

Managing the UK National Debt 1694-2016 – II Debt Dynamics

Along with Martin Ellison of Oxford University I have for the last couple of years been working on creating a historical database of UK government debt. A number of authors have made extensive use of the fact that for the UK we have more than 300 years of public finance data. Our contribution has been to create a database for the *market value* of UK government debt built up bond by bond and based on the individual price of each bond. Further details (and a lot of details) are available in the actual paper on which this blog is based. For a summary of some of the key features of the data read *Managing the UK National Debt 1694-2016 – I The Data*. In this blog we focus on what the data tells us about how the government has achieved fiscal sustainability over the past 300 years. In a future blog we will summarise the implications of our results for debt management.

Introduction

Over more than 300 years of data the UK government debt has shown huge swings. There are four factors that lead the market value of debt to change over time

- The cost of funding – each period the market value of debt changes because the government has to pay coupons on outstanding debt (an interest expense) and bond prices may rise or fall which will lead to a change in the market value of debt
- Inflation – Our focus is on the Nominal Debt/Nominal GDP ratio. High inflation means high nominal GDP growth and so other things being equal a lower debt/GDP ratio. In other words what matters for the government is the real cost of funding so we need to deduct inflation from the nominal return listed above
- Real GDP growth – Again because our focus is on the Nominal Debt/Nominal GDP ratio higher GDP growth produces a lower Debt/GDP ratio all other things equal. In other words, what matters for the government is the growth adjusted real cost of funding.
- Government Borrowing –The government will also see its debt rise if it runs fiscal deficits.

We use our 300 years of data to examine which of these four factors has played the most substantial role in explaining debt dynamics and in achieving debt sustainability.

Three Centuries of Debt Dynamics

The table below shows the results of our decomposition of debt dynamics for the period 1730 to 2015 and breaks the results down to a variety of sub-samples.

	Start Debt to GDP	End Debt to GDP	Change in Debt to GDP	Contribution of Nominal Return	- of which coupons	- of which revaluations	Contribution of Inflation	Contribution of GDP growth	Contribution of New Debt
1730-2015	67.8	101.0	33.3	888.1	825.7	62.4	-236.7	-423.8	-194.3
1730-1815	67.8	122.9	55.1	249.9	270.8	-20.9	-65.8	-96.1	-32.9
1816-1913	122.9	17.0	-105.9	372.2	301.2	71.0	36.1	-189.1	-325.1
1914-2015	17.0	101.0	84.1	266.0	253.8	12.3	-207.0	-138.6	163.7
1730-1763	67.8	91.7	23.9	63.6	69.1	-5.5	-5.0	-22.3	-12.4
1764-1815	91.7	122.9	31.1	186.3	201.7	-15.4	-60.8	-73.9	-20.5
1816-1913	122.9	17.0	-105.9	372.2	301.2	71.0	36.1	-189.1	-325.1
1914-1945	17.0	127.2	110.2	125.5	106.5	19.0	-59.6	-53.6	98.0
1946-1970	127.2	26.2	-101.0	32.9	60.1	-27.3	-81.0	-46.1	-6.8
1971-1997	26.2	39.6	13.4	61.3	55.7	5.6	-55.2	-19.2	26.5
1998-2015	39.6	101.0	61.4	46.3	31.4	14.9	-11.3	-19.6	45.9

Over the entire period the debt/GDP ratio rises from 68% to 101% but in between there are very large swings. Because ours is such a long historical period we also show results broken down by different sub-samples. We can expect the means by which governments achieved fiscal sustainability to have varied over different periods.

- *Bond holders have over the entire sample period achieved good rates of return and this is the main single factor driving debt upwards over time.*

Over the entire sample period bond holders received an average nominal return of 4.4% whilst inflation was 1.9% - so a 2.5% real return. Allowing for GDP growth of 1.8% the real growth adjusted cost of funding for the government was positive and so has placed continual upward pressure on the level of debt

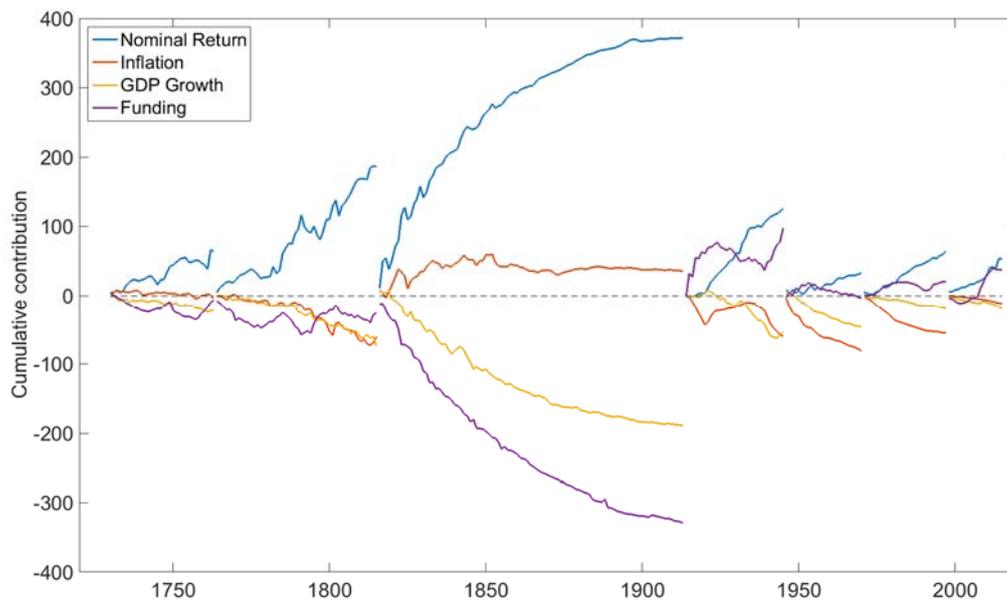
- *Over time the government has kept debt at broadly sustainable levels through running primary fiscal surpluses (e.g. excluding interest payments government revenue has exceeded government expenditure).*

The upward impact on debt from funding costs (the 4.4% nominal average return) amount to 888% GDP but adjusting for inflation (-237%) and GDP growth (-424%) this would have seen the Debt/GDP ratio rise 227% (888-(237+424)). However debt only increased by 33% of GDP because the primary surplus reduced debt over this period by 194%. Over 300 years of government debt the government has on average run primary surpluses to repay back their past borrowing.

That Time it Was Different

Taking averages over a period of more than 300 years can be misleading. Closer inspection reveals that the twentieth century saw very different debt dynamics compared to the rest of history.

- *The twentieth century saw a change with governments running consistent fiscal deficits.*



The Figure above shows our decomposition of debt dynamics for several sub periods. Clearly before the First World War nominal returns drove debt upwards and more than offset any downward effect from inflation and GDP growth. Debt sustainability was achieved by running continual primary surpluses (“Funding” line tracks downwards showing how surpluses paid down the debt). After the First World War things are different and the effect of the fiscal deficit is to raise debt throughout the 20th century sub periods.

- *Inflation and weak returns for bond holders in the twentieth century also helped contribute to stabilising the debt level. Compared to the US the UK financed Second World War debt through inflation (and devaluation).*

After the First World War nominal returns are lower and growth and inflation are much higher and reduce the cost of borrowing for governments. This is particularly so for the period 1946-70 when the real return on bonds was -1.9% and growth adjusted -4.7%. Comparing this with US results from Hall and Sargent the UK post Second World War used inflation (and devaluation) to keep debt sustainable.

- *Since the 2007-9 financial crisis government debt has been pushed up in equal amounts by the running of fiscal deficits as well as the rise in bond prices, especially long bonds*

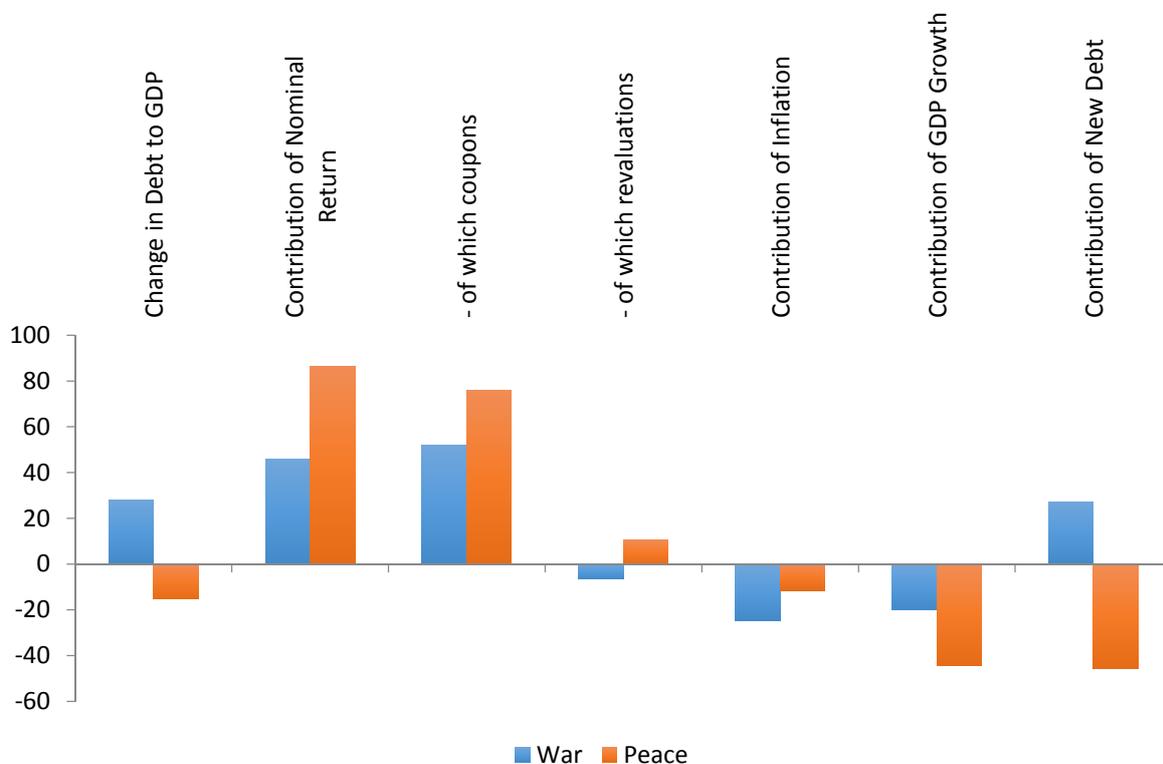
The last period in the above Figure shows the behaviour of UK government debt since 1997. The fact that government debt has increased in response to a series of substantial fiscal deficits is well known. More surprisingly the Figure shows that an equally important increase in debt has occurred because of increases in the market value of debt. Whilst real interest rates have been low the capital gain on bonds over this period has meant the one period holding return for investors (the cost of government borrowing) has been high.

How to Pay for the War(s)

One major reason for fluctuations in government debt in our sample period is wars. Focusing on periods of major conflicts which saw substantial increases in government expenditure we can use our data to see how debt dynamics differ between times of war and times of peace over the last 300 years.

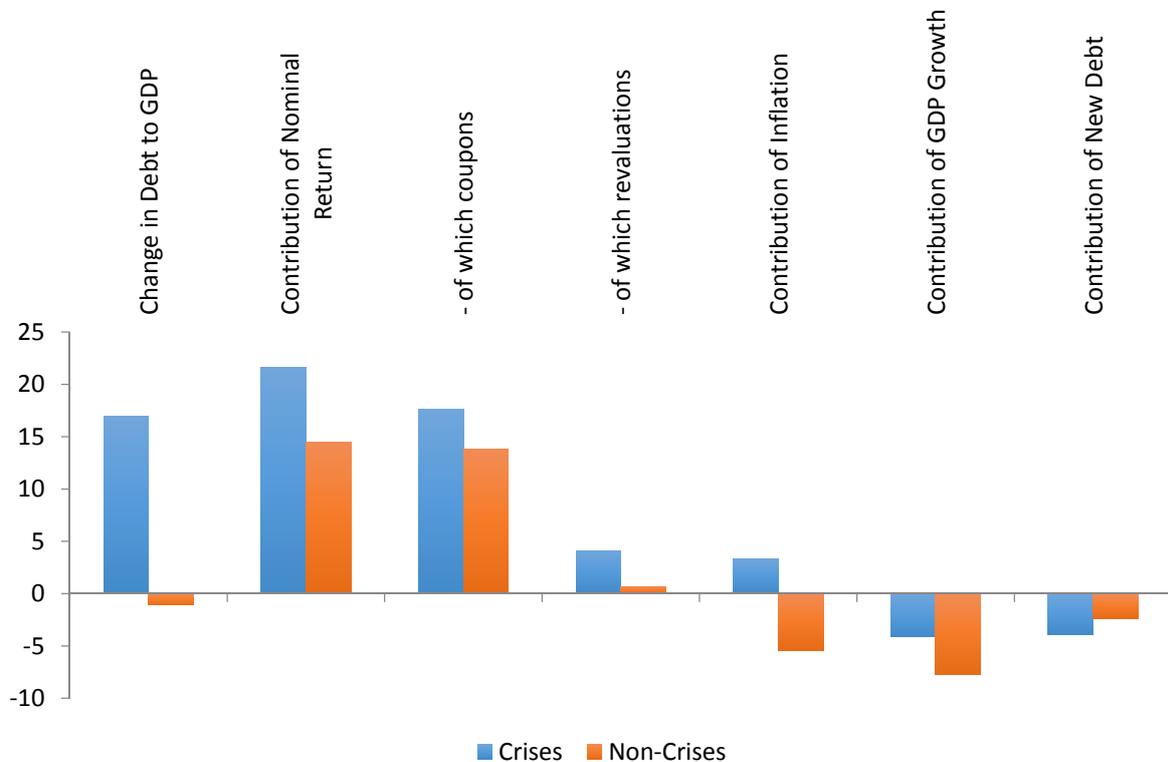
We show the results below for 7 major conflicts with timings based on the level of government expenditure (1740-49 War of Austrian Succession including King George’s War and War of Jenkins’ Ear; 1756-64 Seven Years War; 1775-1786 War of American Independence, Anglo-French War, Anglo-Spanish War; 1793-1815 War of French Revolution and Napoleonic Wars; 1853-56 Crimean War; 1914-1919 First World War; 1939-1946 Second World War)

- Wars are mainly financed by peace time surpluses but inflation and low real returns to investors (0.7% during war and 2.3% at other times) also play a role. The effect of wartime inflation mainly operates through long bonds.



Financial Crises

The 2007-9 Financial Crisis saw a major increase in government debt. Our sample period contains 6 major financial crises (1825, 1837-42, 1847, 1857, 1866 and 2007-9) and enables us to see how governments finance financial crises.



- *On average financial crises increase government debt but not always*

The 2007-2009 crisis saw an increase in debt of 61% GDP which is the largest of any of the financial crises. 1837-1842 saw a 24% increase, 1847-1850 a 15% increase whilst the three other financial crises saw debt fall.

- *In the 19th century governments ran fiscal surpluses during financial crises and this helped stabilise debt. In the aftermath of 2007-9 the UK government ran deficits that led debt to rise*
- *Lower levels of inflation (and sometimes deflation) put upward pressure on debt during financial crises.*
- *The cost of borrowing increases in the aftermath of a financial recession and this pushes the market value of debt upwards.*

Interest rates tend to fall in the aftermath of a financial crises so that bond prices rise in value. This is particularly so for long bonds. This capital gain raises the one period holding return for investors and so increases the cost of borrowing for governments and increases the market

value of government debt. During periods of financial crises the real return on long bonds is 4.7% compared to 0.2% otherwise. In the most recent crises long bond holders earned an average real return of 4.5%.

- *Long bonds help contain debt during periods of war but push up the value of debt in the aftermath of financial crises.*

The above is a summary of our results on debt dynamics for the UK over the last 300 years. For more data on the structure of UK government debt see **Managing the UK National Debt 1694-2016 – I Data**. If you are interested in the dataset or a copy of the paper “Managing the UK National Debt 1694-2016” by Martin Ellison and Andrew Scott then please email martin.ellison@ox.ac.uk or ascott@london.edu .

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