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Managing a Century of Debt

John FitzGerald and Seán Kenny***

Abstract

This paper provides a consistent series for the Irish national debt since the foundation of the state in 1922. It also provides a continuous series for bond yields over the same period. The paper examines the factors behind the fluctuations in the debt burden over almost a century. The management of the debt burden by the Irish authorities has evolved over time, seeking to minimise both the burden on the economy and the risks which the debt represented to the state. The paper also examines how the cost of borrowing for the Irish government compared to that for the UK and, since the break with sterling, for Germany. This cost of borrowing was, in turn affected by developments in the domestic economy.

Keywords: Public Debt; debt sustainability; debt management; fiscal policy; Ireland.

JEL Codes: E62; H6; H63; N00; N14.

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1. Introduction

When Ireland became independent in 1922, it had gone through a period of armed conflict with the United Kingdom authorities resulting in substantial property damage, though on a much smaller scale than that experienced by many other European countries as a result of the wars of the 20th century. Within the first two years of independence, a civil war broke out within the country, causing further damage to infrastructure and to the wider economy. As a result, the new country faced a significant bill in 1923 to compensate those who had suffered physical damage to property and to finance the necessary rebuilding of the country. In addition, as part of the Treaty that agreed the break-up of the United Kingdom of Great Britain and Ireland, Ireland accepted liability for a share of the UK national debt. We consider the subsequent history of the national debt and how it was managed by successive governments up to the advent of the recent financial crisis. The management of the build-up of debt from 2008 onwards is discussed in FitzGerald and Lane (2017).

As part of the Treaty in December 1921 establishing the Irish Free State, Ireland had a very large contingent debt liability due to the commitment in the Treaty to accept a share of the UK national debt, which would have represented between 80% and 90% of GNP (FitzGerald and Kenny, 2017). However, as a result of a further agreement with the UK government in December 1925, the UK wrote off Ireland's liability for its share of the UK debt. As a result of this agreement, and prudent fiscal management in the early years of the state, the level of public debt remained quite low, peaking at just over 40% of GNP in 1938. By the mid-1920s the Irish government was able to borrow at interest rates quite close to those enjoyed by the UK government and the debt burden did not place a major constraint on the economy.

Because Ireland was neutral during the Second World War, unlike the majority of Europe, it suffered almost no property damage. With continuing tight budgeting, after the war Ireland still had a debt burden of less than 30% of GNP in 1947. This contrasted with the situation across the rest of Europe where the debts accrued in financing the war were magnified by the necessity to fund huge rebuilding programmes to deal with the devastation wrought by the War itself.

From 1950 through to the mid-1960s, the burden of debt rose to around 60% in 1960, remaining at that level throughout most of the 1960s. It was only with the response to the oil price crisis of the 1970s and the period of fiscal profligacy in the late 1970s, that the burden of the debt was allowed to surge. Over the 1960s and much of the 1970s the risk premium for Irish government debt relative to UK government debt was very low, sometimes even negative. It was only with the breaking of the link with sterling in 1979 that the path of government bond rates in the two jurisdictions diverged.

The late 1970s and the first half of the 1980s saw a dramatic increase in debt as a result of expansionary fiscal policy in the late 1970s. While action to tackle the fiscal crisis was implemented from 1983 onwards (Honohan, 1999; Kearney *et al.*, 2000; Kearney, 2012), the crisis was only fully brought under control by the end of the 1980s. As a result, the debt burden peaked at just under 120% of GNP in 1988. The fact that the state of public finances had deteriorated so acutely in the early 1980s, with government borrowing peaking at nearly

14% of GNP in 1982, meant that interest rates were appropriately high. A consequence was that payments of interest on the debt comprised almost 10% of GNP in 1985.

The 1990s saw quite a rapid fall in the debt burden, largely as a result of real growth in the economy. Over the 1990s inflation averaged only 2.5% a year, in contrast to the 7.7% a year in the 1980s, so that inflation did not play a major role in reducing the debt burden. With the government generally running a surplus from the late 1990s through to 2007, the debt burden continued to fall.

This paper develops a broadly consistent series for the national debt from the foundation of the state. Using linked series for GNP and other key aggregates it examines the development of the debt burden over time. It considers how the Department of Finance, and subsequently the National Treasury Management Agency, managed the debt, including the choices they made on whether to borrow abroad and the maturity profile of the debt. Finally, the cost of borrowing, which was affected both by external developments and by the perceived riskiness of the Irish economy, is discussed.

2. Data

Here we provide a brief outline of the sources of the data used in this paper and how the data have been adjusted to provide consistent series over time. Full details of this work are given in the data appendix, available on request.

The key contemporary source of data on the debt is the numbers produced by the CSO based on standard EU rules. The definition used ensures that there is no double counting and that all the liabilities of the state are included. Using these definitions, the CSO publish data on the General Government debt from 2000 onwards. The Department of Finance have published an estimate of what the debt was using these definitions for the period 1990 to 2000. Prior to 1990, the primary source of information on the debt is the *Finance Accounts*. This publication has appeared on an annual basis since 1922/23.

The accounting treatment of some of the items has not been entirely consistent in the Finance Accounts over the full period from 1922 to today. While the data, in principle, only cover the liabilities of the Central government, in practise since the 1930s these are close to the liabilities of the general government sector (including the local authorities), as most of the borrowing for Local Authorities was undertaken by central government and passed to the Local Government sector as transfers. A further problem with the Finance Accounts data is that they do not directly provide a figure for the consolidated liabilities of the state, as there were a range of different Funds which complicate the accounting treatment.

For the period to 1973, the government financial year ran from the 1st of April to the 31st of March of the following year. In 1974 there was a nine month financial year as the accounts transitioned to a full calendar year basis from 1975. All the data in the Tables in this paper are shown on a financial year basis. For example, while the end year debt figures are for the 31st of March up to 1974, data on debt are generally shown as relating to the calendar year covering nine months of the financial year: e.g. the debt data for the end of the financial year 1924/5 are shown as the debt for 1924 in graphs and tables.

In so far as data are available, a consistent series for the debt has been prepared for the years 1922 to 1990 from the Finance Accounts. This series has then been linked to the CSO based series from 1990 to the present. In fact, for 1990 the two series are close: the General Government Debt (CSO data) for 1990 was roughly €34 billion whereas on the Finance Accounts basis it was €32 billion.¹

In 1925, as part of the financial settlement with the UK, it was agreed that Ireland would accept a liability of £5 million to be paid off over 60 years. In the Finance Accounts, this capitalised debt does not appear until 1943/4. However in the debt figures shown in Appendix Table A1, an estimate of the amount of this debt outstanding each year is included. It begins with an addition of £5 million to the debt figure for 1925 and declines thereafter as some debt is repaid. The numbers are consistent with the figure for the residual sum included for the first time in the accounts for 1943/4.

Land Bonds issued after the foundation of the state are treated as a state guaranteed liability and not included in the national debt figures in the Finance Accounts. This is because these bonds were issued by a separate public body and the interest and repayment of this debt was to be funded by a stream of payments by beneficiaries of the land purchase funded by this body. However, some of this liability was shifted onto the state's debt figures in the Finance Accounts for 1933/34 when the state decided to reduce the land annuities paid by the beneficiaries of land purchase. This makes it clear that ultimately these bonds were a liability of the state and, as a result, the debt series in this paper includes them as part of the national debt.

Over the years the Finance Accounts changed from treating the debt gross of financial assets held in state funds to treating it net of some of these assets. In 1988 the treatment reverted to a gross debt basis. Here we treat the debt on a gross basis and show a separate series for financial assets and net debt. The EU definition of financial assets, to be deducted to produce the net debt figure, is broader than the Finance Accounts definition. The former includes the assets of the National Pension Reserve Fund, now the Irish Strategic Investment Fund as part of the EU definition of liquid assets, whereas the Finance Accounts only included cash or bank deposits. Here, we deduct only the liquid financial assets included in the Finance Accounts to derive a modified net debt figure.

Up to the 1980s, the Finance Accounts include borrowing for the postal and telephone service. However, the borrowing to fund these services was excluded from the national debt from 1987 onwards reflecting the establishment of the post office as a commercial state body. As a result, there is a discontinuity in the debt series between 1986 and 1987: in 1986 the post office debt amounted to 1.2% of GNP, a figure excluded from the 1987 debt figure.

Significant changes in definitions were introduced in the Finance Accounts in 1975 and again in 1988. Up to 1975 the figures for the debt denominated in foreign currency was based on the exchange rate in the year in which the money was borrowed, but from 1976 onwards the debt is valued at the then current exchange rates. However, the Central Bank reports give the

¹ Irish pounds have been converted to euros using the standard conversion of £IR 0.787564 = € 1

debt for earlier years at current exchange rates and these data are used in deriving the consistent debt series using current exchange rates.²

Between 1954 and 1988 the national debt figure included borrowing under the housing acts and other similar capitalised liabilities. However, in 1988 they were excluded from the debt figure as they represented double counting – they were liabilities of local authorities to central government. As a result, they are excluded from the consistent debt series for the full period.

The 1988 changes in definition moved the accounts to a consistent treatment of the debt on a gross basis. It also regularised the treatment of foreign borrowing, where the proceeds of the borrowing were temporarily held in an account outside the Central Bank and not included in the national loans figure for the relevant year. This had been an important feature of the accounts from the early 1980s.

In the early years of the state Local Authorities had additional debt – borrowings from the private sector. However, from 1922 Local Authorities increasingly depended for funding on transfers from Central Government. Thus in the early years, the national debt figure slightly underestimates the debt of Public Authorities as it does not include local authorities’ debt. However, this issue steadily declines in significance over time.

The series for GNP at current prices is generally taken from CSO publications, as set out in Table 1. The approach used for the earlier years generally follows Kennedy (1971). In each case the series are linked at an overlap year – the earliest year in the latest series is linked to the earlier series for that year. Three CSO sources are used to take the series back to 1947. Before that date, the series are less satisfactory due to changes in definitions. A full description of the approach used is given in Appendix 1.

Table 1: Source National Accounts Data

	Publisher	
National Income and Expenditure, 2016	CSO	1995-2016
CSO Historical National Accounts	CSO	1970-1995
National Income and Expenditure, 1977	CSO	1960-1970
National Income and Expenditure, 1971	CSO	1958-1960
National Income and Expenditure, 1969	CSO	1947-1958
Irish Statistical Survey, 1956	CSO	1938, 1956
McCarthy, 1952	JSSISI	1944-1947
National Income and Expenditure, 1938-1944 ³	Dept. of Finance	1938-1944
Duncan, 1939	JSSISI	1926-1938

Data for real GNP are available from 1947 from the same sources as for nominal GNP. Before that date, the CSO gives a figure for 1938 consistent with the published data for the

² It can be useful to have the series where the debt is valued at historic cost as changes in this series this give a better indication of government borrowing.

³ This publication only gave data for national income. These data were used to provide estimates of GNP for the intervening years.

1950s. However, no estimates are available for the years 1939-1946. Instead we use year interpolation for the intervening years. Prior to 1938, series for real national income are used, taken from Duncan (1939). However, these are very rough estimates relying on 3 crude price indices and are interpolated between benchmark census years. Neary and Ó Gráda (1991) using a different approach, show that the Duncan estimates for real growth in the economy in the 1930s are probably too low. However, they do not provide alternative estimates.

The data on national debt interest from 1947 to 2016 are also taken from the national accounts, suitably linked. From 1922 to 1946, the series is derived from the Finance Accounts. However, as discussed in FitzGerald (1986), the Finance Accounts data need to be adjusted because some debt interest was paid from Supply Services and some from extra-budgetary funds.

Three additional adjustments are made to the Finance Accounts numbers to deal with these problems.

The interest on the debt of £5 million agreed with the UK as part of a financial settlement in 1925 is only included in the Finance Accounts from 1945. Here we impute a figure for this payment back to 1926.

The Finance Accounts only provide a figure for payments of interest from Supply Services from 1946. However, back to 1935 a figure is given for debt service costs – including sinking fund payments. This figure for debt service costs changed little between 1935 and 1946 so it is assumed that there was also no change in this element of debt interest over that period.

Finally, interest was also paid by Local Authorities on their borrowings, other than those from Central Government. The CSO give a figure for national debt interest paid by Local Authorities for 1938 and from 1952 onwards on a consistent basis. The figure for intervening years is obtained by linear interpolation.

Data on general government borrowing on a consistent EU basis are available from the CSO back to 1995. The National accounts provide data on a consistent basis for net borrowing by the government (Public Authorities) back to 1953, though there are some relatively minor discontinuities over that period in this series. From 1922 to 1952 borrowing is taken to be the difference between government revenue and expenditure, as recorded in the Finance Accounts. New borrowing is excluded from revenue and debt repayments, including payment to sinking funds, are excluded from expenditure.

Between 1923 and 1953 the change in government net debt is also an indicator of government borrowing, or exchequer deficits.⁴ The borrowing measured using the Finance Accounts for the period to 1952 and the borrowing based on the national accounts figures from 1953 onwards, both closely track the change in the debt.

⁴ With the exception of the sterling devaluation of 1949 there are no major changes that would affect the valuation of existing debt instruments. When the government borrowing figure from the Finance Accounts is regressed on the change in the debt for the period 1930 to 1952 (with a dummy for the valuation change in 1949,) the coefficient on the change in the debt is 0.83 and not significantly different from one.

The yield on Irish government bonds at different maturities has been published by the Central Bank on a consistent basis since 1971. For earlier years, the yield has been derived from data on the sinking funds for individual national loans, published each year in the Finance Accounts.⁵

Each year up to 1970, the sinking funds bought back significant quantities of government bonds. The accounts record the amount paid for the bonds, the face value of the bonds purchased and the interest rate and maturity of the bonds. From this information it is possible to derive the yield at different maturities each year since 1924. However in the period to 1950, because of the preponderance of bonds outstanding with 15 years or more to maturity, it is only for this maturity profile that a consistent series on bond yields is derivable from 1924 to 1970.

With a number of different bonds outstanding over much of the period, the Irish bonds were much less liquid than UK bonds. Thus the yields implied by infrequent transactions that are reported in the papers may not be fully representative. The data from the sinking funds has the advantage that the purchases are generally of a significant size and are likely to give a reasonable estimate of the market yield. The downside is that it is not known on which precise dates within the calendar year these transactions took place.

In the case of each sinking fund purchase, the yield is calculated on the assumption that the state repays on the last possible payment date. This was the case for the bulk of the bonds over the period to 1970.

The simplified formula used is:

$$Y = \frac{C + \frac{F - P}{n}}{\frac{F + P}{2}}$$

Where:

Y	=	Yield to maturity
C	=	Interest payable on the bonds
F	=	Nominal value of bonds purchased
P	=	Amount paid for the bond
n	=	Years to maturity

If data were available on the exact maturity date and the exact dates of payment of interest, a more precise calculation could be conducted as shown in FitzGerald (1986, pp. 58-9).

While the number of separate bonds outstanding in the 1920s was low, the yields suggested by the different sinking funds (for different bonds) appeared broadly consistent. From the

⁵ Nevin (1963) gives data on Irish and UK yields. However, the UK yields are very different from the Bank of England data available in their historical file (Thomas and Dimsdale, 2017). The Irish data are also different from the estimates derived in this study from sinking funds. It may be that Nevin (1963) used shorter dated debt or debt that was not of comparable maturity. Data from the IMF for Ireland also seem to be unrelated to actual yields as observed here.

1930s onwards there are a range of different bonds, where information is available on the amount and price of the purchases made by the state.

Where there are a number of bond purchases within the same maturity band, the yield is calculated as a weighted average of the different purchases using the nominal value of the bonds purchased as a weight. From 1970 onwards, the Irish bond yields are taken from Central Bank reports.

3. Borrowing and the National Debt

In 1922, the new state began with a very small debt burden. However, as a consequence of the war of independence and the subsequent civil war in 1922 and 1923, there had been very considerable property damage. This resulted in a need for major replacement investment and a liability for substantial sums to compensate those who were affected. At the time, there was also an undefined contingent liability for a share of the UK debt, agreed to as part of the Treaty establishing the Irish Free State. It potentially amounted to 85% of GNP and it should have made borrowing by the Irish government seem even riskier to potential investors (FitzGerald and Kenny, 2017).

Given the financial urgency brought about by the civil war, the new government had to rely on short term borrowing from Irish banks for the first few months of its existence, which was aggravated by the difficulties in collecting tax revenues (McLaughlin, 2015). The Governor of the Bank of Ireland took the view in September 1922 that the government's credit was "nil" and that the market would lend them nothing "without a guarantee from the British government" (Fanning, 1978, p. 81). Likewise J.J. McElligott (Assistant Secretary of the Dept. of Finance) recognised the major factor affecting the prospects of the loan- "military uncertainty and the general feeling of insecurity" (Fanning, 1978, p. 83). In April 1923, Joseph Brennan (Secretary of the Department of Finance) replied to a foreign loan offer from the National City Bank (New York) that "internal borrowing would naturally precede external borrowing" (Fanning, 1978, p. 81).

The Governor of the Bank of England, Montagu Norman, expressed his view to Brennan in June 1923 that a National Loan should be postponed until after the elections (Drea, 2014). The election of August 1923 was favourable to the Cumann na nGaedhael administration, returning a total of 102 Treaty supporters. The refusal of the Bank of England and the British Treasury to intervene in Irish affairs forced the hand of the Bank of Ireland and the Irish banks. Norman expressed the view (which Otto Niemeyer in the British Treasury shared) to the Irish commercial banks that they should directly finance the Irish Free State (Fanning, 1983, pp. 73-7). However, the banking sector's concerns about the potential inflationary impact that the national loan would have, were mentioned by a director of the Bank of Ireland. He worried that the Cosgrave government might undertake "some expedient that might be financially disastrous to Ireland" (Fanning, 1978, p. 91). Despite Niemeyer's (Treasury) assurances, on behalf of the Free State to the Irish banks, that such a loan could not be inflationary because "as long as you borrow from the investor you are removing from him the purchasing power," the Irish banks remained unconvinced (Fanning, 1978, p. 96).

Brennan had anticipated the reluctance on the part of the banks and expressed it as early as March 1923: “the attitude of the Banks towards us on the borrowing question appears to make it specifically desirable for us to make more effort than would otherwise be required to raise money from the public in the immediate future” (Fanning, 1978, p. 88). This sceptical outlook amongst the Irish banks on the creditworthiness of the state persisted for the Second National Loan of 1930 and through that decade also (Ó Gráda, 1995, p. 417). Brennan instead, suggested a “tap issue” which would secure public support on terms that do not contemplate redemption for some considerable time- 5 % bonds issued at par which the Government would have the option to redeem at par after twenty years and must redeem after thirty years” (Fanning, 1978, p. 88). By the end of May 1923, following the end of the civil war, Brennan and McElligott interviewed the Dublin Stock Exchange committee and suggested a National Loan to be floated of £25 Million which the latter doubted could be absorbed on the exchange without active cooperation on the part of the banks (Fanning, 1978, p. 90).

Following the success of the existing administration in the elections at the end of August, the Government instead reduced the National Loan to £10 million (of redeemable stocks issued at 95 per cent) and despite further resistance from the Irish banks in agreeing to take up to £4 million [in the event of it being undersubscribed], floated it successfully on the 7th of December, 1923. It was oversubscribed by some £200,000 as a “resounding triumph” as it rose 4 points to 99 on the first day of its dealing on January 7, 1924. Fanning noted (1978, p. 97) “the Irish public clearly had confidence in the credit and financial stability of the state even if their banks did not.” This first national loan amounted to over 4% of GNP.⁶

The share of the UK debt which Ireland had agreed to accept would have amounted to just under £Ir160 million – around 85% of GNP in 1926. However, this liability was never crystallised and it was written off by the UK as part of a wider agreement in December 1925 when the Irish government accepted the status quo border with Northern Ireland (FitzGerald and Kenny, 2017).⁷ As part of that agreement, the Irish government agreed to pay an annuity of £250,000 a year to the UK for 60 years. This was capitalised as £5 million, around 2% of GNP in 1926.⁸

Figure 1 shows the debt/GNP ratio beginning in 1924 when it was just over 7% (The UK contingent debt would have pushed it to over 90% of GNP). With low inflation and government borrowing running at between 0.5% and 1.5% of GNP each year to 1931 (Figure 2), the debt/GNP ratio rose slowly.

The period 1926-31 has been described as one of overall stability in public expenditure in an attempt to “keep taxation down to a minimum and to regulate expenditure accordingly” (Lyons,

⁶ Using the value for GNP for 1926.

⁷ This agreement was enshrined in the Treaty (Confirmation of Amending Agreement) Act, 1925. In Section 1 of the Schedule to the Act the Irish government accepted the current boundary with Northern Ireland. Subsequent Sections reflected the agreement on writing off the liability for the UK national debt while Ireland accepted liability amounting to IR£5 million for compensation for damage to property.

⁸ Given the assumed interest rate, the debt would have been written off over the full 60 years by means of the annual payment. However, the remaining debt of £2.8 million was written off by the UK government in 1968/9.

1973, p. 607) as national debt remained comparatively small by international standards. However, the deteriorating state of the national and international economy in the latter part of the 1920s was felt by the Cumann na nGaedhail administration.

Between 1926 and 1931 the government deficit averaged 1% of GNP (Figure 2). With falling prices and the effects of the Great Depression, nominal GNP fell quite rapidly resulting in a substantial rise in the debt/GNP ratio. The deteriorating public finances meant that the government was forced to introduce a supplementary budget in November 1931.

Against the advice of the department of Finance, the government raised taxation in order to maintain spending levels prior to the upcoming election. A Finance memorandum stressed that other government departments had “yet entirely failed to realise the serious financial position of the country,” as an increase in the deficit transpired through increases in expenditure and falls in revenue (Fanning, 1978, p. 214, 211). It was highlighted that this was not an “unexpected development,” as longer term commitments had been made “in respect of salaries and pensions and of subsidies of various kinds to local authorities,” while the “yields of all tax fell” as “national income was steadily contracting” (Fanning, 1978, p. 212). The Department of Finance in fact had failed to block the Shannon Hydroelectricity scheme of 1927, despite its premier position within the new state. In line with the inherited British model, government seldom questioned its decisions (Bielenberg and Ryan, 2013, p. 10).

Indeed, the year 1931 marked a turning point for over the next two years there was a pronounced rise in the public sector share of GDP stemming from both a large increase in expenditure and a substantial decline in national income (O’Hagan, 1980). In 1931 public expenditure accounted for around 11.6% of GNP whereas by 1933 it had exceeded 15%.

The incoming Fianna Fáil administration of 1932 was issued a “warning which cannot be ignored” via another Finance memo concerning decreases in “barometer tax” yields (Fanning, 1978, p. 220). It was stated that “trade is bad, the national income has fallen, the burden of taxation has increased absolutely and relatively and we are definitely approaching a point beyond which additional taxation will cease to be productive” (Fanning, 1978, pp. 222-3). Though previously the budget had been prepared by the Department of Finance, the new administration politicized the function by allocating that responsibility to the Minister and Cabinet (Bielenberg and Ryan, 2013, p. 13).

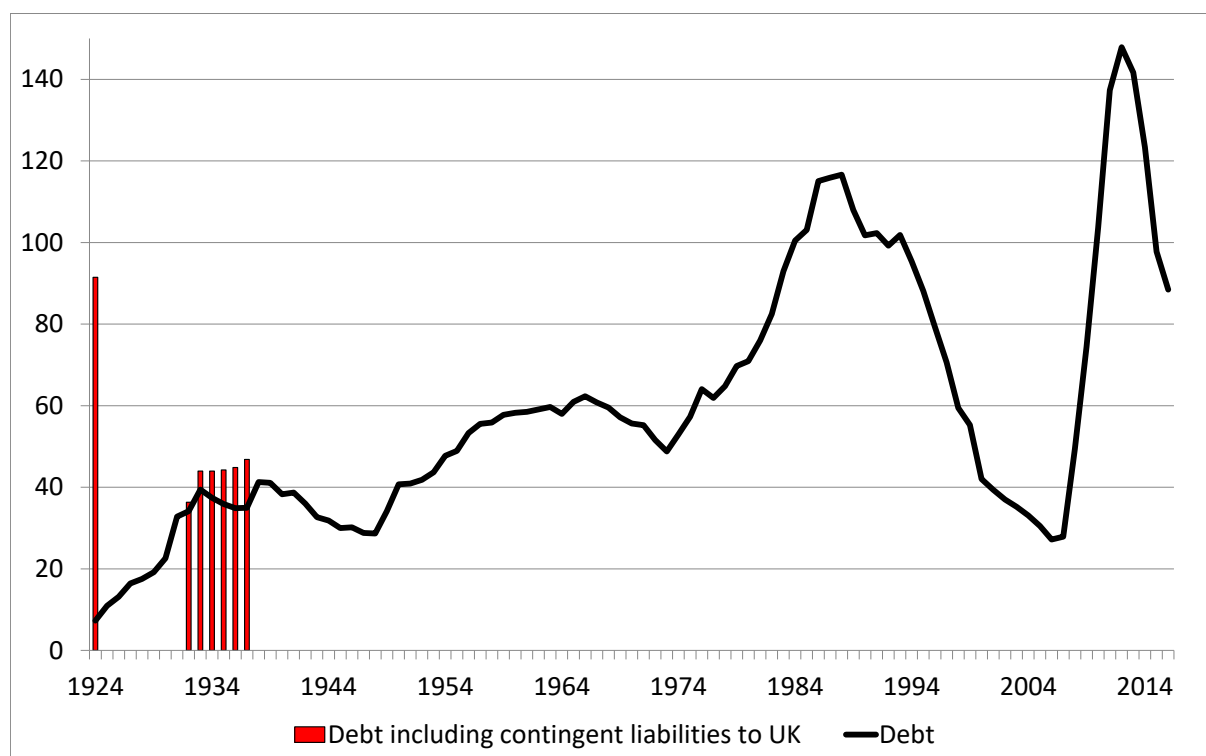
The newly elected administration of Fianna Fáil in 1932 had campaigned upon withholding land annuity payments from the British exchequer amounting to £3.7 million; over 2 per cent of GNP (Ó Gráda, 1994, p. 412). These annuities, which the Free State remained obligated to pay following independence, were collected from Irish tenants who had received loans of up to £127 million (to buy land covering an area of three quarters of the Free State) from the Land Commission (Foley-Fisher and McLaughlin, 2016a). However, as the Agreement relating to the Land Annuity payments in 1923 was conducted in secrecy and not ratified by the Dáil (as with the Ultimate Financial Settlement in 1926), de Valera justified defaulting on them (Fanning, 1978, p. 280). In contrast, as the 1925 Financial Agreement was passed by the

Dáil, the compensation annuities continued to be paid until 1969 (Fitzgerald and Kenny, 2017).⁹

This decision to withhold the annuities from the UK government reduced expenditure (payments to the UK) and increased revenue (payments that would have gone to the UK). While these payments were shown in the Finance Accounts as a contingent liability, the government used the payments to increase expenditure and to reduce payments of land annuities by farmers. This represented a significant fiscal injection in 1932 and 1933. However, because the payments were diverted from the UK, they did not involve borrowing. In fact the new administration ran a surplus in 1932 and borrowing averaged under 0.5% of GNP over the lifetime of the administration.

Throughout the 1930s, the Fianna Fáil administration reversed the expenditure cuts on old age pensions of the previous government, increased public housing and provided a small farmers dole (Ó Gráda, 1994, pp. 440-1). The increase in expenditure by local authorities on housing was demonstrated in a surge from an annual average of £0.5 million between the 1930/31-1931/32 period to £3.5 million for the 1934/35 period (O'Hagan, 1980). Though it did not alter fiscal policy dramatically, debt was raised to fund newly planned capital expenditure as the prominence of the expansionist Department of Industry and Commerce grew as the Department of Finance was marginalised (Bielenberg and Ryan, 2013, p. 14).

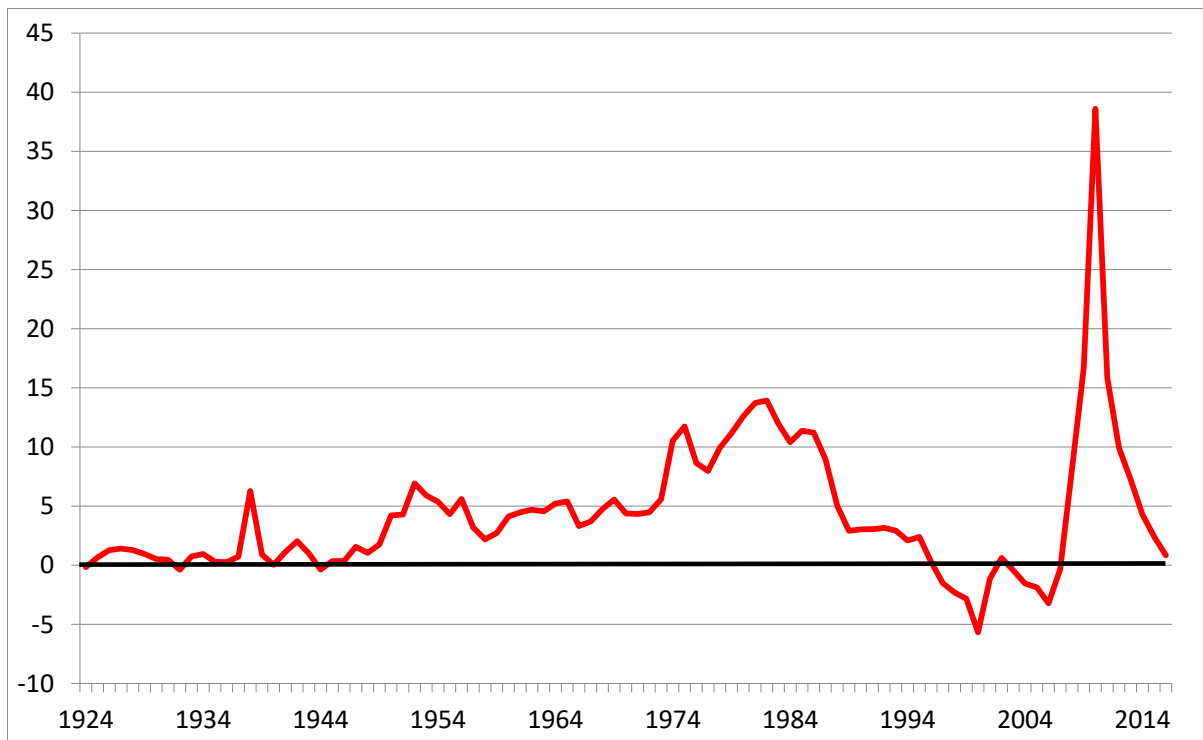
Figure 1: Debt / GNP Ratio



Source: See text

⁹ These agreements are: The Agreement of 12 February, 1923, The Agreement of 3 December, 1925 and the Ultimate Financial Settlement of 19 March, 1926.

Figure 2: Government Borrowing as % of GNP



Source: See text and data appendix

While the “economic war” with the UK over the withholding of the land annuities continued between 1932 and 1938, each year the Finance Accounts recognised the payments that were withheld represented a cumulating contingent liability for the state.¹⁰

Foley Fisher and McLaughlin (2016b) find that a non-trivial secondary market risk premium on land bonds of about 43 basis points was attributable to uncertainty about the UK government’s guarantee. When they upheld the guarantee after the Irish default in 1932, the risk premium on UK-guaranteed land bonds disappeared. However, “the politicisation of Anglo -Irish Financial relations” continued until 1938; in contrast to the 1920s where the political momentum was towards consensus and compromise within which financial relations could be harmoniously conducted (see FitzGerald and Kenny, 2017), in the thirties the momentum was towards political disagreement against which financial relations could hardly be conducted at all (Fanning, 1978, p. 306).

When the first default occurred on the 1st of July, 1932, the British government responded by raising special duties on Irish livestock to 40 per cent and 30 per cent on other agricultural produce. In return, the Irish government imposed a number of duties on British imports and bounties on Irish exports (Ó Gráda, 1994, p. 412). So began the Economic War which would last until the Financial Settlement of 1938 (see Fanning, 1978, pp. 297-307). Ó Gráda (1994, p. 416) claimed that the desire on the Irish side for a once-and-for-all settlement was matched by the fear on the British side that the Irish government would be unable to raise such sums

¹⁰ Each year from 1933 the cabinet specifically instructed the Department of Finance to continue to make payments to the UK on the liability of £5 million acknowledged in the 1925 agreement, while also withholding the other disputed payments to the UK.

[the total government debt including the land bonds]. O'Rourke (1991) concludes that the Economic War appears to have been beneficial from the Irish point of view, when addressing the Financial Settlement of 1938: "Say that 3 percent of GDP was lost in the seven years between 1932 and 1938: this amounts to roughly £4.5 million per annum or £31.5 million in all. Against this a capitalized £100-million liability was settled with a £10 million lump-sum payment, and Ireland gained the Treaty ports."

The £10 million sum "was raised with ease for 3.75 per cent" as the Financial Agreement Loan (Ó Gráda, 1994, p. 416). It represented almost 8% of national income and it took the debt/GNP ratio to around 33%. This payment saw a temporary spike on government borrowing to 6.3% of GNP in 1938.

The poor economic environment of World War II in Ireland stood in marked contrast with the buoyant conditions of World War I. Between 1938 and 1943 the volume of exports almost halved and imports fell to less than a third of their pre-war volume in 1938 (Cullen, 1972, P. 180). Given the associated "abnormal pressures on the Exchequer", an initial loan was raised in 1939 of £7 million, for which only £4 million was subscribed (Fanning, 1978, p. 316), though the full amount appears in the Finance Accounts 1939/40, suggesting the banks absorbed the remainder.

However in spite of the economic difficulties, government borrowing averaged 0.7% of GNP over the war years. With the consequently higher rate of inflation,¹¹ such limited borrowing meant that the debt / GNP ratio fell from over 40% of GNP in 1939 to only 30% in 1945.

In 1941 a further loan of £8 million at 3.25% was raised and, in stark contrast to the experience in 1939, it was oversubscribed as "the general feeling of hesitancy" of 1939 had been replaced by the political view in late 1941 that "very few places are as safe as this country at present" (Fanning, 1978, p. 317).

With relatively tight fiscal policy over the war years, by 1947 the debt ratio had fallen back to 25% of GNP from the pre-war figure of 33%. This contrasted starkly with the massive debts incurred by most of Europe as a result of the war, and the subsequent need to reconstruct the continent.

After the war, the US introduced the Marshall Plan to help rebuild Europe. However, in Ireland accepting funds from the Marshall Plan in the European Recovery Programme (ERP) was actually opposed by the two key financial institutes of the State- the Department of Finance and the Central Bank. The former were worried that funds would be unwisely spent by politicians on American imports creating further inflationary pressures, reinforced by the Central Bank's warnings of a chronic balance of payments problem in 1948. Finance were also concerned that it threatened their special relationship with the British Treasury, as the UK's position was yet undecided and favoured the retirement of debt in the event of the arrival of funds, instead of capital expenditure (Whelan, 2000, p. 44). However, as the European "dollar problem" became ever more apparent and the needs of American and

¹¹ Consumer prices rose by an average of 8.7% a year between 1939 and 1945.

British economic and political policy eventually necessitated the ERP, Ireland had little choice but to participate (Whelan, 2000, p. 50).

Politicians and officials were misguided in assuming from the outset that the bulk of assistance to Ireland would be in grant form (Whelan, 2000, p. 286). As it transpired, the vast majority of funds which were provided were via an American Loan which removed control from the Economic Co-operation Administration (ECA) officials in Dublin and left responsibility for its allocation with the government (Whelan, 2000, p. 238). This figure was £40.5 million and was fully exhausted between December 1949 and January 1952, though the loan was not fully paid off until maturity in 1983. The Central Bank's fears of receiving a loan instead of a grant were realised by the fact that due to the devaluation of Sterling in 1949, repayment obligations in terms of Irish currency had increased by about 44 per cent (Moynihan, 1975, p. 345).

Table 2: Borrowing, the Debt and the Balance of Payments as % of GNP

	Debt/GNP	Borrowing/GNP	Balance of Payments Deficit/ GNP
1948	28.7	1.1	-5.0
1949	34.1	1.8	-2.3
1950	40.7	4.2	-7.0
1951	40.9	4.3	-13.6
1952	41.8	6.9	-1.7

Source: See text and data appendix

In the Finance Accounts, the loan is deposited on Government account from the Central Bank as Ways and Means Advances to the Exchequer. Of the total, 75 per cent was invested in capital projects, 6 per cent was invested in land reclamation and 10 per cent was invested in other local authority works, with the remainder on other items such as fuel imports and harbour improvements. The agricultural aspect has been criticised as having little impact on increasing output (Bielenberg and Ryan, 2013, p. 55) and the Central Bank voiced heavy criticism claiming that funds were “slanted towards projects that yielded little or no return producing continual deficits in the balance of payments” (Meenan, 1970, p. 258). Poor investment decisions and rent seeking have played a causal role in the poor performance of post war economic growth (Ó Gráda and O'Rourke, 1996, p. 421). In this respect, the social and political agenda of the Irish government to boost employment and help small farmers took precedence over purely economic criteria (Bielenberg and Ryan, 2013, p. 55). The grant component arrived in the form of a Grant Counterpart Fund (1949-57) which totalled £5.8 million and targeted improvements in education, healthcare and agriculture (Whelan, 2000, p. 312).

As a result of Marshall Aid, there was a surge in investment funded by this borrowing from the US. Economy-wide investment grew by almost 18% a year over those three years. As a result of this major fiscal stimulus, the current account of the balance of payments ballooned (Table 2) and the debt/GNP ratio rose from under 30% in 1948 to 41% by 1950.

However, even after this investment surge, funded by Marshall Aid, the government continued to borrow over the following decade. Between 1955 and 1965 borrowing averaged over 4% of GNP a year (Figure 2). The resulting rise in the debt/GNP ratio was moderated by the fact that nominal GNP grew by almost 6.5% a year, while real GNP grew by around 2.5% a year over the same period. By 1960 the debt/GNP ratio was just under 60%. As a result of closer control of the public finances and higher growth in both nominal and real GNP over subsequent period to 1973, the debt ratio fell back under 50% by 1973.

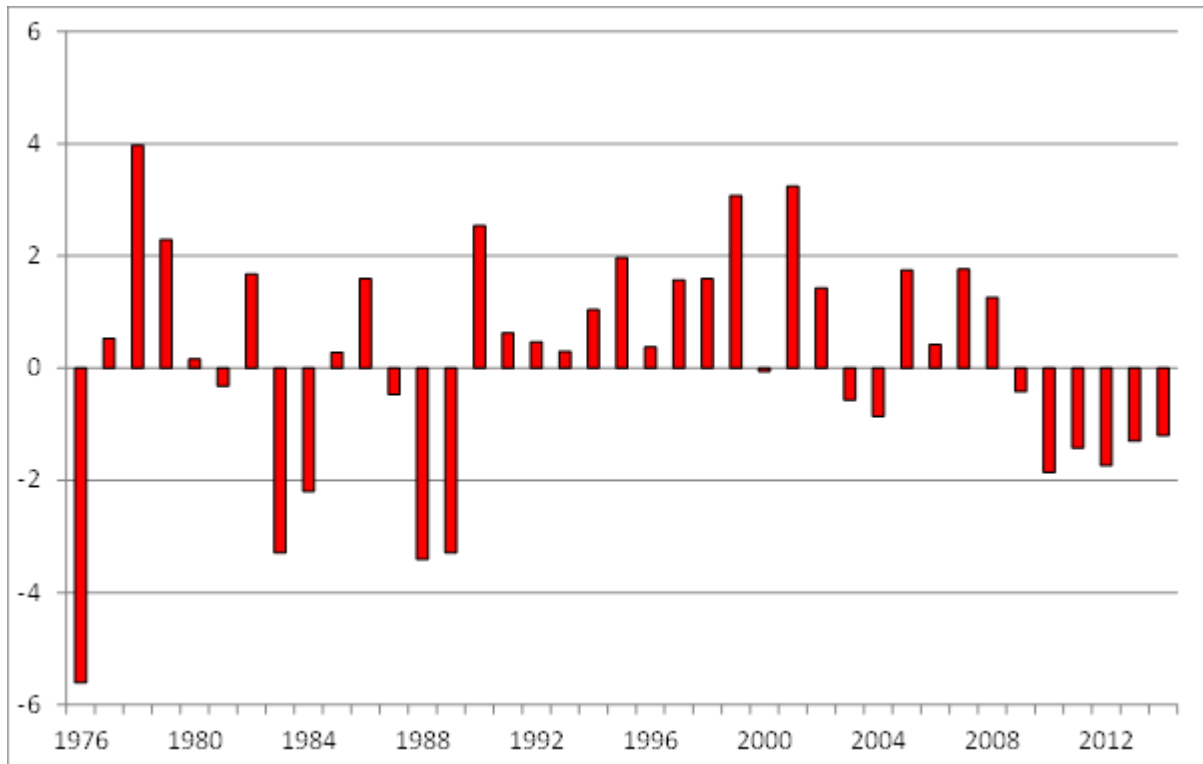
The dramatic rise in the price of oil in the second half of 1973 provoked a world economic crisis. The Bank of England, which controlled monetary policy in the sterling area (including Ireland), allowed sterling to weaken. The result was a surge in inflation both in Ireland and the UK (Geary and McCarthy, 1976)

The Irish government which took office in the first half of 1973 initially pursued a counter-cyclical fiscal policy, allowing borrowing to rise rapidly. Over the period 1973 to 1977 borrowing averaged 9% of GNP each year. The result was that by 1977 the debt/GNP ratio had increased from under 50% of GNP in 1973 to over 60% in 1977.

Figure 3 shows the discretionary fiscal stance pursued by successive governments each year from 1976 to 2014. This takes account of the automatic stabilisers that affect the Budget each year, such as changes in unemployment. A positive figure represents a net injection into the economy by discretionary cuts in taxation or increases in expenditure over and above what could be expected from indexation to prices.

The toughest Budget of the last fifty years was implemented in 1976 involving, inter alia, dramatic cuts in capital expenditure. This coincided with a recovery in the economy and represented a continuation of counter-cyclical fiscal policy. However, from 1978 onwards, with the economy growing relatively strongly, fiscal policy became highly expansionary as can be seen from Figure 3. The debt burden began to climb so that by 1981 it exceeded 75% of GNP. Over the period 1978 to 1981 borrowing averaged 12% of GNP, having been 8% in 1977.

Figure 3: Fiscal Stance as % of GNP. (Positive is a stimulus)



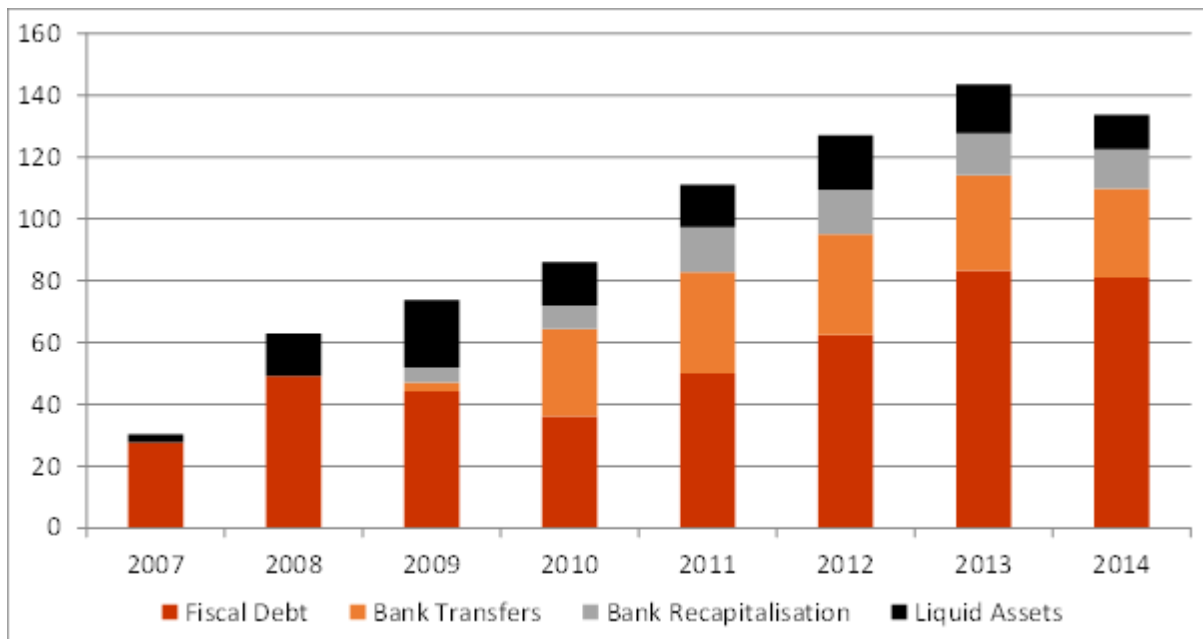
Source: Kearney *et al.*, 2000; Kearney 2012; FitzGerald 2013.

In 1979, a further oil price shock resulted in a new downturn in the world economy. In addition, real interest rates, which had been very negative in the late 1970s, became positive from 1983 onwards. With exceptionally high levels of borrowing, the economy faced an economic crisis from 1981 onwards. While strong fiscal action was taken in 1983 and 1984 (Figure 3), it was not sufficient to stabilise the debt/GNP ratio, which rose from 75% in 1981 to over 115% by 1988. It was only with further contractionary fiscal action of 1987 and 1988 that the tide turned.

Government borrowing fell from over 9% of GNP in 1987 to 3% in 1989, helped by a recovery in the real economy. With the public finances back under control, government borrowing averaged below 3% of GNP between 1990 and 1995. By 1995 the debt/GNP ratio had fallen back under 90% of GNP, from its peak of over 115% in 1988. From 1994 to 2007, real GNP grew by 6.3% a year and government borrowing averaged a surplus of below 1% of GNP each year. The result was a dramatic reduction in the debt/GNP ratio to 27% in 2006.

FitzGerald and Lane (2017) discuss in detail the effects of the financial crisis on the debt burden between 2008 and 2014. A combination of a collapse in the financial system requiring a huge capital injection from the state, and a related collapse in the economy and government revenue required unprecedented levels of government borrowing. In 2010 government borrowing peaked at just below 40% of GNP, with borrowing in 2009 and 2011 running at around 16% of GNP. The inability of the state to fund itself on financial markets resulted in the “bail out” of December 2010.

Figure 4: Composition of Irish Gross Debt, % of GNP



Source: FitzGerald, 2016

While in 2007 the gross debt/ GNP ratio was under 30%, as a result of the crisis, it had exceeded 140% by 2013. As shown in Figure 4, of this increase in the debt / GNP ratio of 110 percentage points, over 40 percentage points were due to the need to fund the banks. The rest accumulated as a result of the very high level of borrowing to fund normal government expenditure.

Since 2014, government borrowing has continued to fall and the return to rapid growth has seen the debt / GNP ratio fall to below 90% in 2016. However, this fall is partly due to an abnormal increase in GNP in 2015, which was unrelated to the welfare of those living in Ireland. Nonetheless, if the alternative measure produced by the CSO (GNI*) is used, the debt ratio peaked at 158% in 2012 and had fallen back to 106% of GNI* by 2016 (CSO, 2016).

4. Composition of Borrowing

Foreign – Domestic

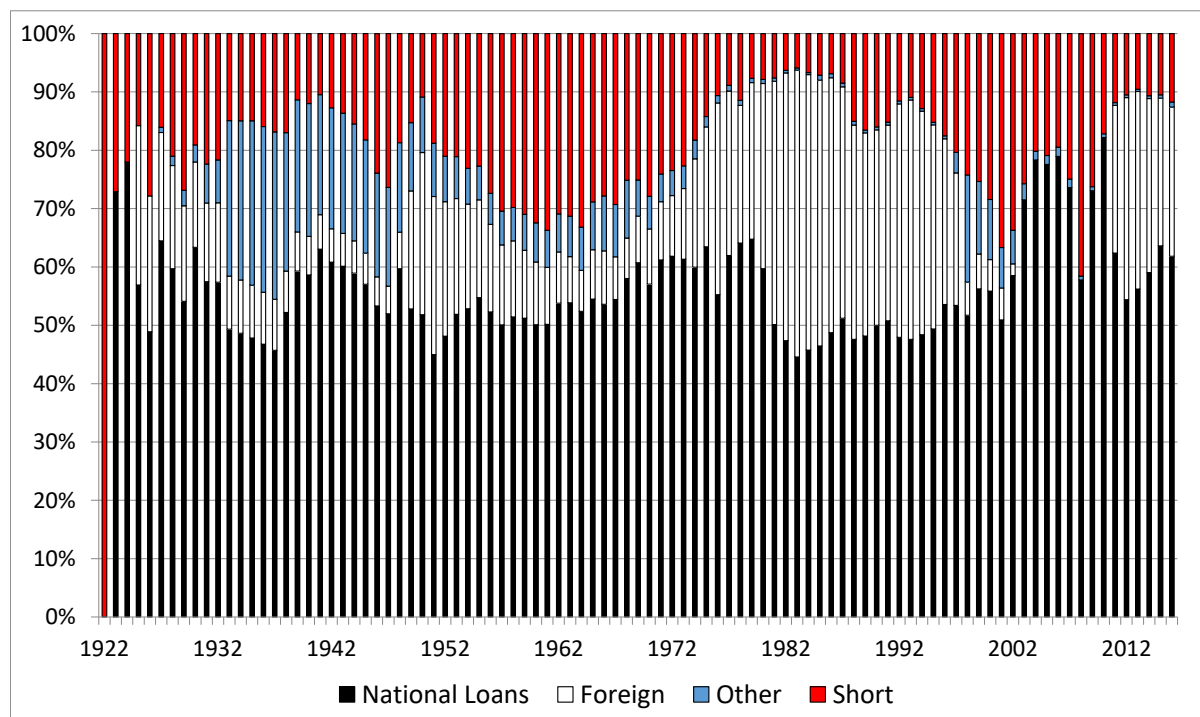
Since 1922, over half of the national debt has been funded by means of the sale of bonds denominated in domestic currency (Figure 5). With the exception of two periods of economic difficulty, borrowing abroad in foreign currency has played a limited role in funding the debt. However, as discussed later, a significant share of government bonds has been held abroad since the establishment of the EMU in 1999.

Irish liabilities to the UK arising from the Treaty (1921) were crystallised in 1925 as £IR 5 million.¹² It was denominated in sterling but, because of the sterling link, it did not carry

¹² The Second National Loan “External Issue of 5 per cent Bearer Bonds- \$15,000,000 Bonds at par of Exchange (£205 9s 8d- per \$1,000” which made up just under half of the total.” It was even called “The

exchange rate risk. Ireland borrowed abroad again as a result of the Marshall Plan in 1948-1950. No further foreign borrowing was undertaken until 1965. Thereafter, there was a slow pick up in the share of funding found abroad denominated in foreign currencies. It is not clear why this change took place as there was no evidence of shortage of domestic funding in the 1960s and early 1970s.

Figure 5: Composition of Government Debt



Source: Finance Accounts

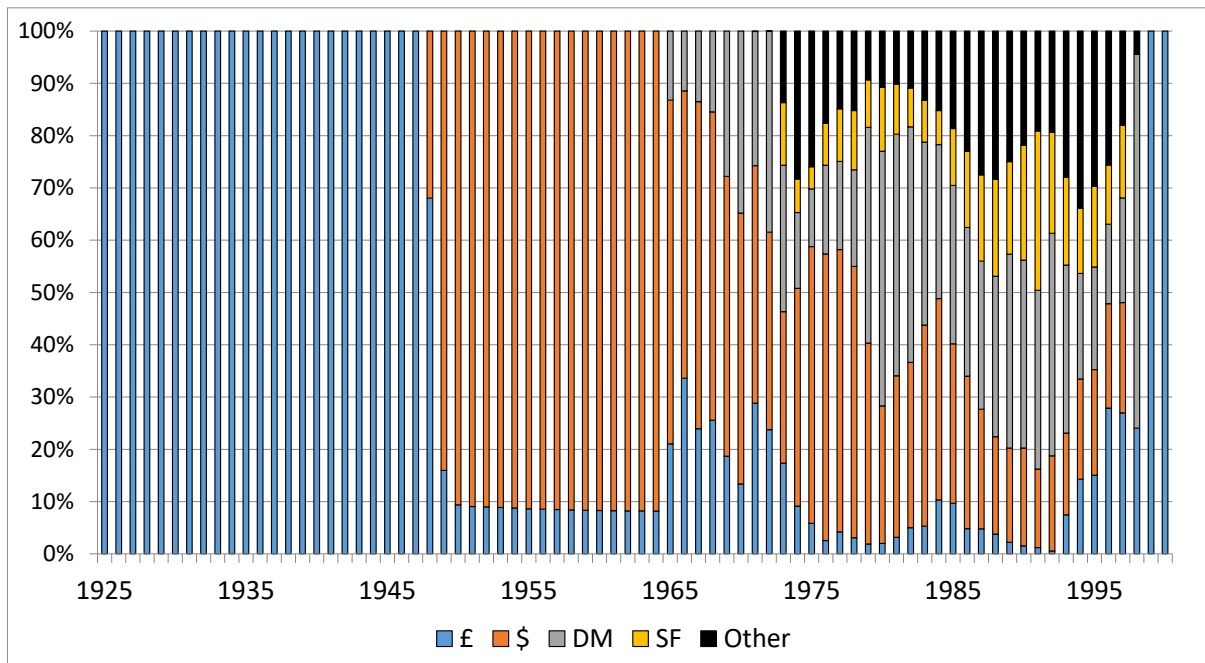
However, as domestic economic difficulties mounted in the 1970s, there was increasing resort to borrowing in foreign currencies. Generally this borrowing was also at shorter maturity than the domestic borrowing. However, the difficulty in raising funds domestically pushed the government to seek external sources of finance. The formal link with sterling was legally ended in 1972, though the two currencies traded at par until the beginning of 1979. This may have increased the perceived riskiness of lending to the Irish government in Irish pounds. A further related reason for borrowing abroad was the need to fund the very large deficit on the current account of the balance of payments, which peaked at 14% of GNP in 1981 (see Appendix).

The foreign borrowing needed to close the government’s funding gap was clearly onerous. There was a wide range of small bonds issued in quite a range of foreign currencies (Figure 6). The first loan in 1925, effectively a debt to the UK, was denominated in sterling. The second tranche of foreign borrowing under Marshall Aid in 1948-50 was, of course,

American Loan” and 3 out of 4 million was raised in New York. (Gwynn, 1928). However, up till it was repaid in in 1951, it was always shown in Irish pounds in the Finance Accounts and the sum repaid in 1951 was consistent with the Irish pound valuation throughout the years.

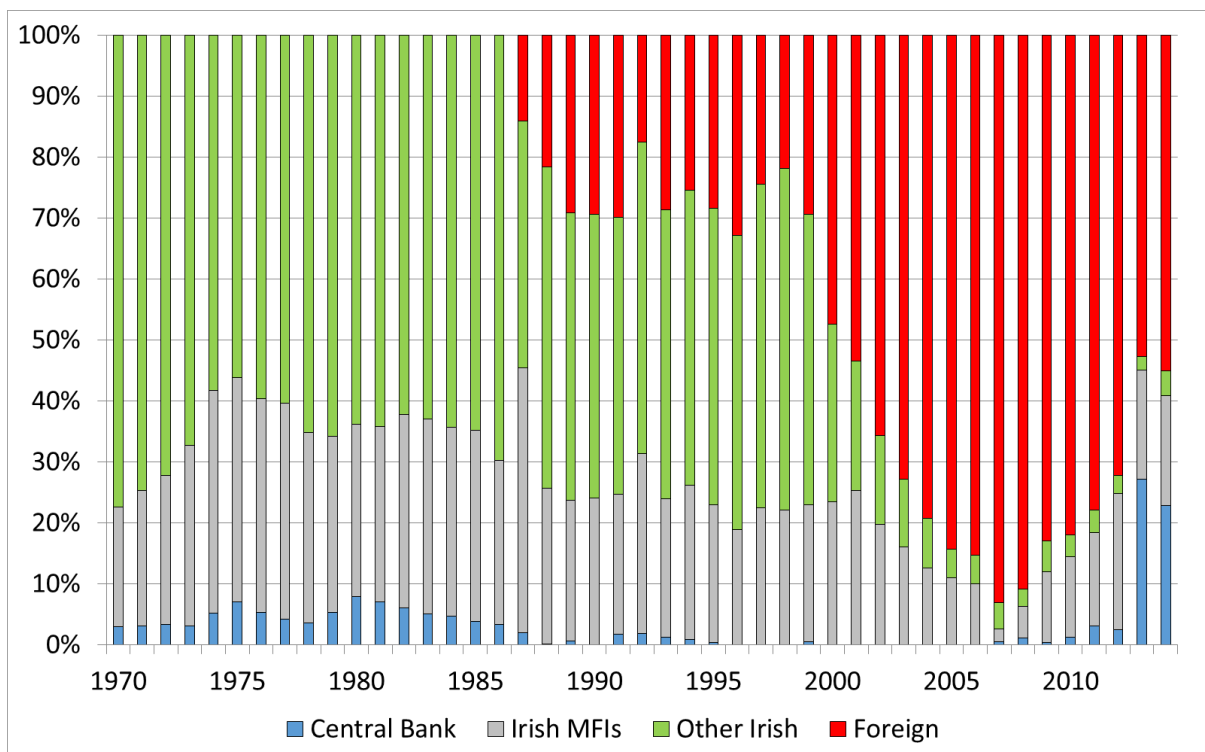
denominated in dollars. It was only when foreign borrowing began again in the late 1960s that the instruments were denominated in a wider range of currencies.

Figure 6: Currency Composition of Foreign Debt (1926-1998)



Source: Central Bank Reports and Finance Accounts. After 1999 most “foreign” loans were reclassified as they were now denominated in euro – hence the series ends in 1998.

Figure 7: Holders of Irish Government National Loans



Source: FitzGerald and Lane (2017)

From the mid-1960s onwards very little borrowing was undertaken in sterling until the UK government loan in 2011. Over the 1980s this reflected greater scepticism about Irish economic prospects in London than in other financial markets, something that was repeated in the recent crisis.

In addition, with EU entry in 1973 and the advent of EMS in 1979, there was a perception that the future value of the Irish pound would be more closely related to the DM. As a result, from the early 1970s much of foreign borrowing was undertaken in DMs, SFs and Guilders. There was also significant borrowing in dollars, reflecting the depth and sophistication of that capital market.

The 1990s saw very little foreign borrowing as the public finances came under control. In addition, there was a long transition after Maastricht from 1992 for entry into EMU in 1999. Instead of borrowing in foreign currencies, the government borrowed in Irish pounds (or euro from 1999), replacing maturing foreign currency debt with national loans.

However, while the borrowing was denominated in Irish pounds, a growing share of the national loans was held by foreign financial institutions (Figure 7). After 1995, with the increasing certainty that EMU would materialise with Ireland as a member, foreign investors gradually increased their holdings of Irish national loans. By 2000, almost half of the bonds were held abroad and by 2007 this had risen to 90%. This also reflected a divestment by Irish institutions, who wanted to diversify their portfolio. Once exchange rate risk disappeared for Euro area investors, this diversification happened very rapidly.

As discussed in detail in FitzGerald and Lane (2017), the financial crisis changed the situation dramatically over the period 2008 to 2010. It catalysed a sharp decline in the share of Irish bonds held abroad. Also, as the crisis worsened, it proved impossible to borrow at any reasonable interest rate in 2010. The result was the “bail out” of December 2010. This agreement with the EU, the IMF, and the ECB provided Ireland with access to €67.5 billion. The majority was provided by the EU, denominated in Euro. The IMF also provided a significant share of the funds and the UK, Sweden and Denmark also volunteered loans at very favourable interest rates denominated in their national currencies.

With an economic recovery beginning in late 2012, there was a return to rapid growth. Combined with very tough fiscal measures over the years 2010-14 government borrowing fell steadily to under 1% of GNP in 2016. As a result, the government was able to return to the financial markets with significant borrowing in 2013. Since 2014 the government has repaid most the IMF loans as it has been able to refinance this debt at very favourable interest rates through issuing bonds.

Maturity and Liquidity

From the first national loan issued in 1923 up until 1970, the bulk of Irish bonds had a long maturity of over 15 years. Figure 8 shows the share of the national loans by maturity. The shift to bonds with maturity of less than 15 years began in the 1960s. By the mid-1970s over half of the bonds outstanding had a maturity of less than 10 years with around 30% having a maturity of less than 3 years. While in normal times relatively short-dated debt may not pose

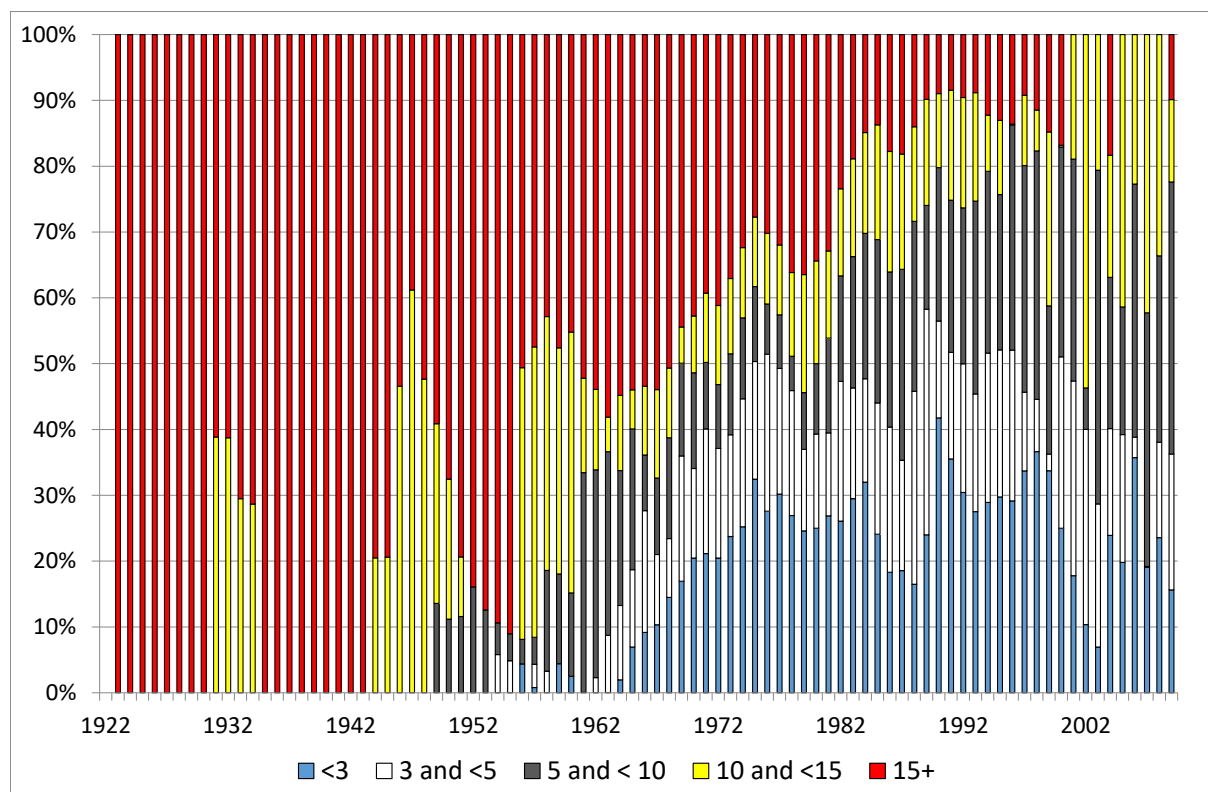
a problem, in times of crisis refinancing major tranches of debt, as well as funding budget deficits, can make servicing and managing debt very difficult.

The maturity of the stock of bonds continued to shorten over the 1980s and into the 1990s with half the stock of bonds having a maturity of less than 5 years in the mid-1990s. However, with rapid economic growth, government surpluses and a pronounced reduction in the debt burden, this did not pose a problem.

Ellison and Scott (2017) consider borrowing by the UK government over a long period. Their analysis suggests that since the Second World War, the UK government could have significantly reduced its interest bill by borrowing at much shorter maturity. However, this does not take account of the potential risks posed in times of economic crisis, by having to refinance major tranches of debt every year.

When the crisis was looming in Ireland in the first half of 2008, the NTMA borrowed very large sums for short terms – much greater than was needed to fund the rising government borrowing requirement (Figure 9 and FitzGerald and Lane, 2017). The fact that this borrowing began before there was widespread awareness of the gravity of the crisis shows considerable foresight on the part of the NTMA.

Figure 8: Maturity Structure of National Loans

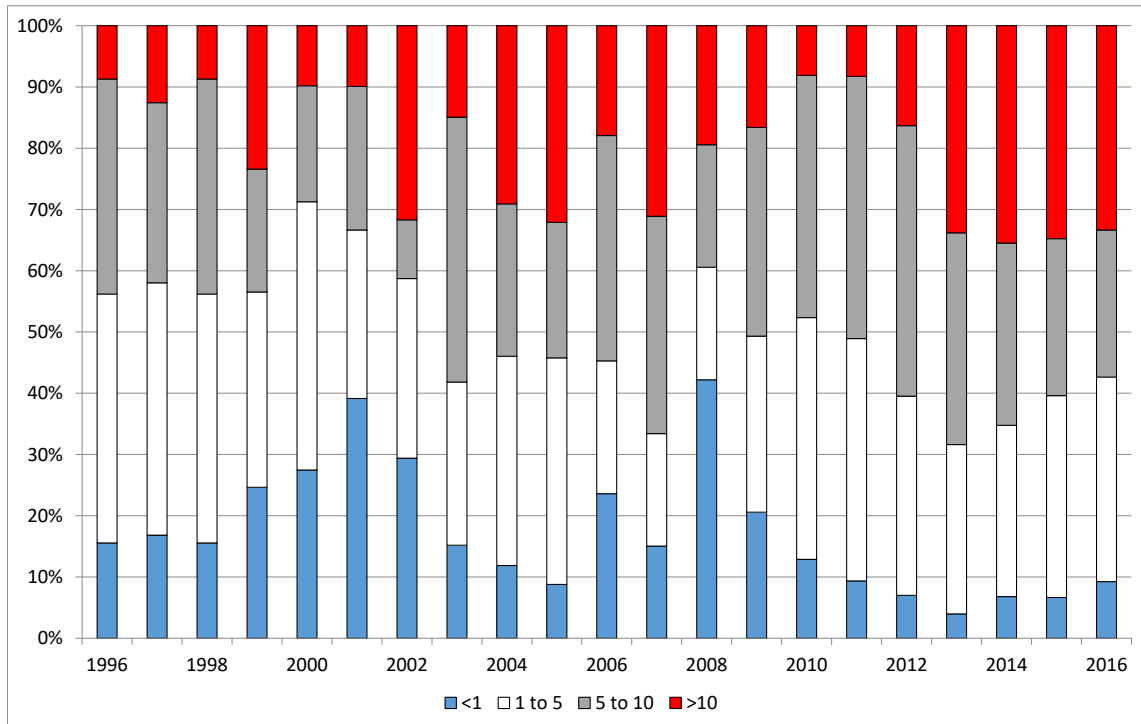


Source: Finance Accounts and Central Bank reports

However, as the crisis worsened the NTMA converted the short-term borrowing into medium to long term debt over the course of 2009. Having experience of the 1980s when managing

borrowing under very unfavourable economic circumstances, there was widespread institutional awareness that extending the maturity of the debt was of paramount importance.

Figure 9: Maturity Structure of the National Debt



Source: Central Bank Reports

Figure 10: Liquid Assets as % of GNP



Source: See Text and data appendix

The NTMA had accomplished the task of replacing the short-term debt with very extensive sales of medium to long-term bonds over the course of 2009, before the perceived risk of lending to Ireland dramatically worsened in 2010. At the beginning of 2010, it had looked as if the Government was adequately funded to meet its borrowing needs and the need to roll over maturing debt, at least to mid-2011. However, as the full gravity of the crisis in the banks became apparent it was clear that the government would not be able to continue without the support of the EU and the IMF.

As well as extending the maturity of the debt, another key lesson from the 1980s crisis was that the government's position was greatly strengthened by holding large stocks of cash or liquid assets. This move to liquidity came at a significant cost in the 1980s and again in the recent crisis. The interest paid on "excess" borrowing at medium to long term to build up liquid assets was much greater than the return available on short-term liquid assets or cash.

Nonetheless, as the crisis continued over the 1980s, the government steadily raised its holdings of cash and liquid assets (Figure 10). In 1985 and 1986, instead of lodging some of the money raised by foreign borrowing with the Central Bank, certain funds were placed abroad. As a result, at the end of 1986 the gross debt to GNP ratio appeared worse than the net debt to GNP ratio. Early in 1987, when the new government made it clear that it would tackle the budgetary crisis and it also disclosed this cash reserve, this new information helped produce a fall in bond yields (FitzGerald and Lane, 2017). It became clear that the government's funding needs in 1987 and 1988 would be less than had been anticipated.

The experience of the 1980s informed the approach by the NTMA to the recent financial crisis. As discussed already, in early 2008 the NTMA foresaw difficulties later in the year and it began borrowing heavily at quite a short maturity. By the end of the year, after the crisis had broken it had amassed a large stock of cash, having borrowed much more than was needed to fund the emerging very large deficit. The following year, the NTMA continued to hold very large cash reserves. At the end of 2009 these reserves of cash amounted to 15.5% of GNP. As discussed above, even with this reserve, the crisis in the banks required even greater funds than the government had available – leading to the December 2010 bail-out.

Once the government had negotiated the bail-out, it might have been expected that the government would run down its cash reserves as the IMF and the EU effectively provided an overdraft for the following three years. However, cash reserves were maintained in case there was a disagreement with the IMF and the EU, such as occurred with Greece. Having substantial cash reserves provided the government with additional leverage. Even today, with a much more secure financial position, the government holds substantial cash reserves in case of unexpected shocks. While these cash reserves were comparatively expensive in the early years of the crisis, in today's environment with very low interest rates and a flat yield curve, the cost is minimal.

5. Bond Yields and the Risk Premium

From the first national loan in 1923 until the 1980s, nearly all the bonds issued specified two dates within which the state could, at its discretion, repay the bonds. If the nominal interest

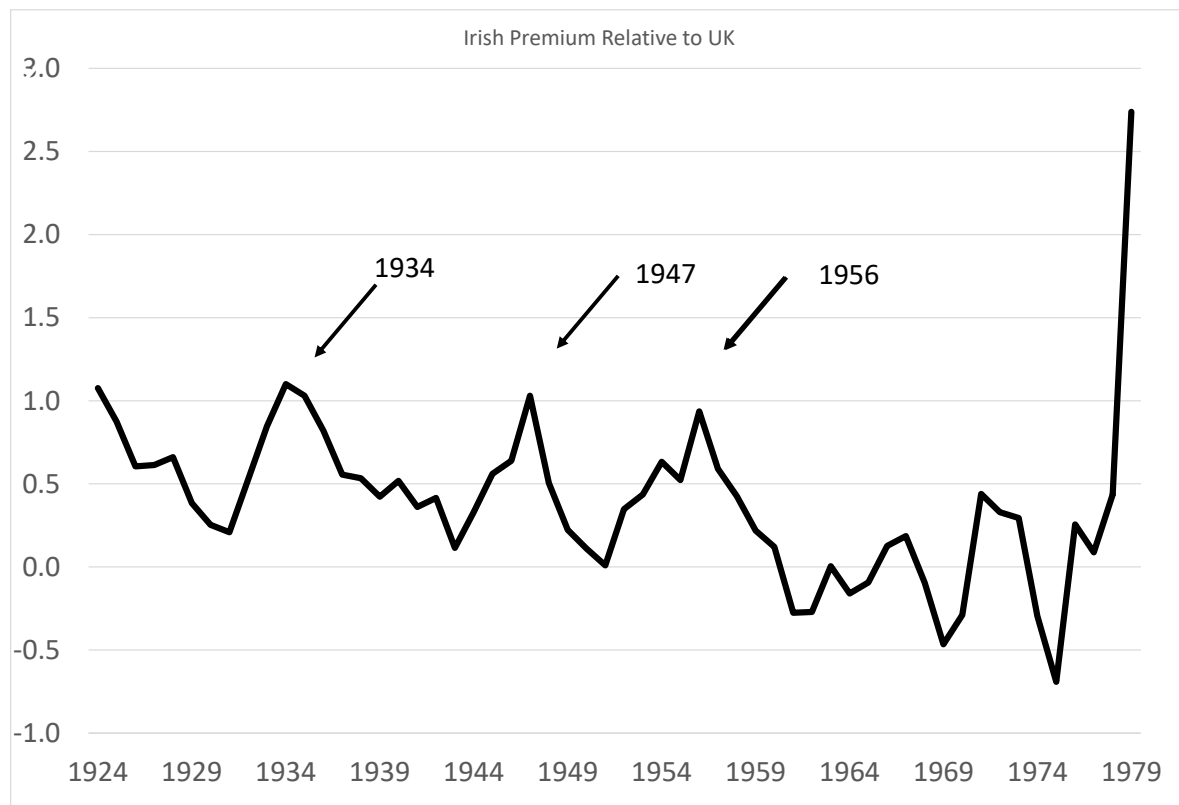
payment was above the going rate, then the state would generally repay the borrowers. The state exercised the right to repay early on a number of bonds in the early 1950s as the market yield was lower than the interest rate on the bonds in question at the time of repayment.

As discussed earlier, over the period until 1970 the outstanding bonds generally had a maturity of 15 years or more. Using the yield calculated for Irish bonds with 15 or more years to maturity from 1924, Figure 11 makes a comparison with yields for UK government bonds. In this case, the yield is not for an identical instrument – rather for the UK it is the yield on consols (with an infinite life), but the long dated nature of the Irish data used for comparison minimises the difference. The UK data are taken from Thomas and Dimsdale (2017).

As shown in Figure 11, not surprisingly, the new state began with a significant risk premium on its borrowing (relative to the UK) of around 1.1 percentage points in 1924. In fact, given recent experience, this premium looks very low for a young country emerging from a civil war. There was also the unknown contingent liability for a share of the UK debt which could have amounted to around 85% of Irish GNP.

During 1925 and 1926, the risk premium fell cumulatively by around a half a percentage point, possibly reflecting the write off of the contingent liability. Given the size of the debt write off due to the 1925 Agreement, one might have expected a more dramatic change (or a higher initial risk premium). However, markets may have expected the write off which subsequently transpired or else they may not have been very well-informed.

Figure 11: Premium on Irish Bonds with maturity of 15+ years relative to UK Consols



Source: See text and data appendix

By the end of the 1920s, the risk premium relative to the UK had almost disappeared. However, the economic war with the UK in the 1930s saw the premium peak again at over 1 percentage point in 1934. Foley-Fisher and McLaughlin (2016a, 2016b) show how the vicissitudes of the economic war impacted on yields of Land Bonds in a similar manner. Our findings for the long run support the generally positive picture of investor sentiment towards Irish debt outlined in McLaughlin (2015) where national loans traded predominantly above par.

The premium relative to the UK had already begun to fall before a settlement was reached with the UK in 1938. It continued to fall in the early war years, when the war was going badly for the UK. This may have reflected the fact that the UK was building up massive debts due to the war. However, the financial markets may also have been constrained in the way they operated during the war – there were not many safe havens for Irish savings. The current account of the Balance of Payments averaged over 10% of GNP between 1942 and 1945. The end of the war saw the premium rise again in 1945, reflecting a return to “normal” business in financial markets. The premium fell again from 1945 onwards, reaching zero by 1950, perhaps reflecting the large differential in the debt ratios facing both nations in the post war era.

Not surprisingly, the risk premium rose again during the economic difficulties of the early 1950s. The fiscal and balance of payments crisis weighed heavily on the then governments, resulting in tough budgetary measures. The balance of payments crisis of the mid-1950s was partly caused by the unwise decision of the government to try and drive short-term interest rates below UK levels (Honohan and Ó Gráda, 1998). This clearly did not influence long-term interest rates. However, the capital outflow, the rising debt/GNP ratio and the poor all-round economic performance obviously made Ireland a riskier prospect than the UK, moving the risk premium backup to one per cent.

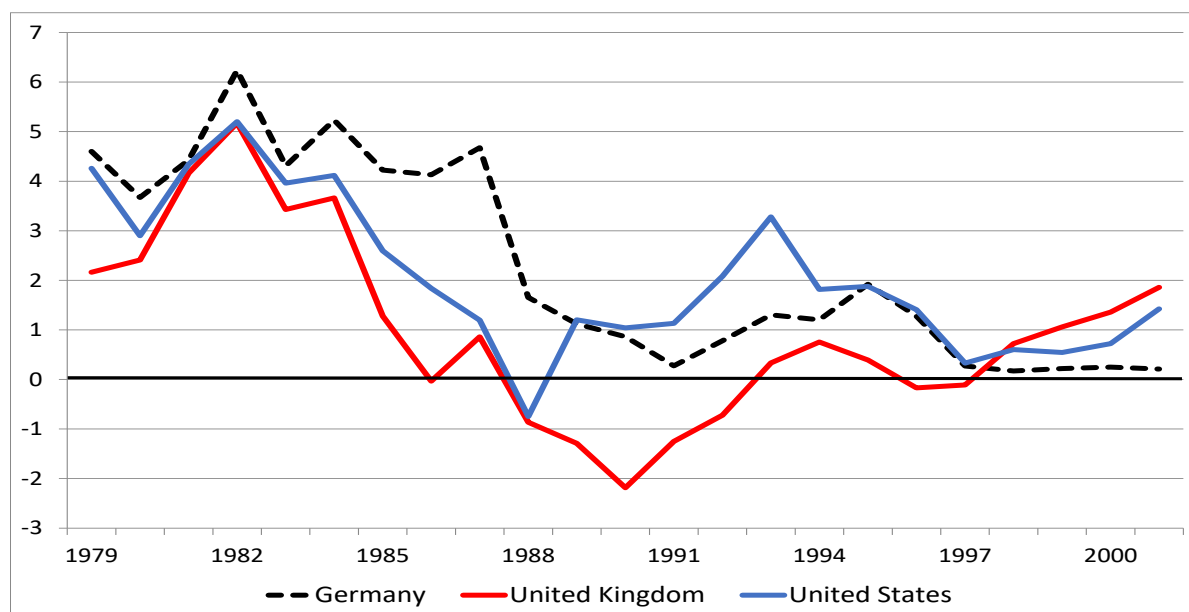
With a turnaround in the economy from the end of the 1950s through to the mid-1960s the risk premium was almost zero. For the 1960s as a whole, the risk premium averaged zero. Between 1968 and 1971 the risk premium was actually negative. Quite why Ireland was then seen as a better prospect for investment than the UK is not clear. The oil price rise in 1973 seriously affected both economies. However, the fractured industrial relations scene in the UK and the general economic problems of that economy saw the UK forced to seek stand-by support from the IMF in 1976. These economic difficulties of the UK may have contributed to the higher UK interest rate in 1975 and 1976.

Another possible factor causing the low risk premium might have been the regulatory requirement for the banking system to hold government debt for liquidity purposes. Central Bank data suggest that the banks' holdings of government debt were less than 10% of their balance sheets in the period to 1970. Between 1970 and 1975 it rose to comprise 20% of their balance sheets. However, their increase in holdings of government debt was a small share of the increase in the national loans outstanding over the period. While the banks held around 30% of national loans outstanding in 1970, by 1975 this had fallen to 20%.

While the legal link between the Irish pound and sterling was broken in 1972, investors clearly did not factor in significant exchange risk. It is only in 1979, when the link with sterling was actually broken, that the risk premium rapidly climbed to over 2.5 percentage points. Of course, unwise fiscal policy pursued in 1978 and 1979 was creating conditions for a major economic crisis in the early 1980s so that, even without the prospect of exchange rate risk, there were good reasons to view Irish bonds as more risky than UK bonds. After the break in the link with sterling it was clear to all foreign investors that lending to Ireland involved both country specific risk and also exchange rate risk. Figure 12 shows the difference between the long-bond rate in Germany, the UK and the US compared to Ireland, taking account of the exchange rate change which occurred, ex post, in the subsequent 15 years.

Honohan and Conroy (1994) provide detailed analysis of the rise in the risk premium on Irish bonds. They indicate that perceived exchange risk was an important factor in this change. However, they also show that the realised change in the exchange rate was less than expected so that there were significant excess returns from investing in Irish bonds relative to German bonds. Figure 12 illustrates this, showing how much more an investor would have made over a 15 year period if they had invested in Irish pound debt relative to German, US or UK debt, taking account of the ex post change in the exchange rate over the subsequent 15 years. It shows that for all of the 1980s, borrowing in Irish pounds was much more expensive than was the case for the German government borrowing. The same was true in the early 1980s for Irish borrowing compared to borrowing by US and UK governments. However, by the end of the 1980s Irish government borrowing, ex post proved significantly cheaper than for the UK government. By the mid-1990s, there was significant convergence between returns on Irish and German borrowing, which was not surprising the prospect of EMU starting in 1999.

Figure 12: Ex post Returns on Investing in Irish bonds relative to foreign bonds, percentage points



Note: Author's Calculations

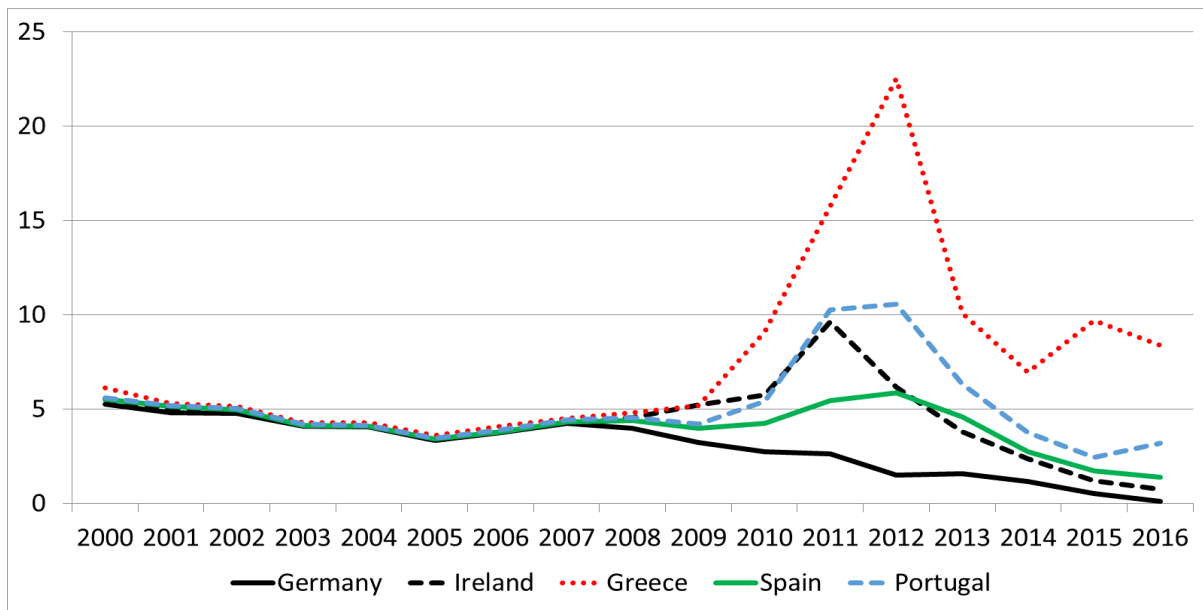
Over the period 1979 to 1988 Ireland raised at least one DM loan each year. As shown in Table 3, the maturity on these loans averaged between 7 and 10 years, generally shorter than for the national loans in Irish pounds. Table 3 compares the yield on Irish government borrowing in DMs with the contemporary yield on German government borrowing. The yield for Germany is that for long dated bonds, with an average maturity somewhat longer than for the Irish borrowing. While thus not strictly comparable, the comparison of the Irish and German yields is nonetheless useful as it should eliminate exchange risk: what remains is country risk. The results here are similar to those in Barry, *et al.*, 2014.

Table 3: Comparison of Yield on Irish and German borrowing in DMs

	Ireland		Germany	Difference
	Maturity	Yield	Yield	
	Average	Yield	Yield	Yield
1981	10	10.62	10.11	0.51
1982	7	9.75	8.97	0.78
1983	7	8.77	8.02	0.75
1984	8	8.20	7.95	0.25
1985	10	7.54	6.95	0.59
1986	10	6.86	5.89	0.97
1987	8	6.27	6.14	0.13

Source: The Irish yield is derived from data on new borrowing in DMs in the Finance Accounts which gives details on maturity, interest rate, nominal value of the bonds and the amount raised by their sale. The German yield, which is for long dated German borrowing, is taken from the EU AMECO database.

Figure 13: Government Bond Yields



Source: EU Commission AMECO Database

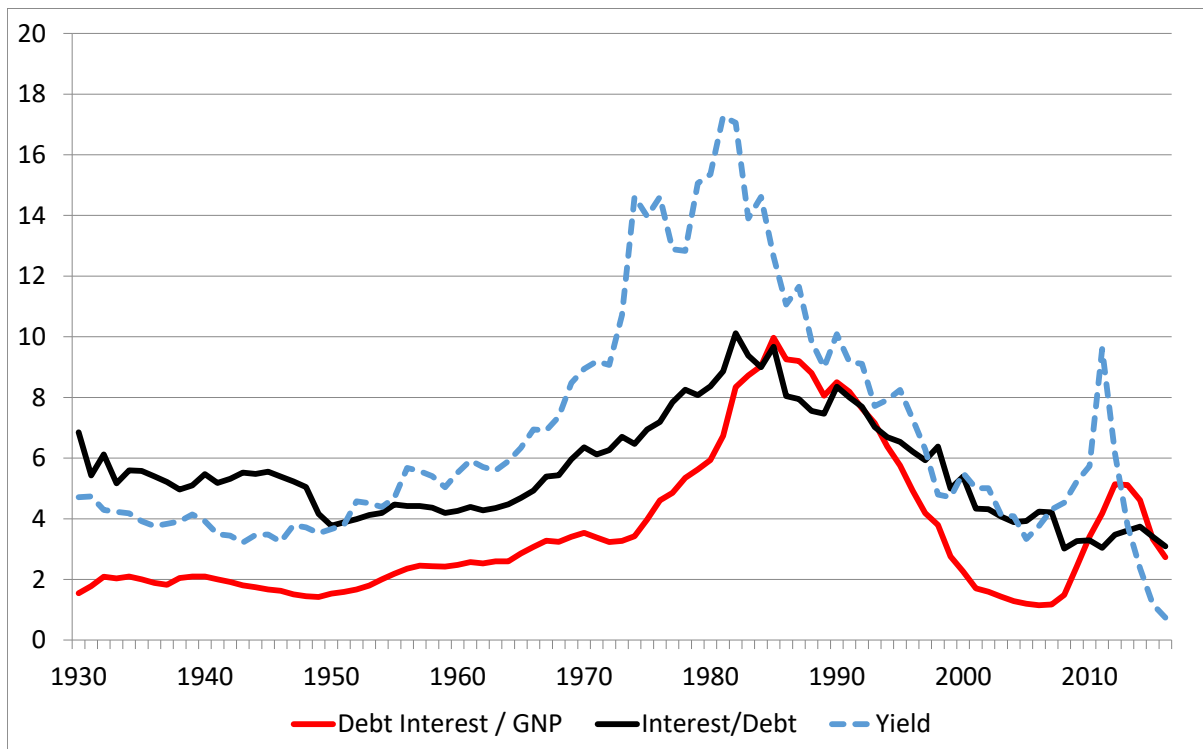
Rather surprisingly, in 1981 the Irish yield was only 0.5 percentage points above the German yield, in spite of the major economic difficulties which were already apparent in the Irish economy. However, it rose in subsequent years to reach a peak in 1986 of 1 percentage point. With visible signs that the fiscal problems were coming under control, the premium fell in 1987. Given the fiscal crisis in Ireland at the time, this relatively small country risk premium seems surprising. It was dramatically lower than the risk premia experienced during the recent financial crisis, as shown in Figure 13.

Figure 13 shows the post EMU country risk premium for government borrowing. Until the advent of the financial crisis in 2008, markets treated debt issued by Euro area governments as almost identical. However, from 2008 to 2011 a large margin emerged between Irish and other peripheral country bond yields relative to those for Germany. As the crisis has passed and growth has returned the risk premium for Ireland and Spain relative to Germany has fallen very substantially. It seems very unlikely to return to the very tight pre-crisis margin in the near future.

6. Interest Payments and the Debt Burden

Reinhart and Rogoff (2010, 2012), looking at the history of government debt, suggest that above a threshold of 90% it becomes increasingly unlikely, because of poorer growth and legacy issues a country will be able to repay that debt. Twice over the last 95 years the Irish debt burden has exceeded that figure and still the economy has gone on to recover and repay its debts. However, a number of factors have made what seemed like an unsustainable level of debt subsequently manageable. Inflation and exceptional growth have also played important roles in reducing the debt burden. In addition, the relatively long maturity of the debt has meant that interest payments on the debt have not responded to temporary peaks in bond yields. Crafts (2016) analyses the effects of these factors on the UK debt burden over the last two centuries.

Figure 14: Burden of Interest on the National Debt



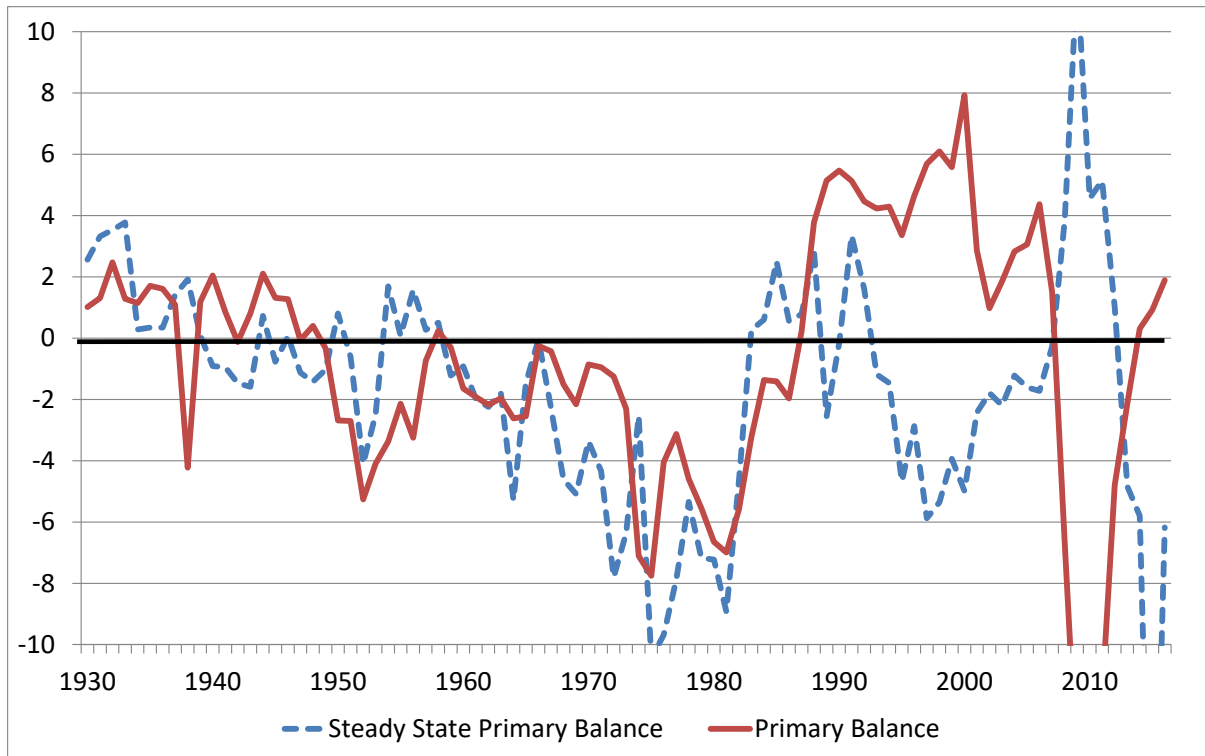
Source: See Text. Author's Calculations

Figure 14 shows that since the foundation of the state until the mid-1950s, debt interest did not significantly exceed 2% of GNP. There was a slow rise in the share of GNP accounted for by debt interest up to the mid-1970s: even then it was under 4% of GNP. However, the explosive growth in the debt due to very high borrowing saw the share of GNP accounted for by debt interest reach a peak in 1985 of 10% of GNP. This reflected a debt/GNP ratio of over 100% combined with an average interest rate on that debt of over 10%. As discussed above, this burden was only sustainable because of the high rate of inflation, which rapidly eroded the real value of the debt. Also the bond yield peaked at over 17% but, because of the long maturity of the national loans and the extensive borrowing abroad in foreign currency, the average interest rate on the debt was much lower than the yield on new borrowing throughout the 1980s (Figure 14).

As the public finances gradually came under control and borrowing was reduced, continuing relatively high inflation eroded the debt burden. However, it was the combination of fiscal responsibility and high real growth in GNP which rapidly reduced the burden of interest rates. The result was that by 2000 debt interest payments accounted for just over 2% of GNP, falling to 1.2% by 2007 immediately before the economic crisis.

By contrast, in the recent financial crisis the average interest rate on the debt never reached 4%. The exceptional assistance from the IMF, the EU and other EU countries, which was extended from 2010 to 2013, came at very low interest rates relative to the then market interest rate for Irish government debt (FitzGerald and Lane, 2017). This laid the foundation for the subsequent recovery.

Figure 15: Primary Surplus needed to stabilise the debt / GNP ratio



Source: See text and data appendix.

Government bond yields across the Euro area fell as a result of the quantitative easing by the ECB. When combined with the reduction in the country specific risk premium for Ireland, this has meant that since 2014, new debt has been issued at an exceptionally low interest rate and maturing debt has been rolled over with substantial savings in interest payments. In addition, these benefits have been locked in through extending the lengthening maturity profile of the debt.

A common approach to analysing the sustainability of the debt is to estimate the conditions that would stabilise the debt to GNP ratio. Equation 1 sets the change in the debt to GNP ratio, d , to zero. b is the government surplus, excluding interest payments, as a percentage of GNP – the primary balance; i is the nominal interest rate; π is the rate of inflation and g is the real growth rate. Thus $\pi + g$ is the growth rate in nominal GNP.

$$\Delta d = -b + (i - \pi - g) d = 0 \quad (1)$$

$$b^* = d(i - \pi - g) = id - d(\pi + g) \quad (2)$$

b^* is the primary budget surplus to GNP ratio that would stabilise the debt ratio in the long run. A comparison of the actual primary deficit with the primary deficit needed to stabilise the debt provides an indication of whether or not the budget is consistent with a rising or falling debt burden in the long run.

In Figure 15, we estimate the steady state condition primary balance for each year since 1930 and compare it to the actual primary balance. In other words, we compare the balance that

was necessary to keep the debt to GNP ratio stable and the primary balance which transpired in reality. The interest rate used is the ratio of interest payments to the debt. When the actual primary balance is above the level needed to stabilise the debt the debt burden will tend to fall.

Figure 15 shows that in the 1930s the primary balance was generally inadequate to stabilise the debt but during the war years the position was reversed with the primary balance being greater than the steady state level, reducing the debt burden. In the 1950s the deficit was higher than would have been consistent with a stable debt ratio and this was reflected in a rise in that ratio over time. In the late 1960s and the early 1970s the actual primary deficit/surplus was tending to reduce the debt burden.

However, in the 1980s the actual primary deficit was very much greater than the debt stabilising ratio. This contributed to a dramatic rise in the debt to GNP ratio. By contrast, in the 1990s tight fiscal policy and rapid growth meant that Ireland ran a large primary surplus. This produced a dramatic fall in the debt/GNP ratio by 2006. For the period 2008-2016, because of the exceptional borrowing to fund the banks and the abnormal growth rate in 2015, this approach to analysing sustainability is not very useful with huge gyrations in both series.

An alternative method of decomposing the factors driving change in the debt GNP ratio is set out in Crafts (2016). He uses it to analyse changes in the UK debt. While there is no formula that allows an exact, clean additive decomposition of changes in the debt ratio, the following formula comes very close. Abbas et al (2011), Escolano (2010) and Crafts (2016) all use slight variants on the same formula to arrive at decomposing changes in public debt ratios, the last of which is adopted identically here.

$$d_T - d_0 = \sum_{t=1}^T \left[\frac{(r - g)_t}{(1 + \pi + g)} \right] d_{t-1} + \sum_{t=1}^T -b_t + \sum_{t=1}^T sfa_t$$

What the above formula shows is that the change the debt ratio between two periods $d_T - d_0$ depends solely on the real interest rate r , the real growth rate g (the first term) and cumulative exchequer balances b_t (the second term) with the residual error item (sfa_t) comprising the difference. It is therefore possible to decompose reductions in debt ratios in a manner which ranks and measures the driving determinants of the reduction. The three terms are referred to separately in Table 4 as the 1) the budget surplus component which will drive down the ratio implied by the negative sign budget surplus component, 2) the $r - g$ component which (if negative) drives the debt trajectory downwards as a result of economic growth exceeding real interest payments and 3) the residual component, which can be positive or negative depending upon the causal mechanism. This additional variable is a stock flow adjustments term (sfa_t) which, as a cumulative residual, captures valuation effects, 'below-the-line' fiscal operations such as privatisations and errors in the data. In our calculations, we separate the effect of devaluation in the Irish currency relative to foreign currencies in which some of the debt was denominated.

Table 4: Contributions to Change in Debt ratios, Various Periods.

	Change in debt	Budget surplus	r-g differential	Exchange Rate	Residual
1938-1947	-0.06	-0.05	-0.04	0.00	0.03
1948-1960	0.29	0.26	-0.06	0.01	0.08
1961-1977	0.04	0.43	-0.63	0.03	0.21
1978-1990	0.40	0.23	-0.21	0.05	0.33
1991-2007	-0.74	-0.69	-0.35	0.03	0.26
2008-2014	0.95	0.74	0.09	0.00	0.12

Source: See text and data appendix. Note: Expressed in Decimals, $I=100\%$

Table 4 shows that the debt ratio changed little between 1938 and 1947 because the cumulative primary balance over the period was very small and the real interest rate was close to the growth rate. Between 1948 and 1960 the increase in the debt ratio was almost entirely due the cumulative primary deficit over the period.

Between 1961 and 1977 there was relatively little change in the debt ratio. While primary deficits on their own would have resulted in a big increase, the very negative real interest rates of the 1970s more than offset it. However, a substantial unexplained residual emerges for the period.

The 1978 to 1990 period saw a major increase in the debt ratio. About half of the increase in the debt burden was due to cumulative primary deficits. Low real interest rates tended to offset this. However, there is a very large unexplained residual. By contrast, there was a huge fall in the debt burden over the period 1991 to 2007. The cumulative primary surpluses over the period made a major contribution to the fall. The fact that high growth more than offset positive real interest rates also contributed to the decline. However, once again there remains a large unexplained residual.

Not surprisingly, between 2008 and 2014 the overwhelming contribution to the increase in the debt burden is attributable to the massive cumulative primary deficits.

7. Conclusions

While there were a number of notable economic policy failures since the foundation of the state, the management of the debt has helped finance the different crises in a sustainable manner. There is evidence that the authorities managing the debt have learned from successive crises.

The first success was avoiding taking a share of the UK debt through the deal with the UK in 1925.

The economic war and the “default” on payments do not appear to have affected Ireland’s credit rating. The eventual deal with the UK in 1938 was very favourable. The negative effects of the “economic war” with the UK may have been more than offset by the effects of the redirection of revenue previously accruing to the UK to support Irish government expenditure. The final payment to the UK in 1938 was a very favourable deal from the Irish point of view.

The crisis in the 1950s saw the risk premium peak at one percentage point in 1956 in spite of the fact that the debt/GNP ratio was relatively low and the risk of default, with the benefit of hindsight, appeared low. This reflected the unwise policies pursued by government at that time.

With the exception of the crises in the 1980s and the recent financial crisis, Ireland has been able to borrow at competitive rates. There is evidence that crises saw a rise in the country specific risk premium in the period up to 1980, but it never significantly exceeded 1 percentage point. The 1980s saw a higher risk premium on borrowing in DMs, but still well below that experienced in the 2009-2013 period. As Honohan and Conroy point out, it was the premium paid on Irish pound borrowing, reflecting exchange risk, which was exceptional.

Borrowing in Irish pounds in the 1980s seems to have been much more expensive than borrowing in DMs. While some of this may have been due to fears of a much weaker exchange rate than that which subsequently transpired, there may have been other reasons. In the absence of fully integrated capital markets, government borrowing in Irish pounds may have driven up domestic interest rates. In turn this may have crowded out domestic borrowers, aggravating the severity of the economic crisis.

In managing a crisis, it helps greatly if the maturity profile of the debt is long. It also helps to hold large amounts of cash. While expensive, these holdings provide an insurance policy in case of unexpected difficulties which may affect a government's ability to borrow. These strategies have been employed with some recent success by the authorities with reference to the previous crisis of the 1980s.

References

- Abbas, S.M.A., Belhocine, N., El-Ganainy, A. and Horton, M. (2011), 'Historical patterns and dynamics of public debt-evidence from a new database,' *IMF Economic Review*, vol. 59, pp. 717-42.
- Barry, F., FitzGerald, J., Honohan, P. and Siedschlag, I. (2014), "The Globalized Irish Economy in Good Times and Bad", TCD: IIS Discussion Paper no. 443.
- Bielenberg, A. and Ryan, R. (2013), *An Economic History of Ireland Since Independence*. Routledge, New York.
- Crafts, N. (2016), Reducing High Public Debt Ratios: Lessons from UK Experience", *Fiscal Studies*, Vol. 37, No. 2, pp. 201-223.
- Cullen, L.M. (1972), *An Economic History of Ireland since 1660*. Batsford: London.
- Drea, E. (2014), 'The Bank of England, Montagu Norman and the Internationalisation of Anglo-Irish Monetary Relations, 1922-1943,' *Financial History Review*, Vol. 21 (1), pp. 59-76.
- Duncan, G.A. (1939), 'The Social Income of the Irish Free State', 1926-38, *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XVI No. 3, 1939/40, pp. 1-16.
- Ellison, M. and Scott, A. (2017), 'Managing the UK National Debt 1694-2017', CEPR Discussion Paper No. DP12304.
- Escolano, J. (2010), 'A practical guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates,' IMF Fiscal Affairs Department.
- Fanning, R. (1983), 'The Impact of Independence,' in *Bicentenary Essays: Bank of Ireland 1783-1983* edited by F.S.L. Lyons.
- Fanning, R. (1978), *The Irish Department of Finance 1922-58*, Institute of Public Administration, Dublin.
- Finance Accounts of Ireland 1922/23-2016*
- Fitzgerald, J. (1986), 'The National Debt and Economic Policy in the Medium Term,' The Economic and Social Research Institute, Dublin.
- FitzGerald, J. (2013), "The Impact of Fiscal Policy on the Economy", *Quarterly Economic Commentary* ESRI Research Notes 2013/3/1.
- FitzGerald, J. (2016), "The Irish Crisis: origins and resolution". The New Palgrave Dictionary of Economics , Online Edition, 2016.
- FitzGerald J. and P. Lane (2017), "Fiscal policy and financial distress: a balance sheet perspective", in Lúdvít Ódor, *Rethinking Fiscal Policy after the Crisis*, Cambridge: Cambridge University Press. isbn: 9781107160583

- Fitzgerald, J. and Kenny, S. (2017), 'Till Debt Do Us Part: Financial Implications of the Irish Divorce from the UK, 1922-6,' Trinity Economics Papers 2117.
- Foley-Fisher, N. and McLaughlin E. (2016a), 'Capitalizing on the Irish Land Question: land reform and state banking in Ireland, 1891-1938', *Financial History Review* 23. 1, pp. 71-109.
- Foley-Fisher, N. and McLaughlin E. (2016b), 'Sovereign debt guarantees and default: Lessons from the UK and Ireland, 1920-1938', *European Economic Review*.
- Geary, P and McCarthy, C. (1976), "Wage and price determination in a labour-exporting economy: The case of Ireland", *European Economic Review*, Volume 8, Issue 3, October 1976, Pages 219-233.
- Honohan, P. (1999), "Fiscal Adjustment and Disinflation in Ireland: Setting the Macro Basis of Recovery and Expansion", in F. Barry ed. *Understanding Ireland's Economic Growth*, London: Macmillan Press Ltd.
- Honohan, P. and C. Conroy (1994), *Irish Interest Rate Fluctuations: in the European Monetary System*, Dublin: The Economic and Social Research Institute, General research series no. 165.
- Honohan, P. and O'Gráda (1998), "The Irish Macroeconomic Crisis of 1955–56: How Much Was Due to Monetary Policy?", *Irish Economic and Social History*, XXV, pp. 52-80.
- Kearney, I., McCoy, D., Duffy, D., McMahon, M. and Smyth, D. (2000), "Assessing the Stance of Irish Fiscal Policy", in A. Barrett (ed.), *Budget Perspectives: Proceedings of a Conference held on 19 September 2000*, ESRI.
- Kearney, I., (2012), "Measuring Fiscal Stance", special article in *Quarterly Economic Commentary*, Autumn 2012, p.67-88.
- Kennedy, K.A., (1971), *Productivity and industrial growth : the Irish experience*, Oxford: Clarendon Press
- Lyons, F.S.L. (1973), *Ireland since the Famine*. Harper Collins, Dublin.
- McLaughlin, E. (2015), 'Economic Impact of the Irish Revolution,' University of St. Andrews, Discussion Papers on Environmental Economics Paper 2015-13.
- Meenan, J. (1970), *The Irish Economy since 1922*, Liverpool University Press, Liverpool.
- Moynihan, M. (1975), *Currency and Central Banking in Ireland 1922-60*. Gill and MacMillan, Dublin
- Neary, J. P. and Ó Gráda, C. (1991), 'Protection, economic war and structural change: the 1930s in Ireland,' *Irish Historical Studies*, vol. 27, 250–66
- Nevin, E. (1963) *The Capital Stock of Irish Industry*, Dublin: The Economic and Social Research Institute, General research series no. 17.
- Ó Gráda, C. (1994), *Ireland: A New Economic History 1780-1939* , Clarendon Press: Oxford.

Ó Gráda, C. (1995), 'Money and Banking in the Irish Free State,' in *Banking, Currency and Finance in Europe Between the Wars* edited by C.H. Feinstein.

Ó Gráda, C. and O'Rourke, K. (1996), 'Irish Economic Growth, 1945-88,' in *Economic Growth in Europe Since 1945*, edited by N.F.R. Crafts and G. Toniolo.

O'Hagan, J.W. (1980), 'An Analysis of the Relative Size of the Government Sector, 1926-52,' *The Economic and Social Review*, Vol. 12, No. 1, October 1980, pp. 17-35.

O'Rourke, K. (1991), 'Burn Everything British but their Coal: The Anglo-Irish Economic War of the 1930s', *The Journal of Economic History*, Vol. 51, No. 2 (Jun., 1991), PP. 357-366.

Reinhart, C.M., Reinhart V.R., Rogoff, K.S. (2012), 'Public Debt Overhangs: Advanced Economy Episodes Since 1800,' *Journal of Economic Perspectives*, Vol. 26, No. 3, Summer 2012.

Reinhart, C.M. and Rogoff, K.S. (2010), 'Growth in a Time of Debt,' *American Economic Review*, Vol. 100, No. 2, May 2010.

Thomas, R. and Dimsdale, N. (2017), "A Millennium of UK Data," *Bank of England*.

Whelan, B. (2000), *Ireland and the Marshall Plan, 1947-57*, Four Courts Press: Dublin.

Table A1: Irish National Debt, € millions

	National Loans	Foreign Borrowing	Other Long- term borrowing	Short- term borrowing	Other including capitalised Liabilities	National Debt – Gross	Liquid Assets
1922	0.0	0.0	0.0	3.1	0.1	3.2	0.3
1923	12.8	0.0	0.0	4.7	0.2	17.7	4.3
1924	13.0	0.0	0.0	3.7	0.7	17.4	2.1
1925	13.2	6.3	0.0	3.7	2.8	26.0	0.3
1926	13.3	6.3	0.0	7.5	4.2	31.3	0.7
1927	21.8	6.3	0.0	5.4	6.1	39.7	3.0
1928	21.2	6.3	0.0	7.4	8.2	43.1	1.0
1929	20.6	6.2	0.0	10.2	10.8	47.8	0.5
1930	26.8	6.2	0.0	8.1	12.8	53.8	2.4
1931	26.2	6.1	0.0	10.2	31.9	74.4	2.2
1932	25.7	6.1	0.0	9.7	32.7	74.2	1.8
1933	32.9	6.1	0.0	9.9	33.0	81.9	6.8
1934	32.2	6.0	0.0	9.9	33.4	81.5	3.5
1935	31.5	6.0	0.0	9.9	34.4	81.8	3.0
1936	31.1	5.9	0.0	10.6	35.2	82.9	2.6
1937	30.8	5.9	0.0	11.3	36.2	84.2	1.2
1938	42.9	5.8	0.0	14.0	36.8	99.6	0.8
1939	51.3	5.8	0.0	9.8	37.2	104.0	4.6
1940	50.8	5.7	0.1	10.4	37.5	104.5	1.0
1941	60.5	5.7	0.1	10.1	37.3	113.7	3.1
1942	59.7	5.6	0.8	12.5	37.2	115.8	1.5
1943	59.1	5.5	0.8	13.4	37.1	115.9	2.5
1944	58.5	5.5	0.4	15.4	36.9	116.7	1.5
1945	57.9	5.4	0.3	18.5	36.7	118.9	1.8
1946	57.6	5.4	0.0	25.9	36.9	125.7	7.0
1947	58.9	5.4	0.0	29.9	37.0	131.0	5.9
1948	74.2	7.8	0.0	23.3	38.2	143.4	4.9
1949	85.8	32.9	0.0	24.8	39.6	183.0	2.7
1950	103.5	55.5	0.0	21.7	41.6	222.3	0.8
1951	94.2	56.8	0.0	39.4	44.9	235.3	1.0
1952	118.3	56.7	0.0	51.6	47.2	273.8	1.7
1953	147.9	56.6	1.3	60.1	48.1	314.0	6.8
1954	166.5	56.5	0.0	72.8	49.4	345.3	7.1
1955	184.7	56.6	0.0	76.6	51.4	369.3	9.5
1956	195.8	56.2	0.3	102.5	53.1	407.9	4.7
1957	204.0	55.8	3.9	124.1	54.2	442.0	5.4
1958	218.1	55.4	4.5	126.4	55.4	459.9	2.9
1959	240.0	54.7	8.9	145.2	56.6	505.4	4.0
1960	250.9	53.9	13.5	162.5	58.9	539.6	4.8
1961	272.4	53.1	14.3	183.1	61.2	584.2	3.2
1962	318.6	52.0	18.3	183.1	65.7	637.7	2.1

1963	345.2	50.9	23.5	200.7	71.3	691.6	2.9
1964	369.4	49.7	30.4	234.0	79.5	762.9	2.4
1965	432.0	67.3	42.7	228.8	87.9	858.7	3.9
1966	455.6	77.8	57.5	236.6	94.6	922.1	6.9
1967	491.7	65.9	57.3	264.7	102.2	981.8	4.4
1968	581.9	69.5	75.4	252.2	109.9	1088.9	2.8
1969	671.6	88.3	43.9	277.4	118.3	1199.6	15.7
1970	690.4	114.2	42.4	337.4	128.8	1313.2	5.5
1971	837.8	136.6	38.4	329.7	142.6	1485.1	6.0
1972	957.1	160.5	39.3	363.2	164.0	1684.1	4.4
1973	1075.7	212.4	39.9	397.6	182.5	1908.0	4.8
1974	1277.4	396.1	37.8	388.8	204.7	2304.8	6.6
1975	1850.6	598.5	19.7	414.2	236.9	3120.0	6.5
1976	2221.9	1320.0	20.1	427.2	278.9	4268.1	7.0
1977	2898.9	1319.0	12.3	415.0	326.0	4971.2	7.5
1978	3666.0	1350.8	9.5	655.6	381.4	6063.3	7.4
1979	4730.7	1958.5	10.0	560.7	460.1	7720.0	4.0
1980	5271.3	2802.1	14.3	694.3	528.6	9310.6	3.6
1981	5796	4817	15	879	528	12035	72
1982	6936	6717	13	921	525	15113	58
1983	8079	8910	14	1067	519	18589	150
1984	9752	10064	22	1426	508	21772	23
1985	10920	10718	150	1679	494	23961	408
1986	13810	12384	155	1942	475	28766	779
1987	15884	12307	158	2631	98	31078	433
1988	15614	12060	160	4940	100	32873	1585
1989	16101	11640	163	5524	0	33428	1920
1990	16758	11235	165	5365	0	33523	1689
1991	17549	11590	167	5258	0	34564	2331
1992	16508	13784	167	3981	0	34440	997
1993	18089	15586	167	4158	0	38000	2000
1994	18466	14641	167	4904	0	38178	1073
1995	19550	13859	173	6027	0	39609	1252
1996	20882	11070	198	6835	0	38985	1006
1997	21474	9127	1422	8180	0	40202	1235
1998	20364	2239	7231	9538	0	39372	1863
1999	23629	2519	5220	10657	0	42025	2175
2000	21784	2114	4019	11085	0	39001	2490
2001	19632	2106	2674	14138	0	38549	2367
2002	22323	758	2207	12853	0	38141	1780
2003	28130	0	1087	10118	0	39335	1725
2004	31260	0	604	8045	0	39909	2063
2005	31311	0	625	8429	0	40365	2183
2006	31189	0	627	7689	0	39505	3588
2007	30946	0	616	10485	0	42047	4487
2008	41863	0	483	30111	0	72457	22059

2009	70858	0	670	25440	0	96968	21816
2010	90102	0	673	18834	0	109609	16164
2011	85310	34629	673	16162	0	136774	17692
2012	87853	55898	772	16959	0	161482	23850
2013	111007	66942	772	18827	0	197548	23601
2014	116339	58793	927	21009	0	197068	14759
2015	125086	49747	1168	20618	0	196619	13554
2016	121645	50298	1698	23088	0	196729	11119