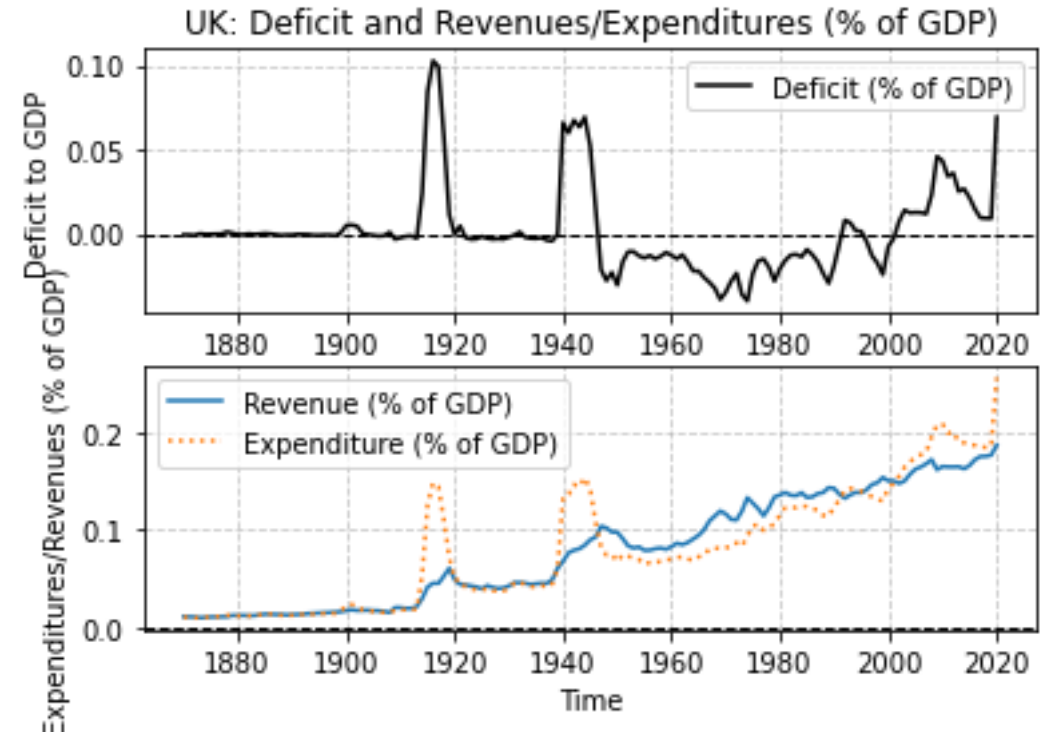
- Late 19<sup>th</sup> Century: modest deficits

- World War I (1914-1918): Huge deficits to finance UK's involvement in the War

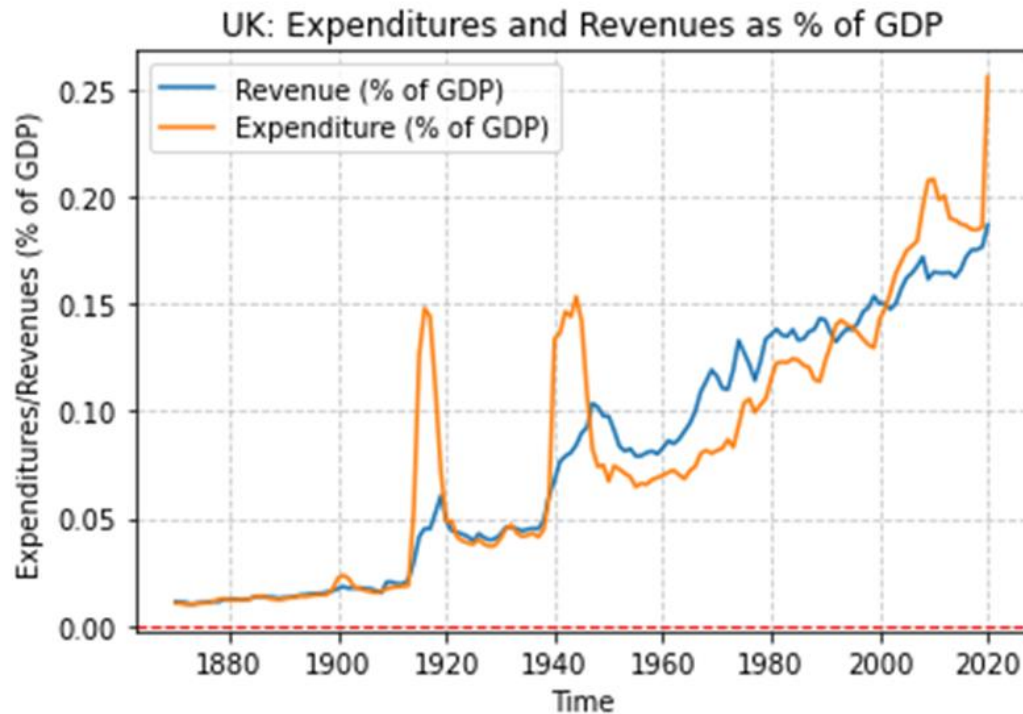
- World War II (1939-1945) brought even larger deficits

# Deficits and Deficits as % of GDP (pt.2)

- Oil crisis (1970s): Brought deficits
- Great Recession (2008): Sharp increase in the deficit to maintain stability.



# Government Expenditures/ Revenues



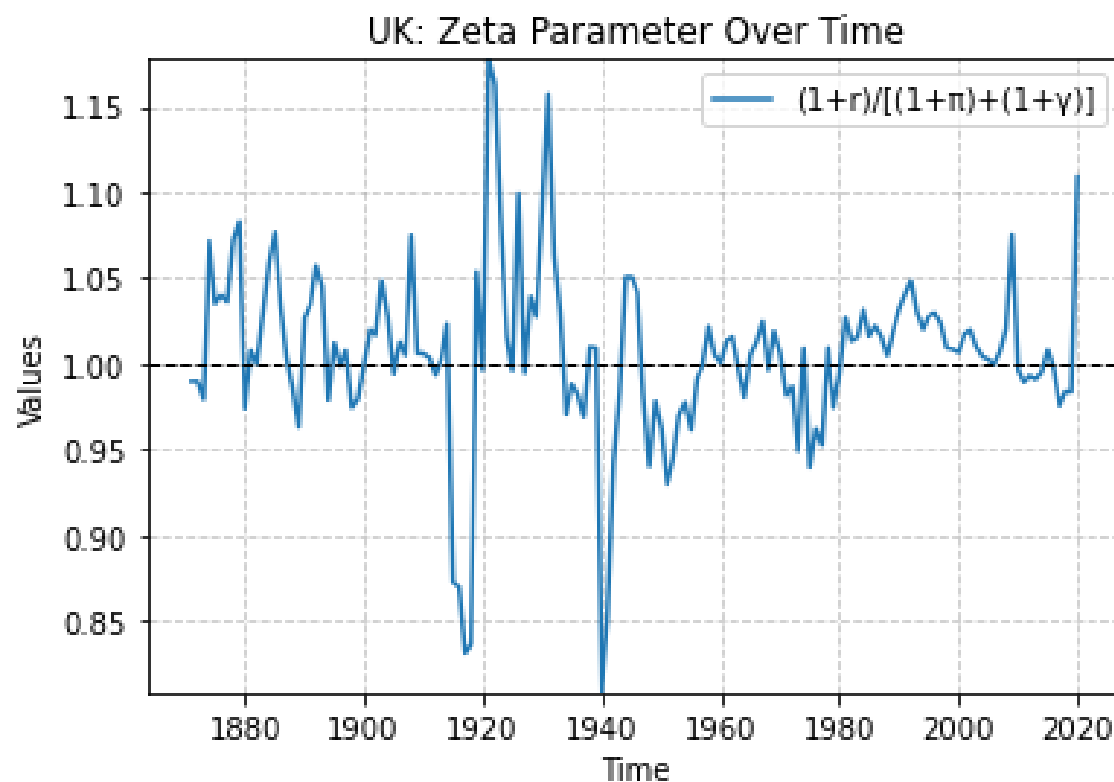
- Expenditures: Increase during periods of high geopolitical risks and uncertainty
- Government Revenues (receipts): Also increase at crises but in smaller proportions than the expenditures.

# Sustainability of Public Debt

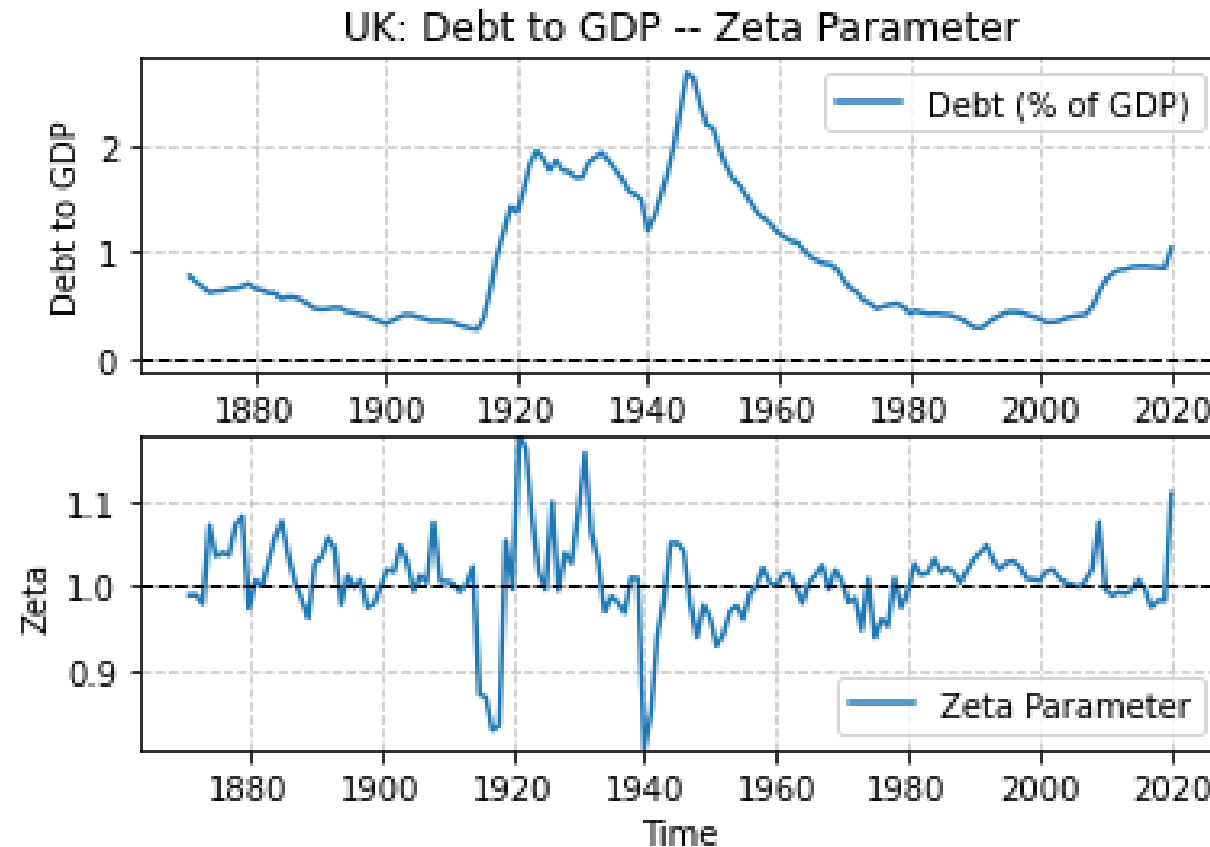
- According to the Governments' Intertemporal Budget Constraint theory the debt-to-GDP ratio of the present can be calculated as the following equation suggests:

$$b_t = \frac{(1 + r_t)}{(1 + \pi_t)(1 + \gamma_t)} b_{t-1} + d_t$$

$$1 + z_t = \frac{(1 + r_t)}{(1 + \pi_t)(1 + \gamma_t)}$$



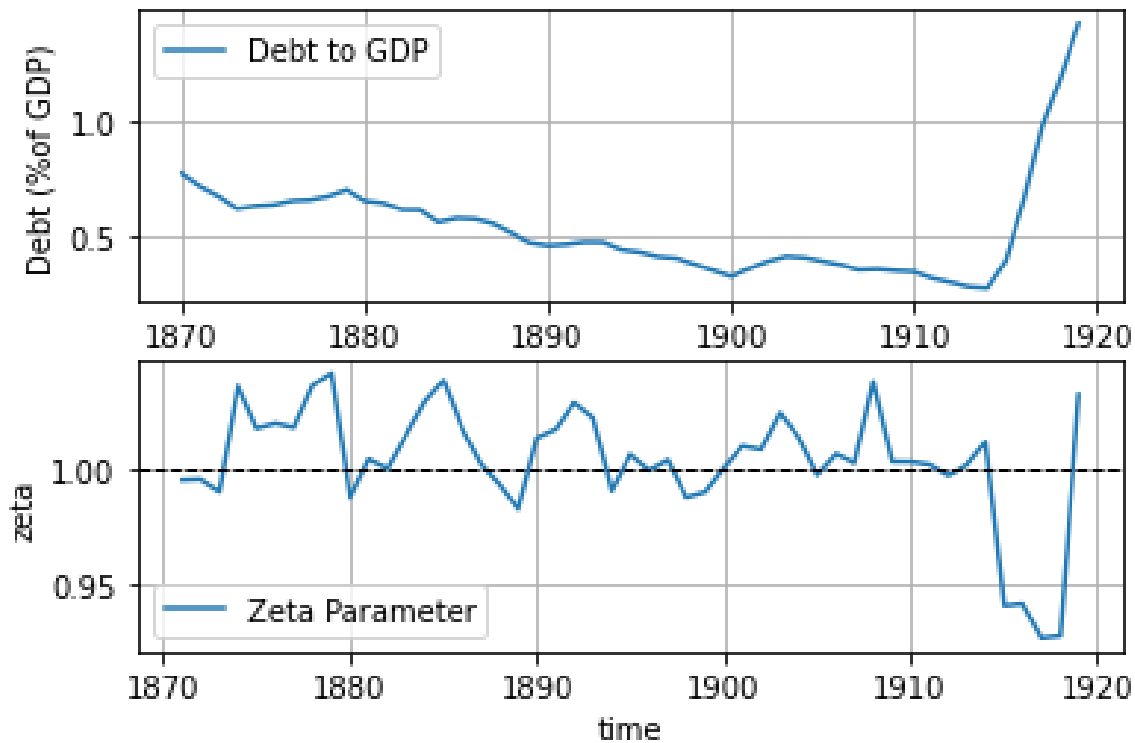
# Debt to GDP growth rate and Zeta Parameter



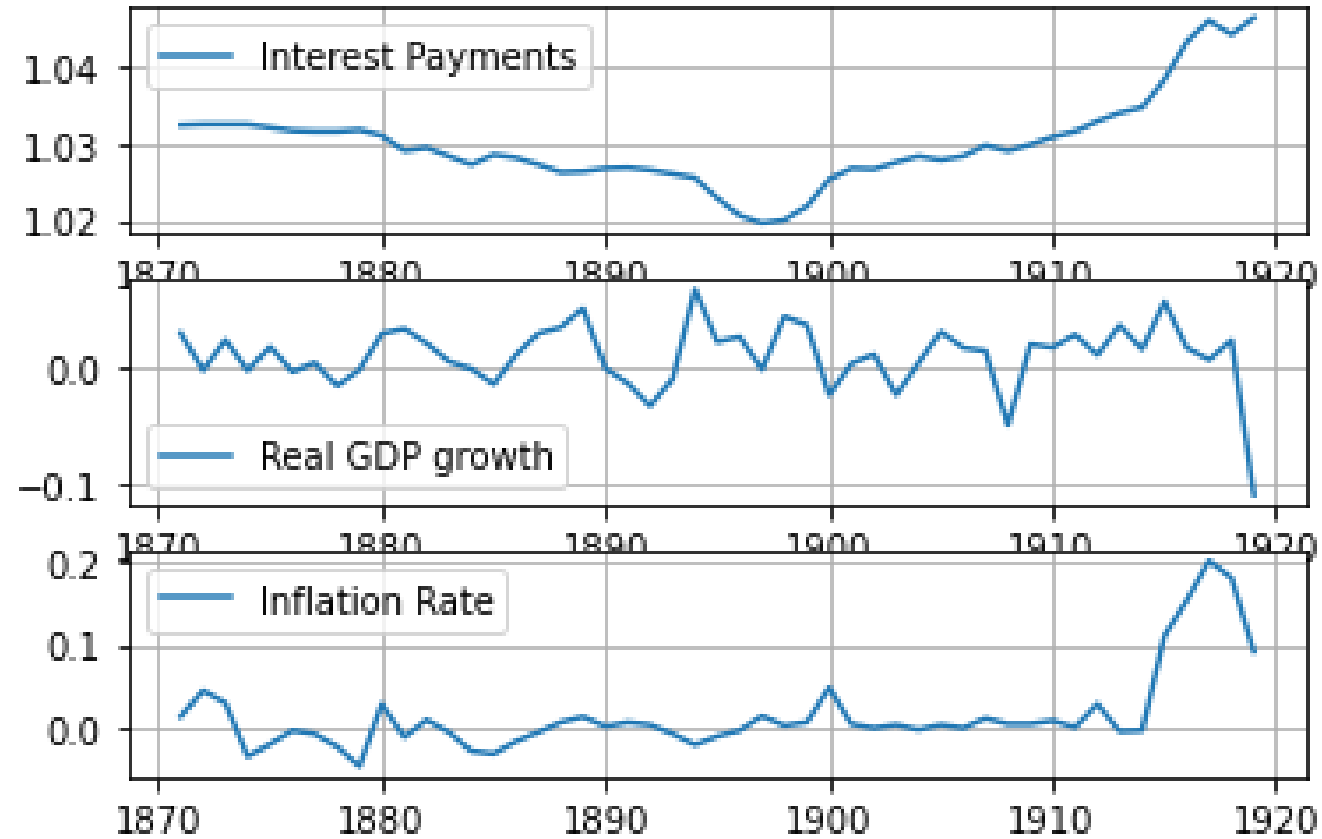
Higher interest payments in relation to the nominal GDP growth rate, for an extended period suggests higher accumulation of public debt.

# Decomposition of the Zeta parameter (1<sup>st</sup> Period: 1870-1920)

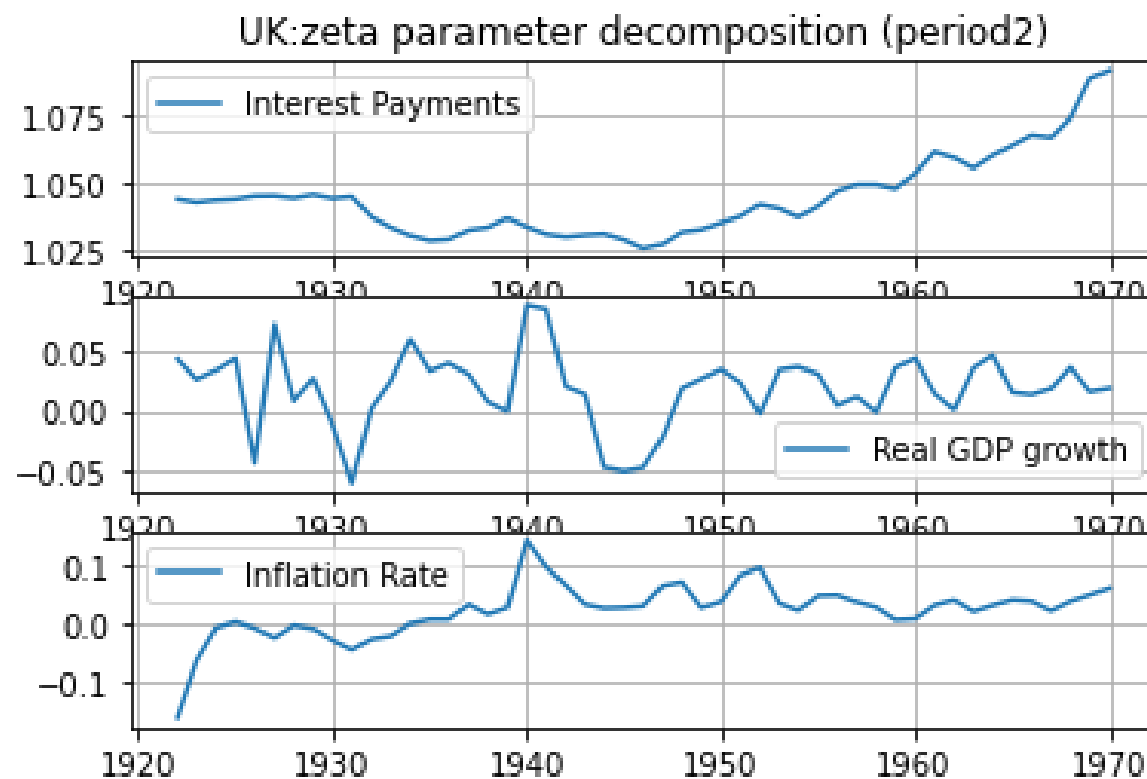
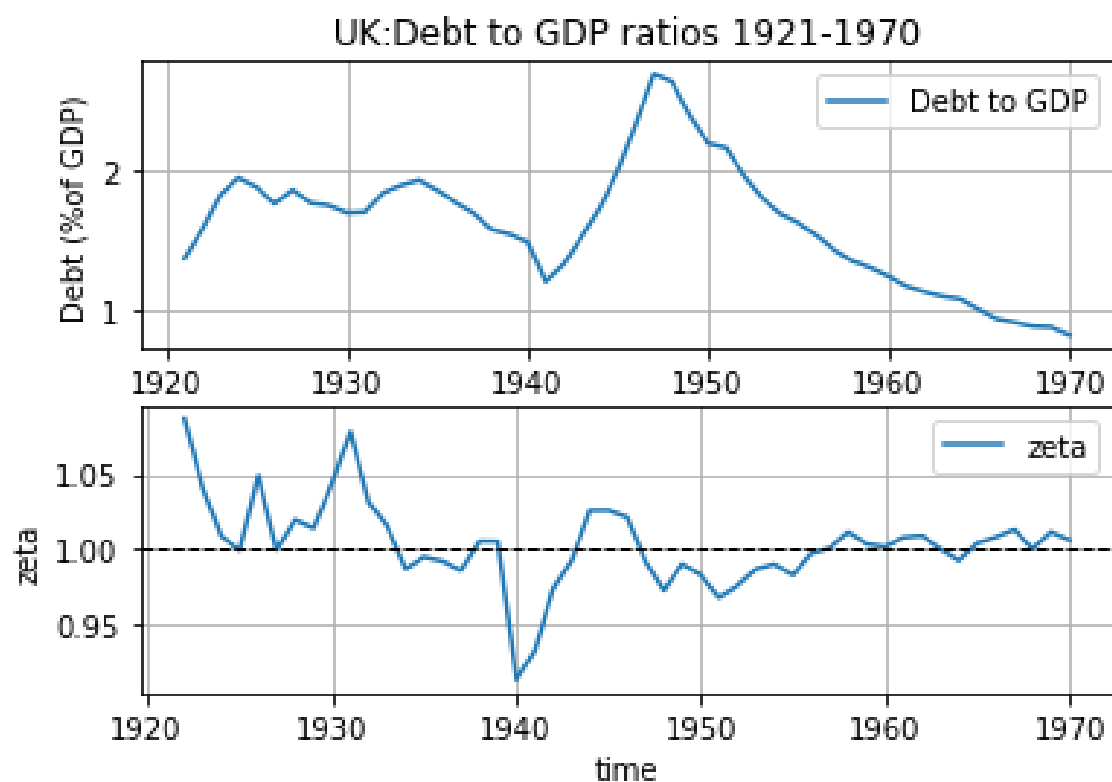
UK:Debt to GDP ratios 1870-1920



UK:zeta parameter decomposition (period1)



# Decomposition of the Zeta parameter (2<sup>nd</sup> Period: 1921-1970)



# Decomposition of the Zeta parameter (3<sup>rd</sup> Period:1971-2020)

