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‘Muddling through or tunnelling through?’ UK monetary and fiscal exceptionalism and the Great Inflation

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Appendix 1: A narrative account of the Great Inflation in the UK 1961-1997

In this narrative overview, we re-examine the phases of inflation during the 1970s and provide a more detailed narrative than in the main paper which re-evaluates the leading hypotheses and makes the case that more attention should be placed on the fiscal roots of the Great Inflation in the UK.

Introduction - The phases of inflation in the 1960s and 1970s

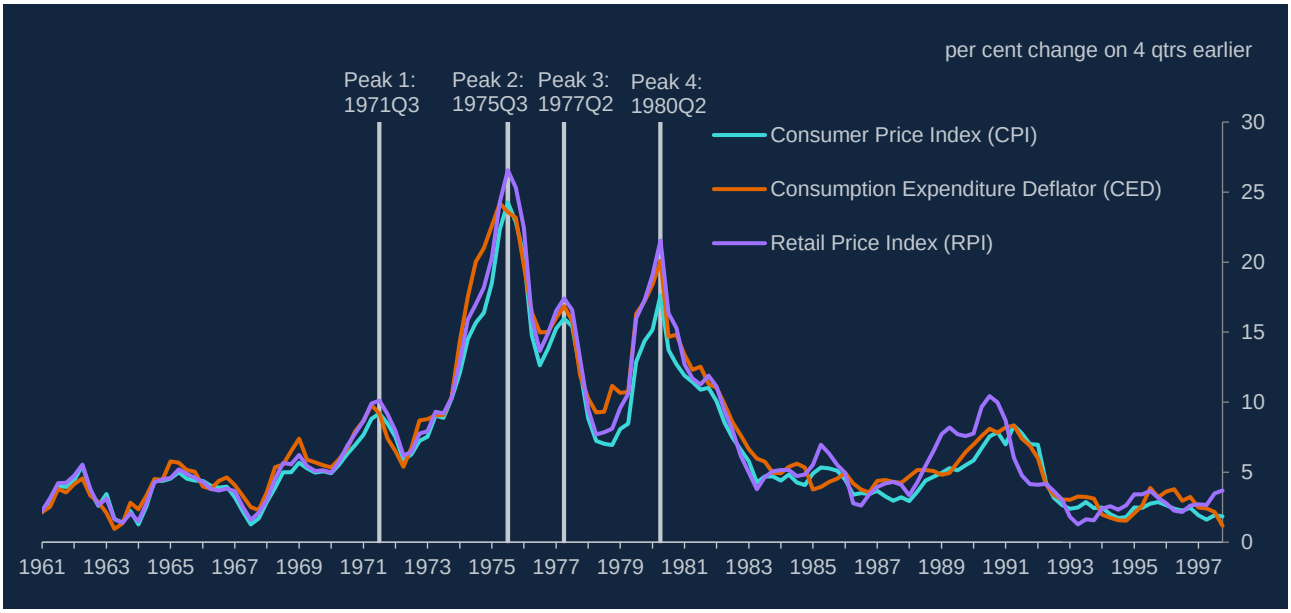
Previous analyses of the Great Inflation in the UK (eg Woodward (1991) and Schulze and Woodward (1996)) have identified the major phases of inflation in the UK. The UK's inflation rate was unique in that there were four distinct phases leading to four peaks of double-digit inflation in 1971Q3, 1975Q3, 1977Q2 and 1980Q2. There was also a resurgence of inflation during the 1990s. Chart 1.1 shows these distinct phases on two measures of consumer price inflation between 1961 and 1992: the retail price index (RPI) which was the measure used by contemporaries at the time, and a retrospectively-modelled version of the current CPI index.[1] Chart 1.2 compares this with other G7 countries and marks several of the key international events during this period.

Chart A.1 shows that inflation in the early 1960s averaged around 3.5% per year. It then started picking up rapidly in the late 1960s following £'s devaluation in 1967, peaking at around 10% in 1971Q3, before falling back to around 6% a year later. The next phase started shortly after the floatation of sterling in June 1972. This led to a long upward phase peaking in 1975Q3 during which there was the first of two large oil price shocks. There was then a significant fall back in inflation until the middle of 1976, before a further peak in 1977 following a large depreciation of sterling over that year. From that point on, inflation began to fall back before another urge in 1979-1980 following the so-called Winter of Discontent and a second oil price shock following the fall of the Shah in Iran.

Chart A.2 shows that the pattern of UK inflation was very different to that in the US and other G7 countries, with perhaps the exception of Italy. The UK showed an unusually large surge in inflation in the late 1960s and peaked almost a year later than average G7 inflation rates following the first oil price shock in 1973/4. The increase in inflation following the second oil price shock in 1979 was more synchronous with other economies but the UK peak was unusually large. Again only Italy shows a similar profile to that of the UK.

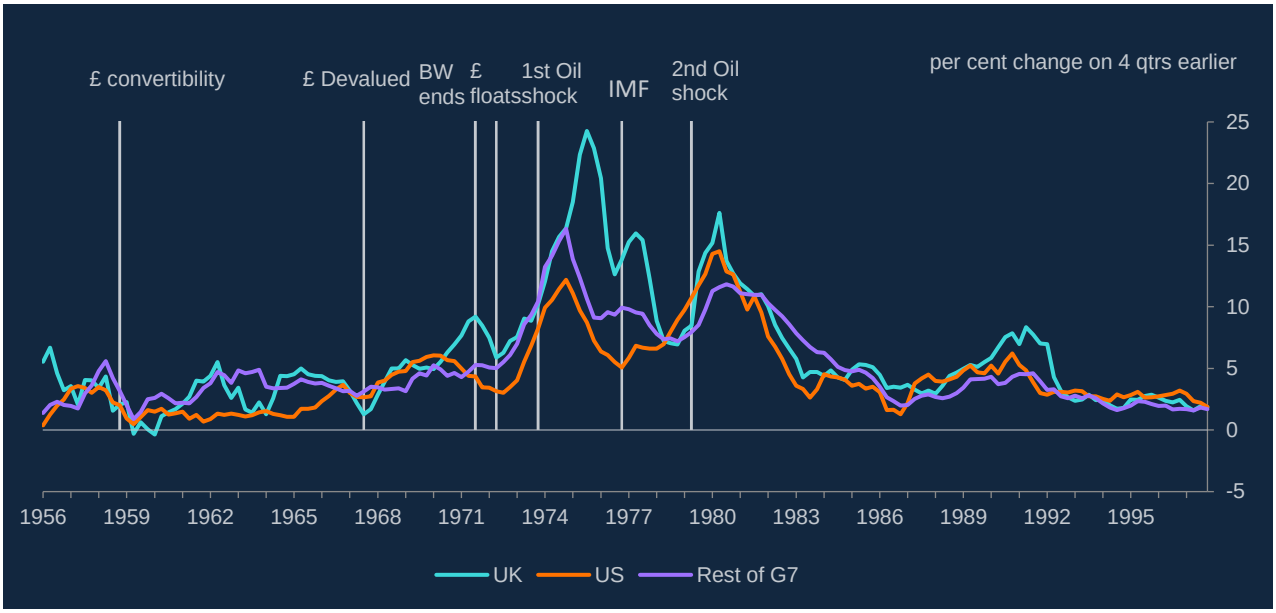
[1] See Consumer price inflation, historical data, UK 1950 to 1988 - Office for National Statistics. Unlike the RPI, the CPI excludes owner-occupied housing costs (mortgage interest payments) and council tax, includes university accommodation fees and stockbroker charges, and the averaging of price quotes at the elementary level of aggregation is exclusively based on using the Jevons and Dutot averaging formulae (the preferred choice of many statistical agencies) instead of a mixture of Carli and Dutot formulae.

Chart A.1 Consumer price inflation: 1961-1997



Source: ONS

Chart A.2: Inflation in the UK, the US and the rest of the G7



Source: ONS, FRED.

This suggests that the UK experience was relatively unique and that there are idiosyncratic as well as common factors in the increase in inflation in the UK that need identifying. The plan for the remainder of this paper is to re-examine the narrative of the inflation experience in the UK during the 1960s, 70s and 80s and tease out the relative importance of the different factors that are hypothesised to have driven the observed movements in inflation. Some of those factors were dependent on structural developments occurring well before the 1970s, so it is worth reviewing some of the fundamentals in the UK economy in the period after the Second World War.

I Background fundamentals: the UK economy in the 1950s and 1960s

In the first section, we present some of the key macro fundamentals and institutional features of the British economy during the 1950s and 1960s. Some of these trends (and changes in them) would have a huge influence on the Great Inflation period and many were changed because of it.

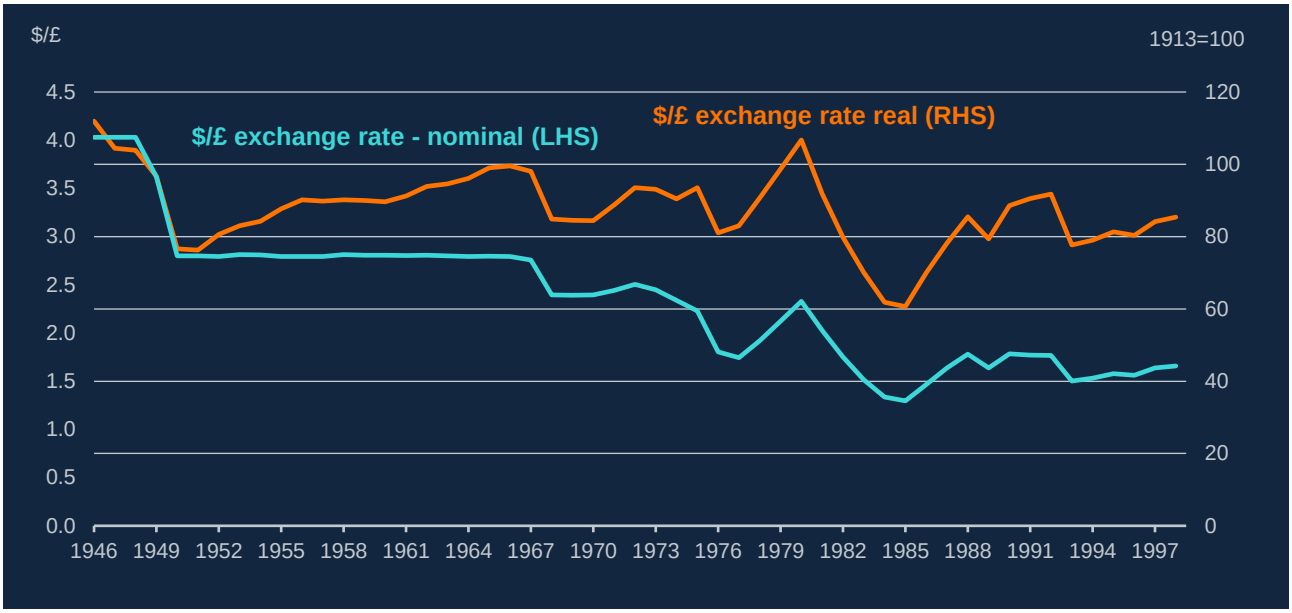
(i) The Bretton Woods regime and supply-side weakness - the constraints on domestic policy prior to 1971

A key fundamental shaping the 1950s and 1960s British economy was the exchange rate regime in place—the adjustable peg Bretton Woods System (BWS), discussed in detail in Bordo (1993). Although the UK was a charter member of the BWS when it was established just after WW2, it only declared current account convertibility in December 1958. Under the BWS, financial policy was constrained by the fixed exchange rate peg and the state of the balance of payments. In theory, the system was self-stabilising. Overly expansionary fiscal and monetary policies relative to those in countries overseas would lead to a rise in nominal income and a balance of payments (current account) deficit reflecting an increased demand for imports. That would be a prompt for the deficit country to tighten policy and, symmetrically, the corresponding surplus countries to relax policy. In terms of the fashionable open economy policy trilemma, independent fiscal and monetary policy under a pegged exchange rate required capital controls to be in place, which was indeed the case for the UK between 1939 and 1979.

In practice, surplus countries were often reluctant to lose their favourable balance of payments position putting the full burden of adjustment on countries with a deficit. If those deficit countries were reluctant to tighten policy because of the impact on their domestic economies, this would typically lead to a decline in foreign exchange reserves and ultimately a speculative attack and currency crisis. Such crises were then only resolved either by an adjustment in the peg or alternatively by a rescue by the IMF and other authorities that would force a policy of contractionary fiscal/monetary policy to remove the deficit and replenish international reserves.

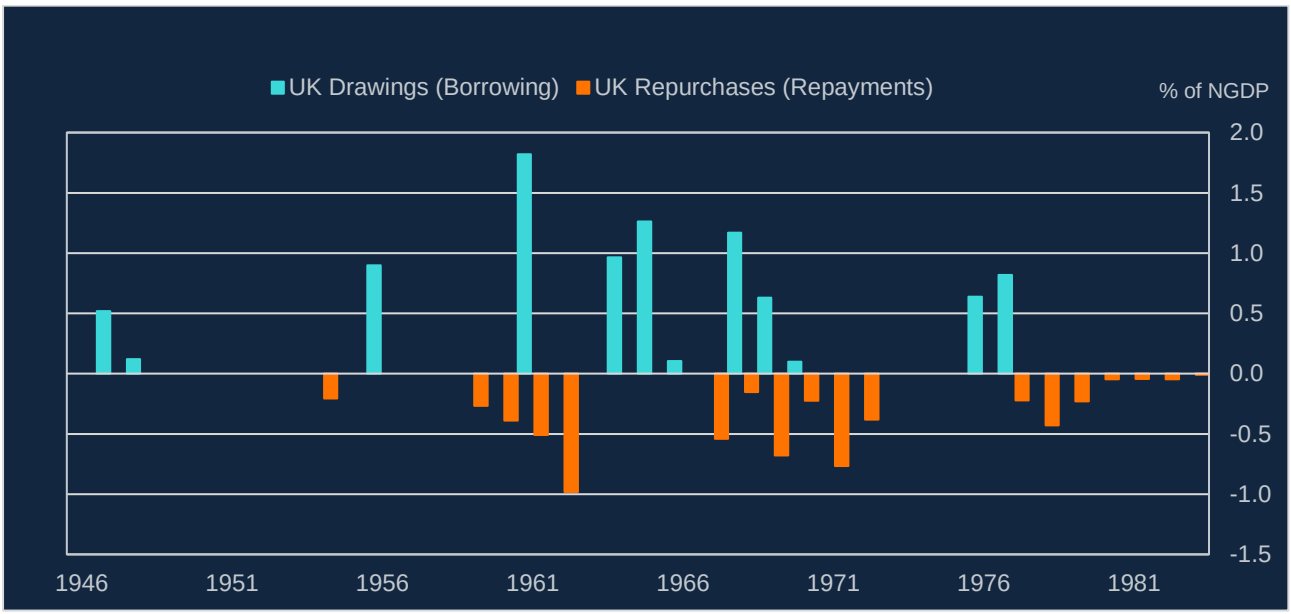
The UK experienced frequent balance of payments problems in the post-WW2 period and experienced both devaluation (in 1949 and 1967) and several rounds of IMF assistance (see **Charts 2.1** and **2.2**). The work of Naef (2021) shows it was also frequently intervening in the foreign exchange market (**Chart 2.3**). Those problems reflected a combination of factors. There were some fundamental weaknesses on the supply side of the British economy, particularly in the tradeable sector of the economy, and the UK also had responsibilities associated with £'s role as a reserve currency. Coupled with a desire by successive UK governments to maintain full employment, this led to a progressive worsening in the net trade position of the UK (**Chart 2.4**).

Chart A.3: $/£ Exchange Rate



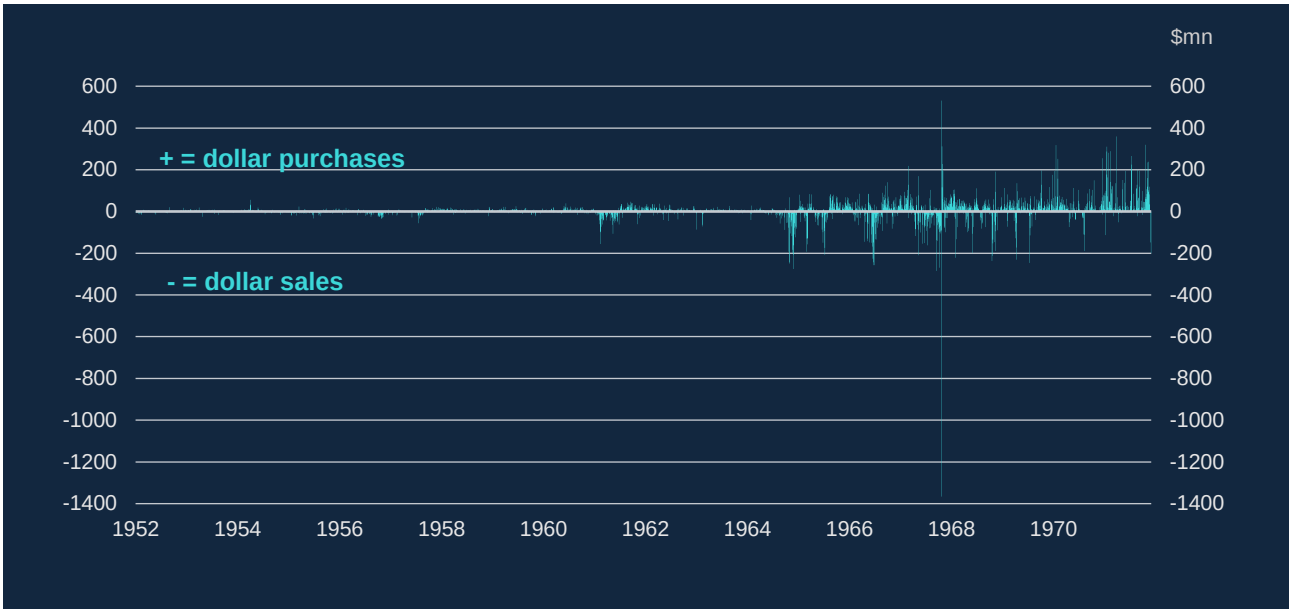
Source: Thomas and Dimsdale (2017)

Chart A.4: UK drawings from the IMF



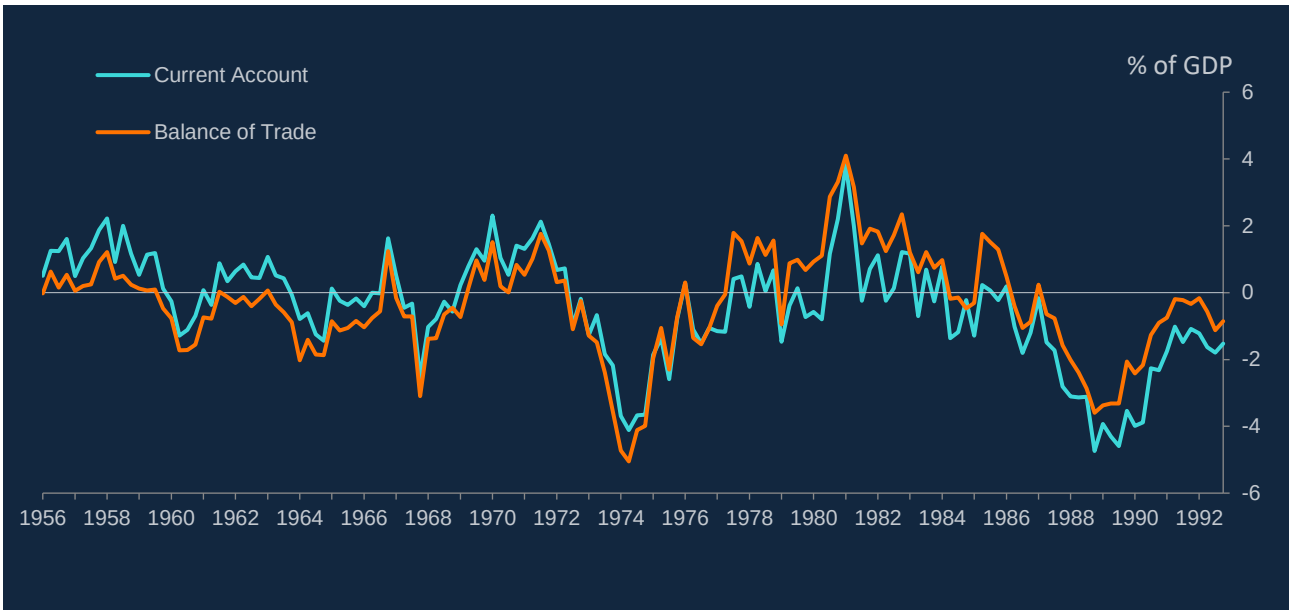
Sources: UK Balance of Payments (Pink Books).

Chart A.5: Bank of England intervention in the foreign exchange market



Sources: Naef (2021)

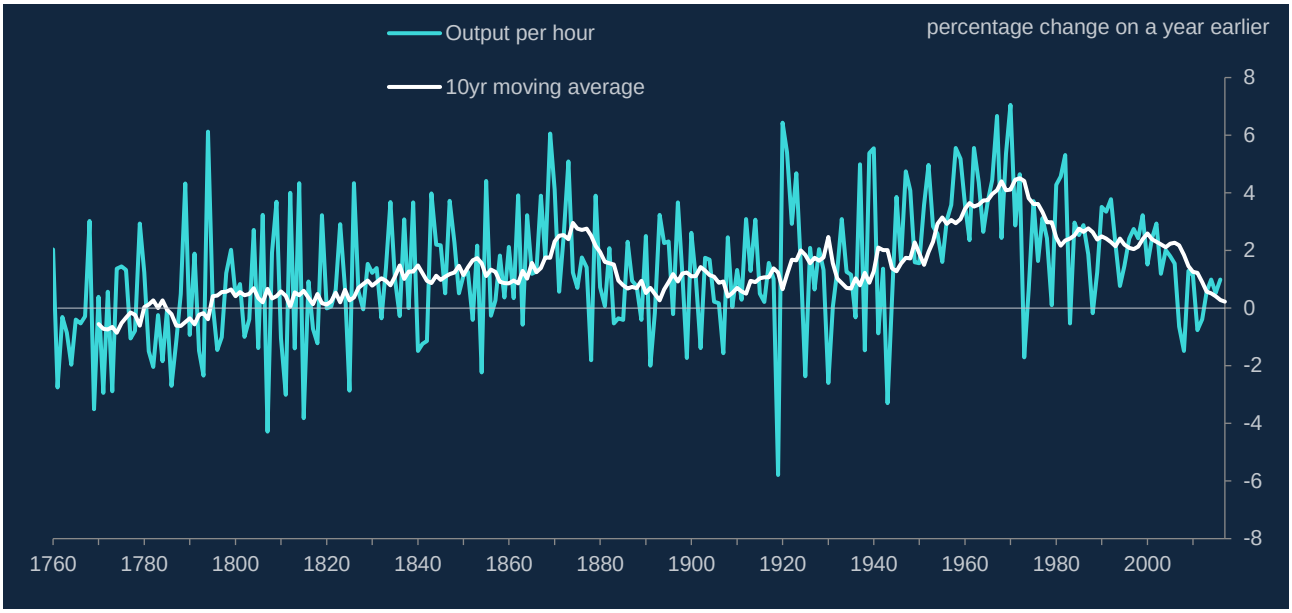
Chart A.6: Current account and balance of trade deficit



Sources: ONS

The period between 1945 and the early 1970s is often seen as a 'golden age' of productivity growth. Indeed, the UK experienced the fastest rates of productivity growth in its history, with the growth in output per hour peaking at around 4% in the late 1960s and early 1970s (**Chart 2.5**). Yet at the same time, the UK's productivity growth lagged behind many of its competitors (**Table A.1**) and the UK economy was increasingly perceived as being in decline and by the 1970s had become known as "the sick man of Europe".

Chart A.7: Labour productivity growth (output per hour)



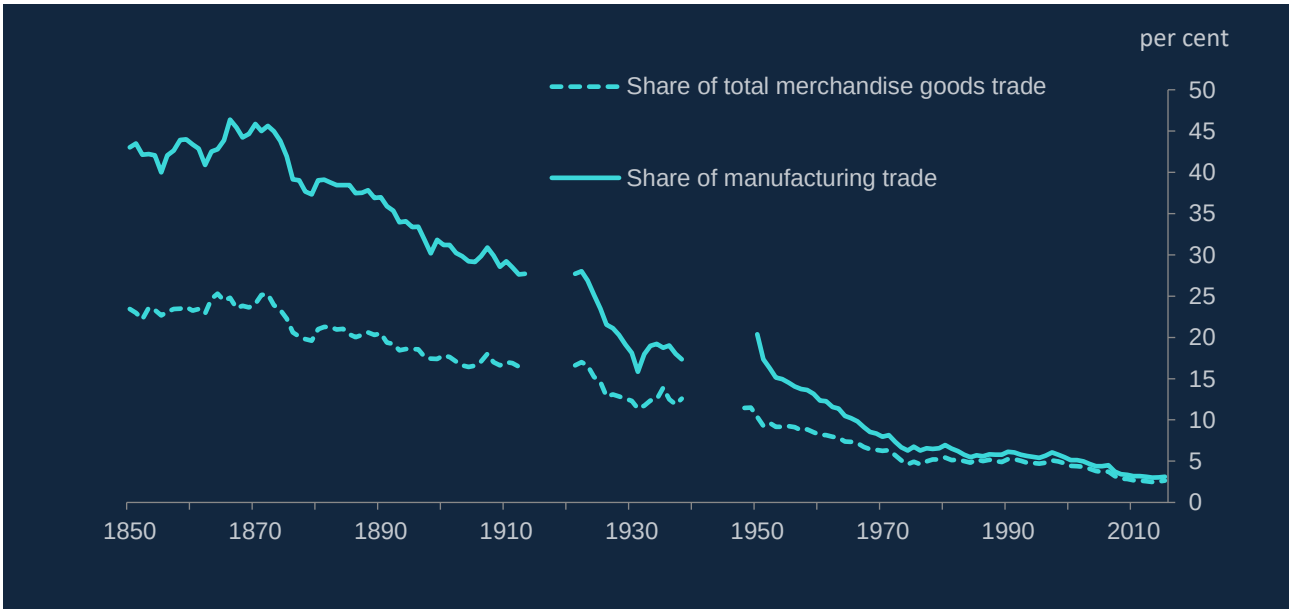
Sources: Thomas and Dimsdale (2017)

Table A.1 Growth in GDP per hour worked, 1950-1973 (% per year)

Canada	3.89
France	5.47
Germany	5.83
Italy	5.94
Japan	7.40
UK	3.87
US	2.68

Source: Conference Board, Total Economy Database

Chart A.8 UK share of world trade

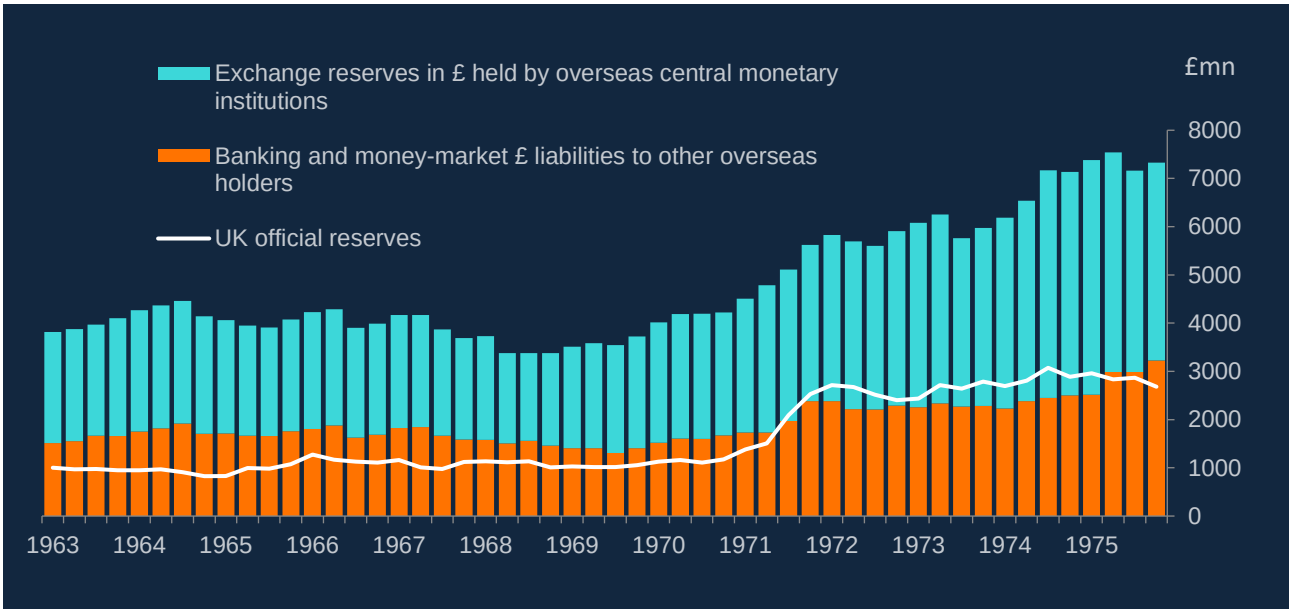


Sources: Thomas and Dimsdale (2017)

That reflected a growing weakness in the tradeable goods sector of the economy, which in turn made it harder to keep the current account in balance. The UK's share of manufacturing trade dropped from around 20% after WW2 to under 10% by the start of the 1970s, continuing the downtrend since 1870 that had been briefly interrupted by a hiatus in the 1930s (**Chart A.8**).

Despite the dominance of the dollar in the Bretton Woods system, sterling also acted as a reserve currency during the Bretton Woods period for the so-called Sterling area countries, who held their foreign exchange reserves in this currency. This required the UK to have adequate reserves of foreign currency to meet potential sales by £ area holders. But the lack of sustained balance of payments surpluses never allowed the UK to build up sufficient reserves which remained only a relatively small proportion of total liabilities (Chart **A.9**).

Chart A.9: Reserves and the £ balances



Sources: Bank of England Statistical Abstracts and Quarterly Bulletins, CSO Financial Statistics.

The apparent failings in the British economy and its responsibilities to the £ area were an important factor in the decisions of policymakers over this period. They sought to understand and remedy the reasons for the UK's productivity performance but were always wary about the constraints it posed and the risks for sterling should its reserve currency status become undermined as a result.[2] As discussed in the next section, their attempts to break out of the straightjacket would frequently come up against the constraints of the Bretton Woods system.

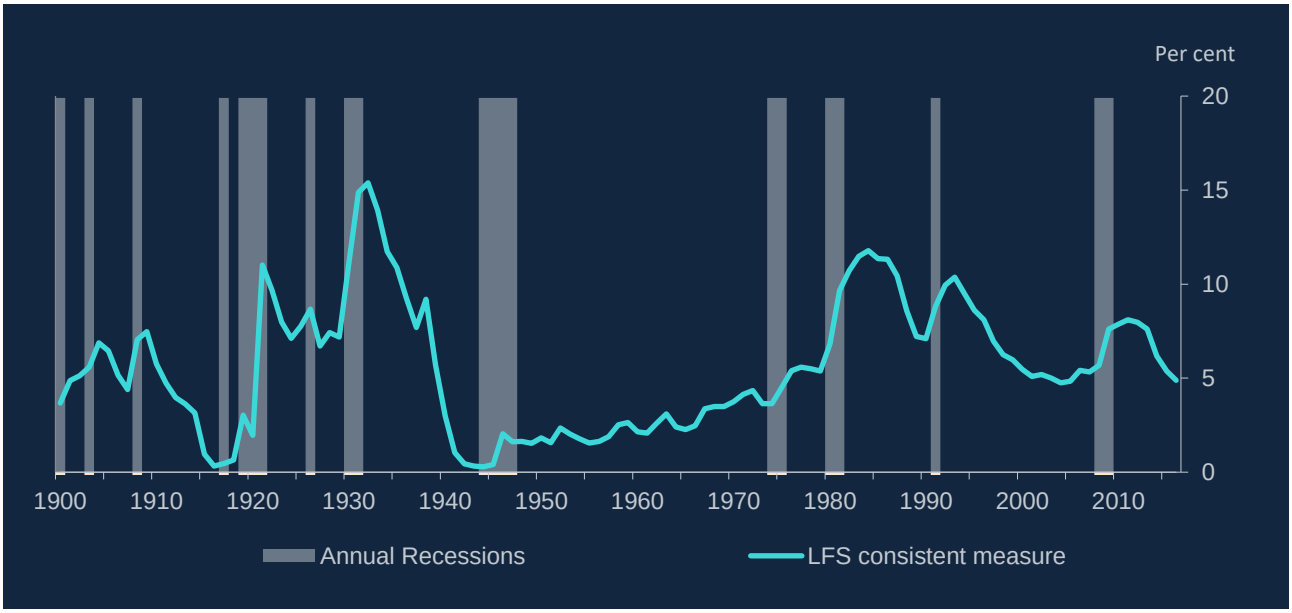
(ii) The objectives of policy – full employment and faster growth

Post-war macroeconomic policy during the 1950s and 1960s has often been characterised as one of Keynesian demand management with an overall goal of full employment. The conventional view is that there was a post-war consensus where governments, both Conservative and Labour, took a "corporatist" view and saw their role as planning and managing the economy together with trade unions and the bosses

[2] See Schenk (2010) and Avaro (2024) for a discussion of the methods through which UK government ensured sterling area countries continued to hold their reserves in £.

of key industries many of which were nationalised. There was a consensus that macroeconomic policy should aim to achieve full employment to avoid the experience of the interwar period which exhibited ruinously high unemployment levels (**Chart A.10**). In return the unions would attempt to ensure pay settlements remained reasonable to ensure full employment could be achieved without it being fundamentally inflationary. This consensus became known as 'Butskellism' named after the Chancellor "Rab" Butler and Hugh Gaitskell who was Shadow Chancellor and, later, leader of the Labour party in the 1950s.

Chart A.10: Unemployment rate adjusted to a LFS basis since 1900



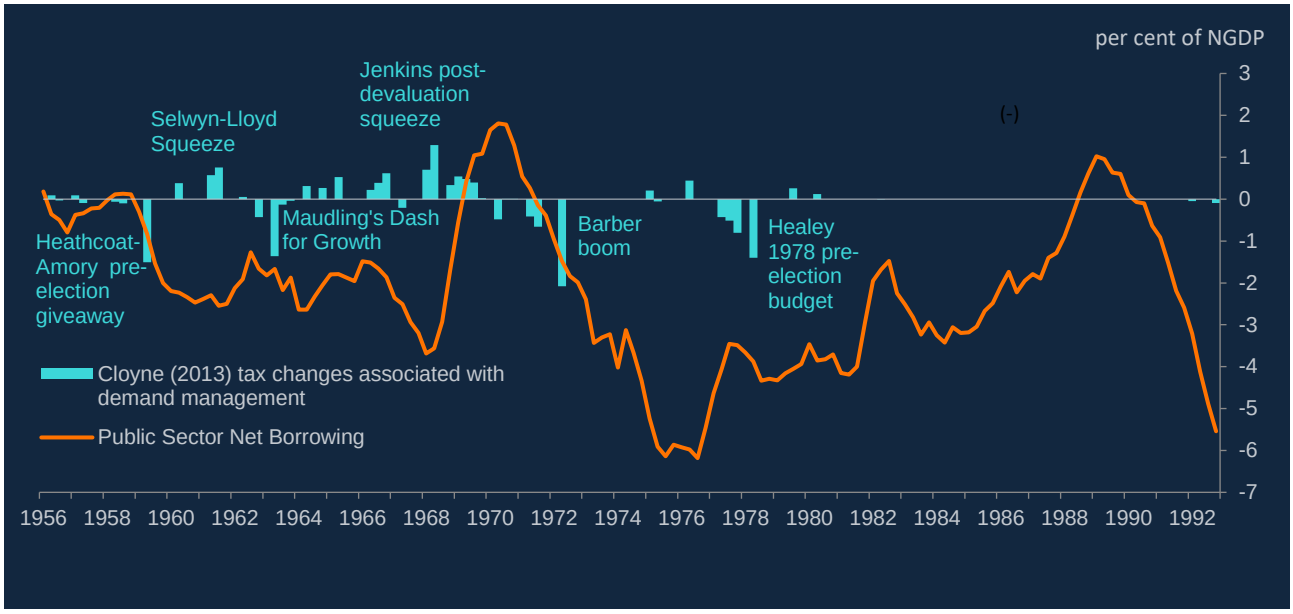
Sources: ONS, Thomas and Dimsdale (2017).

But, as Booth (2000) argues, the belief in Butskellism was not universal either within officialdom or amongst politicians. For example, the Chancellor Peter Thorneycroft and his spending minister, Enoch Powell, both resigned in 1957 as a result of what Booth calls "proto-monetarist" concerns. Worries about inflation were ever apparent in the 1950s and 1960s, even if it remained relatively low, as what mattered for the balance of payments – and hence the ability to meet the sterling peg – was inflation relative to the UK's competitors. Inflation rates exceeding those abroad, which was often the case in the 1950s and 1960s problematic. The Bank itself often took a stand against excessive public spending for fear of the implications for maintaining the sterling peg if that worsened the balance of payments and increased inflation.

Throughout the 1950s and early 1960s there existed a persistent conflict between the objective of maintaining a high level of employment and correcting deficits in the balance of payments and emerging inflation pressure. This produced a succession of what were-called "stop-go" cycle or, as Dow (1998) recommends, "go-stop" cycles in which expansionist periods of 'go', to try and boost the economy and lower unemployment, would lead to balance of payments problems, following which there would be pressure on sterling, forcing the authorities to hit the brakes and introduce deflationary measures which checked economic growth. As discussed in the next section, the go periods were largely implemented via fiscal policy and the stop periods by a combination of fiscal and credit controls. These booms and busts, with their well-known monikers, are shown in **Chart A.11** using both Cloyne (2013)'s identified tax changes associated with demand management and the overall level of public sector net borrowing. This led to a "growth cycle" emerging, where although the economy avoided outright recessions, periods of strong growth were

followed by periods of weak or almost zero growth. The go-stop growth cycle seemed to be holding the economy back relative to the high growth rates experienced by other economies.

Chart A.11: Public sector deficit and tax changes associated with demand management



Sources: ONS, Cloyne (2013).

During the 1960s the growing disillusion with go-stop led to less focus on demand management and more focus on improving underlying growth rates in the economy, in part through increased planning co-ordinated by central government. The Conservative government introduced the National Economic Development Council (NEDC) in 1962 and the Labour government of 1964 introduced the Department of Economic Affairs to co-ordinate these efforts under the umbrella of the "National Plan" which aimed for growth rates of 4%. But how was this to be achieved? The US economics profession in this period was making enormous strides in writing down models of economic growth such as Solow (1957). In the UK policy was increasingly influenced by the development of growth theory by the British economists Roy Harrod and Nicky Kaldor, who were advisors to the Conservative and Labour governments during the 1960s. Harrod's theory of growth, published in 1939, predated Solow's and emphasised the need for high investment as the precursor for faster growth and this appeared to be borne out internationally as sharp increases in the post-WW2 investment- output ratio appeared to be delivering rapid productivity growth in economies such as Japan and Germany. So, improving the environment for investment growth (and, if necessary, that could include direct investment by the public sector) was the means to achieving faster growth. That led to the idea that it may be necessary to run the domestic economy "hot" and lower taxation to generate an environment favourable for investment. Harrod argued the case in several articles he wrote in the Financial Times in the early 1960s,[3] arguing that import restrictions may be necessary should running the economy hot lead to balance of payments problems.

That in part was the reason for Chancellor Maudling's Dash for Growth in 1963/4, which was often seen as a simple extension of previous go-stop policies. As Maudling himself would admit (Maudling (1978)) and Cairncross (1996) confirms, this was a gamble, to try and break out of the straightjacket and achieve a

[3] See for example "Still time for expansion", from the Financial Times Feb 24th 1960.

virtuous circle of higher expected growth, increased investment and productivity which would then work to validate the expectation. This would necessarily require trying to ride out the balance of payments problems until the faster growth was delivered. In private he was even prepared to consider floatation, harking back to the ROBOT discussions of the 1950s (discussed in the next section). But once again the economy overheated though no further action was taken in the run up to the October 1964 election in which the Conservative government was defeated leaving a difficult legacy for the incoming government. It would be faced with a series of balance of payments crises until eventually devaluation was forced upon it in 1967.

Given the failure of force-feeding the economy through pump-priming domestic demand, Kaldor, who was advisor to the incoming Labour government, suggested the focus should be on export-led growth and shifting resources to the manufacturing sector. Underlying this was "Verdoorn's law" which was an empirical observation that faster output growth in manufacturing would produce faster productivity growth (see Kaldor (1966)). This was based on the idea that rapid output growth in the manufacturing sector would cause economies of scale in manufacturing and deliver improved productivity growth rather than high inflation. Fiscal policy incentives were one means of achieving this and this was the reasoning behind the selective employment tax (SET) of 1966, to encourage the shift of jobs towards manufacturing. But it also implied tighter public spending following the devaluation of 1967 to ensure resources shifted appropriately into the tradable sector. This was in fact delivered by Roy Jenkins, the Labour Chancellor, who managed to return the UK current account back into surplus by 1970 but at the expense of higher unemployment which would emerge over the subsequent two years.

This would have a significant impact on the incoming Conservative government. In opposition, the Conservative Party under Edward Heath, who would become Prime Minister in 1970, was developing its own solution to Britain's problems, by, seemingly at least, committing to a hands-off, non-interventionist approach to industry, based on increasing competition (which applying for EEC membership was part) and tax cuts to encourage investment. As discussed later, this policy lasted barely 18 months before an infamous "U-turn".

(iii) The operation of policy – go-stop and the role of monetary, credit and fiscal policy

In the 1950s and 1960s the authorities largely used fiscal policy to stabilize the economy. Monetary policy, as an active tool, was generally sub-ordinated to fiscal policy over this period and was used along with exchange rate intervention to help maintain the Bretton Woods peg. But there were important interlinkages between the two policies that paved the way for much that happened during the 1970s.

Signing up to the Bretton Woods system of fixed exchange rates provided both a nominal anchor and also presented an external constraint on the full employment ambitions of successive governments. There had been some discussion in the late 1940s and early 1950s about the conduct of post-war monetary and exchange rate policy and when the return to full convertibility of sterling would be achieved. In particular, there was the so-called "ROBOT" scheme that would have meant in effect the UK operating under a floating exchange rate rather than joining Bretton Woods (see Cairncross (1985), Burnham (2003)) which provoked intense discussions between the Bank, the Treasury and other parts of government in 1952.

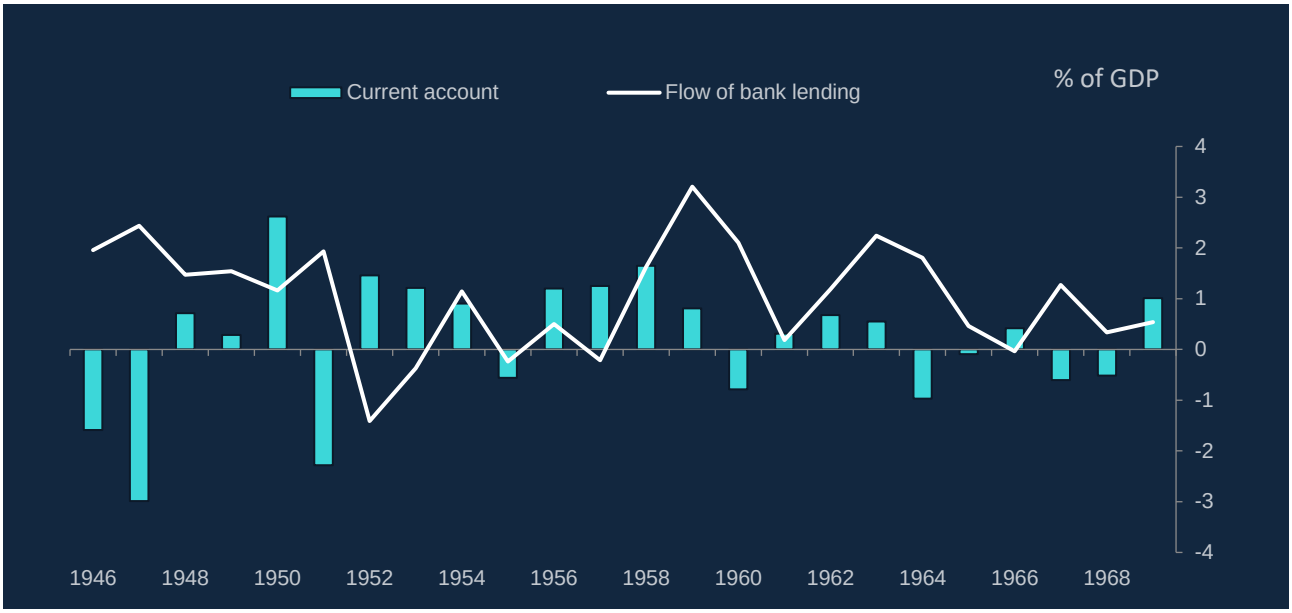
The 1950s and 1960s would see various similar tensions between the different parts of government responsible for monetary and fiscal policy. Following WW2 the government's control over monetary policy was rubber stamped when the Bank of England was nationalised in 1946. The Bank was subsequently an official agent of government albeit with a fair amount of independence in operational matters. Within

government, the Treasury saw itself as in control of macroeconomic policy, taxation and public spending but the shift towards a focus on growth led to other departments encroaching on the Treasury's turf, most notably the Department of Economic Affairs in the 1960s. Often during this period it was easiest to use the word the "authorities" to refer to those in control of macroeconomic and monetary policy. In effect, the authorities represented a tripartite relationship between the Bank, the Treasury and the rest of the government. Sometimes the Treasury and the Bank would align to try and force a change in government policy (eg in the early 1950s with the failed advocacy of the ROBOT scheme). At other times, the Treasury and the government were aligned against the Bank, such as in the mid-1950s when there was unhappiness with the failure of monetary policy to rein in the Butler mini-boom of the early 1950s.

The tension over monetary policy was in part the motivation for the appointment of the Radcliffe Committee to examine the workings of the monetary system. The Radcliffe discussions took place over the 1957 to 1959 period and essentially took the Keynesian position that monetary policy was sub-ordinate to fiscal policy as a tool for demand management (Laidler (1982)). The Radcliffe Committee concluded that monetary policy should be concerned with the overall level of 'liquidity' in the economy and that direct control of the quantity of credit and money should supplement control via interest rates, which was viewed as having little direct impact on demand given a perceived failure of its effectiveness in the early 1950s. So the tendency towards direct credit and monetary controls had started earlier but was rubber stamped by Radcliffe. The fact that the banking system was a cartel of the big 5 banks (Barclays, Lloyds, Midland, Westminster Bank and National and Provincial) made it more amenable for the Bank to implement controls on behalf of the government. Radcliffe recommended working via liquidity ratios of the banks via the use of Special Deposits, which were assets the banks would be required to place in the Bank of England but would not count towards the liquid asset ratios that the banks typically maintained. It was argued the squeeze on liquidity ratios would cause the banks to cut back on their lending. These liquidity ratio tools were supplemented by controls on hire purchase finance companies, which were important in funding consumer durable purchases (see Aikman et al (2016)).

Over the 1950s and 1960s this system of demand management using fiscal and credit instruments would be severely tested as governments frequently came up against a balance of payments constraint leading to the go-stop cycle discussed earlier. Attempts to boost the economy with fiscal policy would lead to current account deficits and moves were then made to use credit controls to rein in borrowing and reduce demand. Current account deficits would frequently be followed by falls in the flow of bank lending (**Chart A.12**) driven by direct controls imposed by the authorities (see Aikman et al (2016)).

Chart A.12: The current account and bank lending



Sources: ONS, Bank of England Statistical Abstract No.1

The efficacy of fiscal policy as a tool of demand management has been one focus of criticism. For example, Dow (1964) argued that government spending and taxes exacerbated rather than stabilised cyclical fluctuations due to the sluggish nature of fiscal policy responses and their lagged effect on the economy. A fiscal boost would often take place as the economy was recovering naturally from a slump. In later work (Dow (1998)) he presents a more nuanced view and prefers the interpretation, discussed earlier, that governments were simply too optimistic about supply potential and simply overheated the economy beyond its limits. UK governments could see the growth rates being achieved by their competitors and were using fiscal policy to try to "force-feed" the economy with demand growth to try and achieve them.

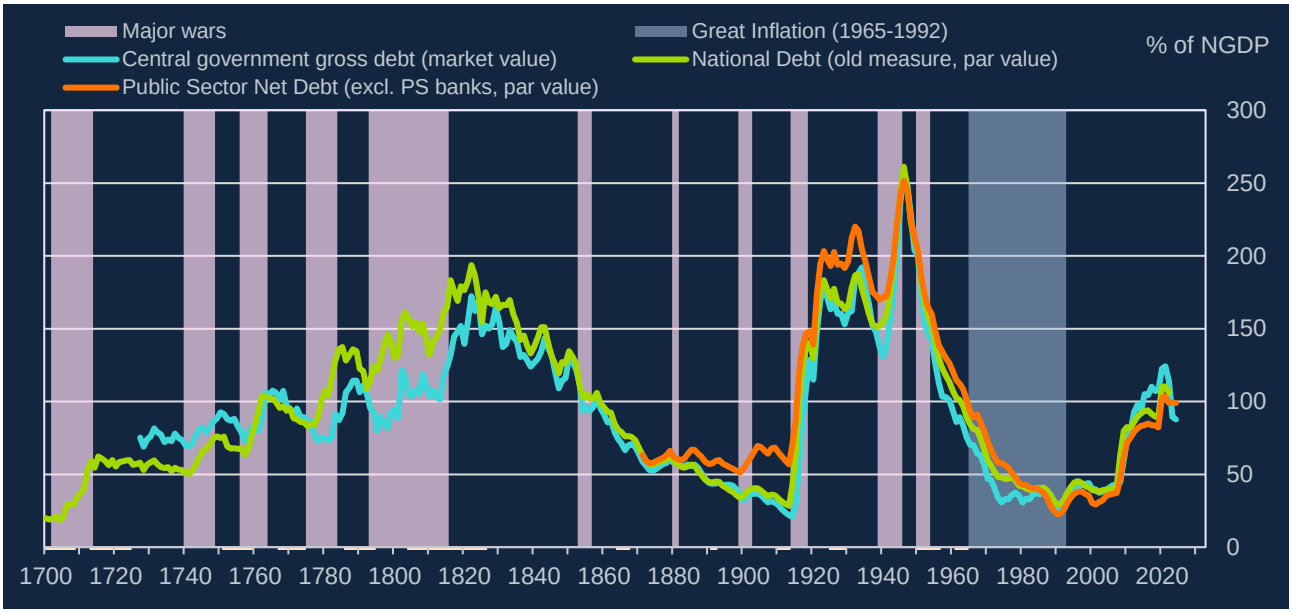
The view of Matthews (1971) is that the authorities just alternated myopically in their policy measures between concern about unemployment during slumps and the balance of payments during booms, without prejudging the issue of whether policy was the only factor generating fluctuations. Another explanation for the stop-go cycle is the idea of the political business cycle. Politicians of the day would simply expand the economy just before an election in order to win popularity only to deflate the economy once the election was won and out of the way. The "Butler boom" and "Heathcoat-Amory boom", which were generated ahead of the 1955 and 1959 general elections, are often seen as a manifestation of this.

The system of liquidity and credit control also came in for much criticism. Liquidity controls were often seen as ineffective as banks always had "back door" access to Bank of England facilities (Howson (2004)). The overdraft system, where firms could draw flexibly on pre-arranged credit lines according to need, also did not lend itself easily to a system which required direct and timely control of bank advances. Frequently the Bank had to use "moral suasion" or arm-twisting to get the main clearing banks to meet government targets for credit expansion. The clearing banks resented this given other parts of the financial system such as the building societies were not subject to the same constraints.

(iv) Debt management and monetary financing

At the interface of monetary and fiscal policy in the post-WW2 period was debt management. At the end of WW2, public sector net debt stood at around 250% of GDP (**Chart A.13**), much of it short-term debt held by the banking system. Although such "monetary financing" had been justified in wartime, there was a fear after the War that the resumption of private sector activity would lead to a large increase in credit and money creation given the liquidity of the banking system. As a result, there was a push to term out the debt by selling medium-term debt to the banks and longer-term debt to non-bank investors as the short-term debt became due. However, there was also a desire to ensure this funding was as cheap as possible to keep the costs of government debt service manageable. In particular, the prevalent Keynesian view of the late 1940s and 1950s, which permeated official thinking at various points, was that long-term interest rates should be kept low to promote investment.

Chart A.13 Public sector net debt



Sources: Appendix 2

As a result, much of monetary policy, in terms of interest rate setting, was tactically involved in walking a tightrope of trying to ensure sufficient sales of longer-term debt to the market without raising the cost of finance too drastically. This was made difficult by the microstructure of the gilt market where the matching of buyers with particular gilt issues was dependent on stock market "jobbers" that were poorly capitalised. One approach the Bank used was the so-called "Duke of York" tactic, where the Bank would increase short-term rates to a peak level in the hope of generating expectations of a future fall in rates and a rise in gilt prices to engender greater demand for long-term government bonds (ie assuming regressive expectations in the gilt market). More generally, the Bank would lean into the wind and attempt to sell more to the gilt market when it was buoyant and fewer when the market was tighter (see Howson (2004), Allen (2019)). That meant gilt sales to non-bank investors often happened in opportunistic bursts and by default meant that large, unexpected government deficits would be financed by default via the banking system if the Bank judged it too difficult for gilt sales. This impinged on bank balance sheets and money growth. **Box A** discusses the detail of this. As a result, the Bank frequently allowed the deficit to be funded by (broad)

money growth.[4] It was only in the later 1960s when monetarist thinking and the credit counterparts framework for monetary control began to impinge on policymaking that the link between the deficit, gilt sales and the money supply became more recognised. These developments are also discussed in **Box A** in the main paper. As the deficits became larger in the 1970s, this issue would become more important for monetary policy, which we discuss later.

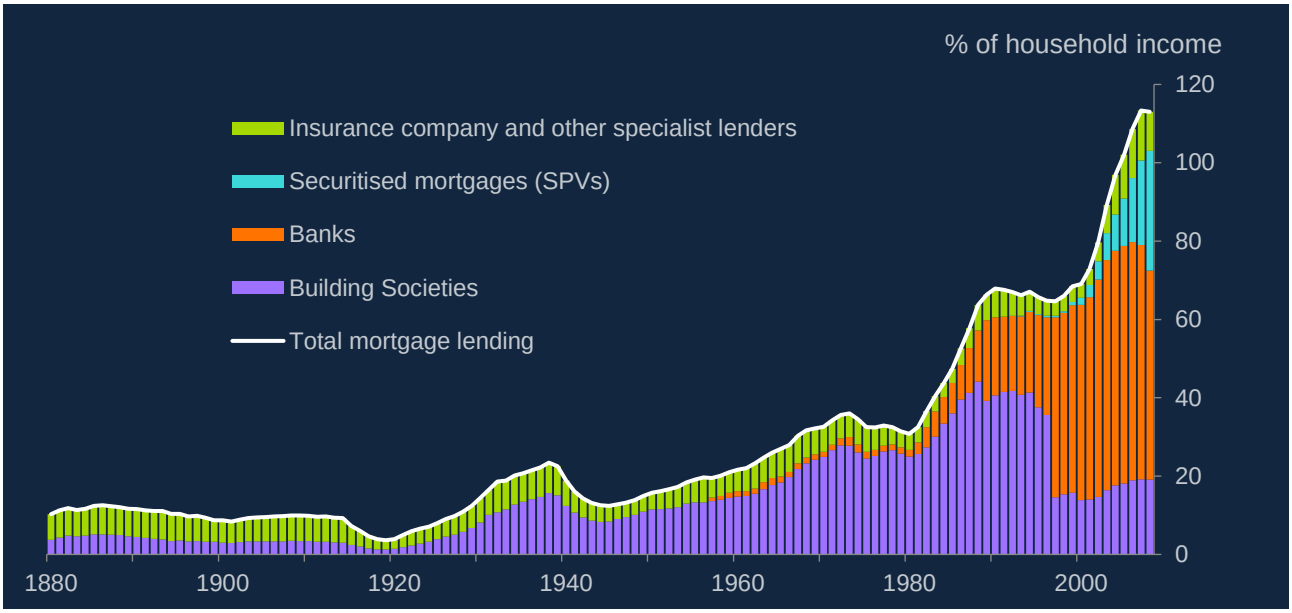
(v) The evolution of the financial system

During the 1950s and 1960s, the UK financial system was highly compartmentalised and cartel agreements operated among the clearing banks, who largely provided working capital for companies, and among the building societies who dominated the provision of mortgage lending (see **Chart A.14**). Investment in equities and corporate bonds in the capital market was the preserve of insurance companies, unit trusts and pension funds. This structure suited the authorities quite well given it made the system more amenable to direct credit controls. It was also a relatively safe system and there were no major financial booms or crises during this period, in part because the balance of payments constraint often meant controls had to be put in place to restrain credit well before any boom were to get going.

But there were costs to this approach. The City of London had largely lost its mantle as the leading financial centre in the world to New York City and was another manifestation of a perceived supply side failure given the UK's historic expertise in financial markets. The total assets of the main UK-owned banks and building societies declined as a share of GDP after WW2 and in the 1960s the ratio was barely higher than a century earlier prior to the dominance of London in the late C19th and early C20th (**Chart A.15**). The presence of capital controls (to the extent they were binding) was an important contributing factor to this. However, on the other side of the ledger financial innovation began to evade the controls and led to the creation of the Eurodollar market that began to breathe new life into the City (Schenk (1998)). Foreign-owned and other fringe and merchant banks outside the main clearers began to become more important. The clearers themselves also began developing their overseas subsidiaries. This led to growing pressure to dismantle the compartmentalised domestic financial system and make it more competitive. This was one of the key reasons for the Competition and Credit Control policy introduced by the authorities in 1971. This was to have major implications for credit growth and the money supply during the Great Inflation period.

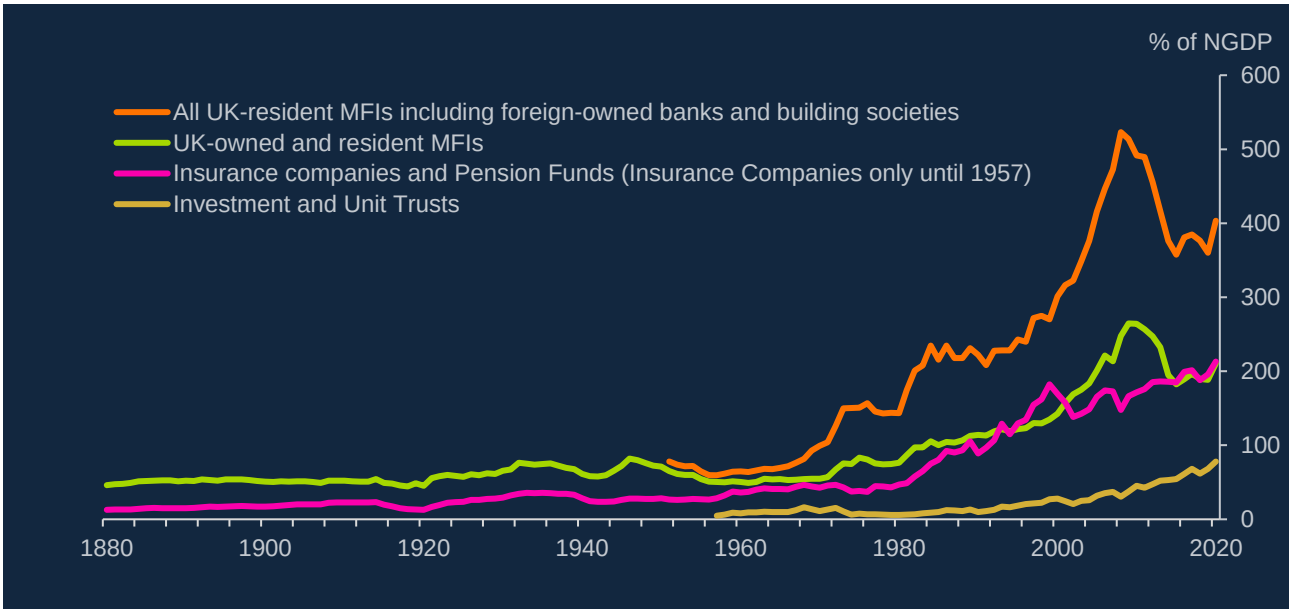
[4] There are analogies here with the "even keel" policy adopted by the Federal Reserve in the 1960s and 1970s. See Consolvo at al. (2020). However, in the case of the UK operations, the banking system would end up holding short-term government debt rather than reserves.

Chart A.14 Mortgage providers 1880-2008



Source: Thomas and Dimsdale (2017)

Chart A.15 Banking system (MFI) and institutional investors' assets since 1880



Sources: Sheppard (1971), Roe (1971), Capie and Webber (1985), Bank of England Statistical Abstracts and Bank of England database, ONS MQ5 release. Monetary Financial Institutions (MFIs) include banks and building societies. The ONS MQ5 release was discontinued in 2018 pending more general improvements and enhancements to the UK financial accounts. The data for Insurance Companies and Pension Funds has been extrapolated to 2020 using ONS balance sheet data from the National Accounts. The data for investment and unit trusts has been extrapolated using data on total funds invested produced by the Investment Association.

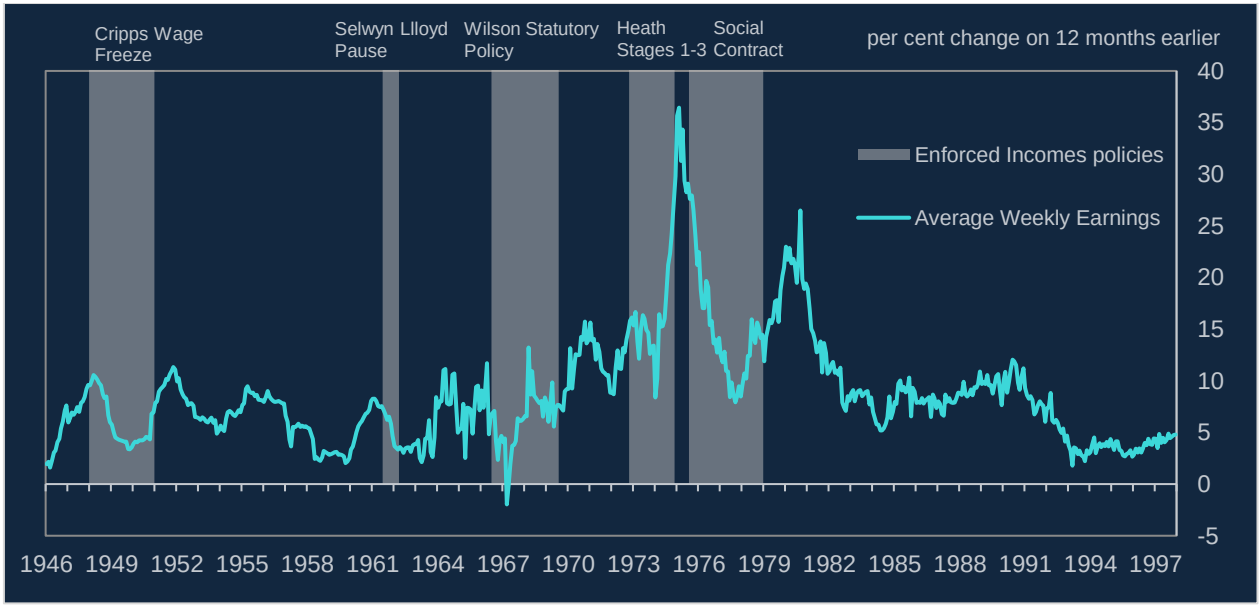
(vi) Trade unions, incomes policies and cost-push inflation

A key belief among many Keynesian economists after WW2 was that inflation was largely a "cost-push" phenomenon, a key element of which were pressures arising from wage costs. Wages were viewed as

essentially exogenous and the outcome of centralised bargaining between trade unions and employers. A key plank of the post-WW2 consensus was not only to maintain full employment but also to ensure adequate real living standards for the bulk of the population, supported by the safety net of the new welfare state. This idea had several strands, which were accepted by both the Conservative and Labour parties. First was to ensure a fair share for labour, which meant co-operation and agreement with trade unions whose interests were to push for higher wages and for redistribution from capital to labour. Second was a fear of social unrest should living standards decline, as was perceived to have been the case in the interwar period. Thus, there was a post-war consensus, supported by both parties, for full employment and for sustainable real growth in labour incomes, alongside the need to keep wage and price inflation low because of the exchange rate peg.

As a result of these objectives the government would turn to prices and incomes policies, sometimes in the form of voluntary agreement with unions and employers, or statutory if agreement could not be reached. These would impose some combination of temporary controls on prices or set and agreed wage "norms" to be respected, sometimes with fines and penalties for transgressions.

Chart A.16 Average weekly earnings and incomes policies



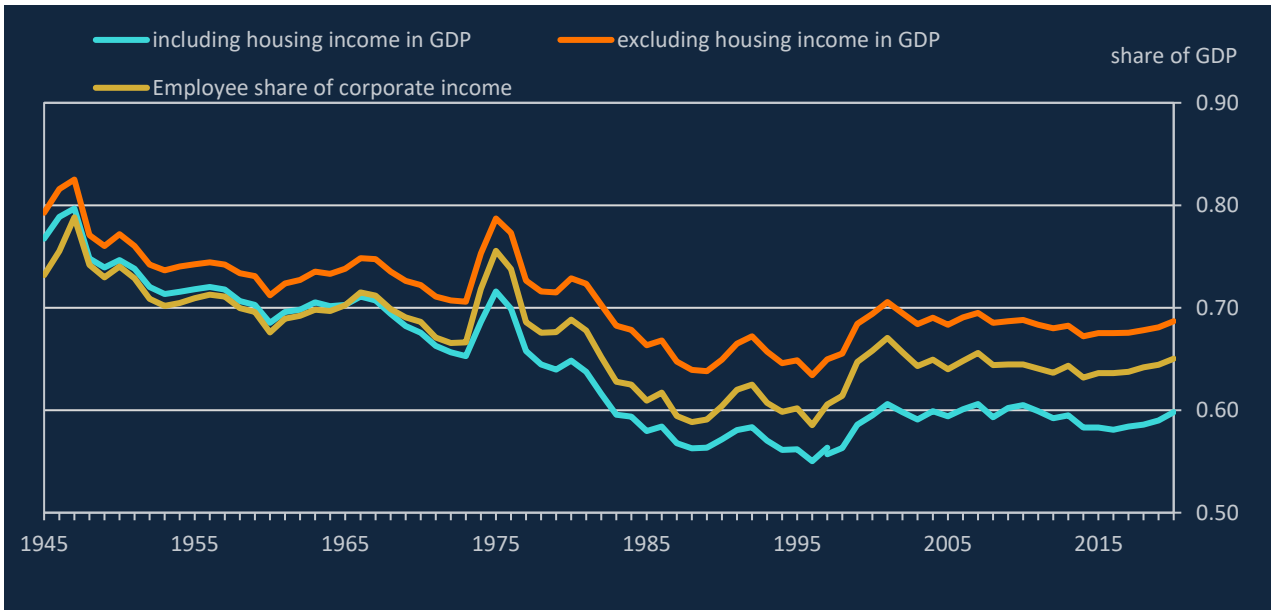
Sources: Thomas and Dimsdale (2017), ONS, authors' calculations.

The problem with prices and incomes policies is that although they often had temporary success they created distortions that meant once the policy had been lifted there would be a burst of wage demands and price increases to restore relativities. **Chart A.16** illustrates this for wages and incomes policies in the post-war period. Part of the problem, identified by Brittan (1979), is that money illusion after WW2 by unions had led to a trend decline in the labour share (**Chart A.17**) and the pressure to restore that share could not be held in check permanently by incomes policies in the mid-1970s.

One particular distortion that was argued to have been induced by prices and incomes policies was the wedge between private and public sector earnings. The government was in principle better able to impose pay restraint on its own workers (at least initially) than those in the private sector. This would then lead to changes in wage relativities that public sector unions would attempt to make up once controls were lifted or

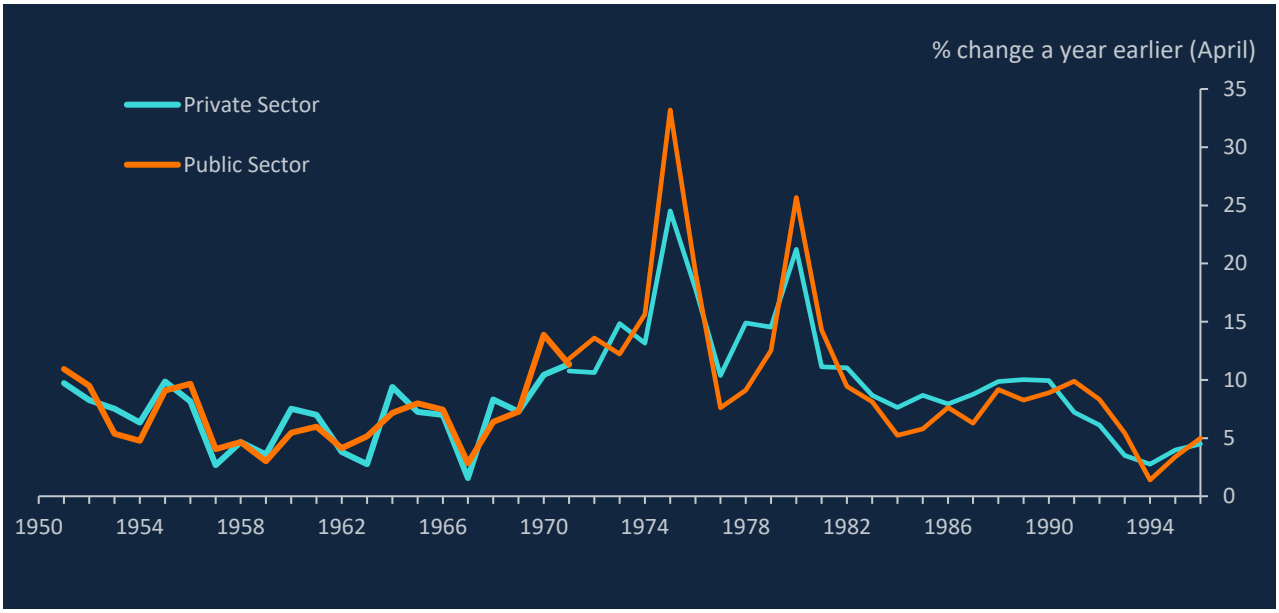
it would lead to strikes, the miners' strike in 1972 being one example. **Chart 2.16** shows that public sector earnings growth would greatly exceed that in the private sector during the peaks in the 1970s following the incomes policies of earlier periods, which had essentially prevented a catch up of public to private sector pay (which had enjoyed a premium for manual workers since WW2). Public sector workers were more heavily unionised and became a larger part of the workforce during the 1960s (**Chart 2.17**) which also helped them more than make up the difference with the private sector given many of these were in critical industries. The pressure on public sector wages obviously had implications for the fiscal position and would be an important feedback loop in the 1970s.

Chart A.17 The labour share of GDP



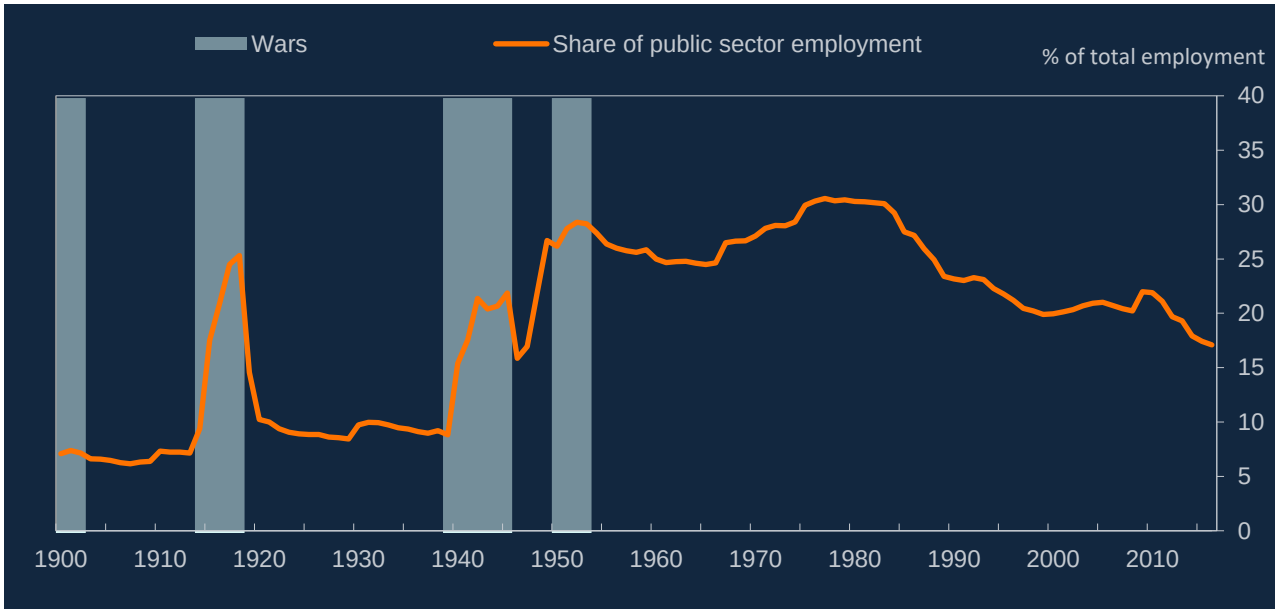
Sources: ONS

Chart A.18: Public and private sector earnings of manual workers



Sources: Dean (1975), CSO New Earnings Survey.

Chart A.19: Public sector employment as a % of total employment



Sources: Thomas and Dimsdale (2017).

However, wage and other cost-push pressures in themselves could not be the ultimate cause of persistent inflation. They had to be accommodated by monetary and fiscal policy. Nominal spending would have to expand, otherwise the wage pressure would simply lead to higher unemployment. This was being made clear by Milton Friedman and later New Classical economists. Ultimately, if workers did try and bid for levels of real earnings that were incompatible with what companies could offer at a given level of employment then the only way these could be reconciled is with a rise in the equilibrium or "natural rate" of unemployment. Repeated attempts by the authorities to push unemployment below that natural rate would simply lead to ever higher inflation particularly if expectations were adaptive. This was the message of Friedman's presidential address to the American Economic Association in 1967: the Phillips curve relationship, suggesting a trade-off between wage or price inflation and unemployment, was an illusion. This, together with the development of the New Classical theory of the Phillips curve, is discussed in more detail in Box A. The lack of a long-run trade-off between output and inflation only gradually filtered through to policy makers at the decision-making level in the UK and they would be thwarted in their attempts to push unemployment below the natural rate. The misplaced belief in prices and incomes policy as a remedy for the resulting increase in inflation is argued to have delayed the implementation of correct counter-inflationary pressures in the UK during the 1970s.

Box A: Developments in monetary theory and re-evaluation of the Phillips Curve Trade off.

The Keynesian emphasis on aggregate demand management using largely fiscal policy measures faced increased criticism from the late 1960s from both monetarists and a little later the new classical macroeconomic revolution of the 1970s (see Hoover (1988)).

Monetarists such as Milton Friedman and later new classical economists such as Lucas (1973) placed more emphasis on monetary shocks (unexpected movements in the money supply) as the major source of disturbances and therefore monetary policy had greater importance. Both schools placed more weight on the role of expectations and uncertainty about relative price

movements, rather than sticky prices, as the reason why such disturbances cause temporary movements in output away from trend and traced out a short-term relationship between output and unemployment. Friedman (1968) placed weight on the idea of adaptive inflation expectations. In Friedman's story, there was an equilibrium or natural rate of unemployment determined by frictions in the labour market. But monetary disturbances could lead to a temporary movement away from that equilibrium. An increase in the money supply and nominal spending would lead in the first instance to an unexpected increase in inflation given flexible goods prices. The actual real wage faced by firms would fall incipiently causing firms to demand more workers. This would then start to bid up nominal wages. Because this increase in nominal wages would be perceived as a rise in real wages by workers with adaptive inflation expectations, they would then be prepared to supply more labour in response. The resulting increase in nominal wages would therefore end up being less than the increase in prices, leading to an equilibrium fall in the real wage and higher output and employment. However, inflation expectations would then adjust adaptively to higher wage and price inflation leading to the possibility of wage-price "spirals" until ultimately unemployment would return to its natural rate at a higher rate of inflation.

The new classical monetary approach to business cycles (Lucas 1973, 1975) placed more emphasis on microfounded models and rational expectations. In this case, monetary shocks would only cause a very temporary disturbance to output to the extent agents have imperfect information and confuse a change in the general level of prices with a relative price change that causes them to supply more labour or output. These mechanisms are discussed further in Hoover (1988). This results in the Lucas "surprise" supply curve linking output to surprise changes in prices and money. This school built on Friedman's legacy to cast doubt on the use of stabilisation policy (the "policy irrelevance hypothesis") given agents with rational expectations would reset prices and wages rapidly once the transitory nature of the monetary shock was revealed (Hall and Sargent (2018)).

These ideas permeated slowly into the thinking of economists and policymakers in the UK. The importance of money supply disturbances rubbed against the grain of the Radcliffe consensus and the historical use of Bank Rate as the key instrument of monetary policy. Friedman's advocacy of a fixed growth rate of money ("the k-percent rule") led to increasing thought being given to monetary targets both in the Bank of England, the Treasury and UK academia from the late 1960s onwards (see Needham (2014)). An emphasis on monetary targets was also increasingly advocated by the IMF and were discussed with the UK government at various points during periods when the UK was asking assistance in the 1960s (Goodhart and Needham (2017)). This led to an experimentation with unpublished targets as a disciplining device on policy and which began to creep into official policy announcements (such as Barber's budget of 1971). Eventually official targets were introduced in 1976.

Understanding of both the theory and empirics on drivers of the natural rate of unemployment took longer and it would not be until the 1980s when economists (eg Layard and Nickell (1983)) developed a framework that would allow estimates of the natural rate to be analysed thoroughly. That meant there was somewhat of a disconnect between the older cost-push theories of inflation, that were associated with wage pressure and higher commodity prices, and the

apparent breakdown of the short-run Phillips curve relationship. As we discuss in the main paper, the authorities were aiming to keep unemployment at levels that retrospectively were lower than current estimates of the natural rate and as a result policy may have "over accommodated" cost-push shocks over the course of the 1970s.

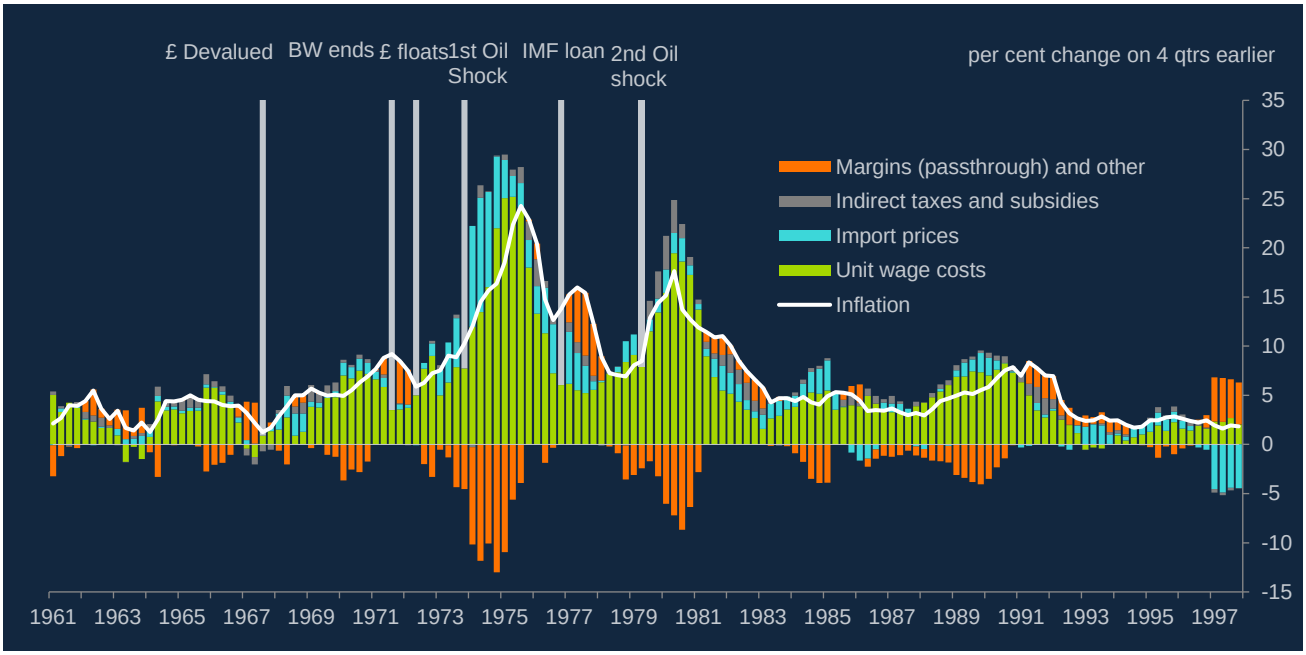
II Explaining the phases of inflation

In this part we provide a narrative of the four phases of inflation shown earlier based on the peaks in 1971Q3, 1975Q3, 1977Q2, 1980Q2 and 1990Q3. For each phase we describe the possible proximate causes of the pickup in inflation from the previous trough and what caused the fall back from each peak until the following trough. For this exercise, we draw extensively on secondary sources but also draw on some under-used information on inflation expectations.

Phase 1: Devaluation in 1967 and the wage explosion of 1969-1970

During this period up to the peak in 1971Q3, inflation rose from under 2% in 1967 to 10%. Why this pick up happened is actually quite difficult to pin down and has not been settled in the existing literature (Schulze and Woodward (1996)). The devaluation of sterling in 1967 did push up import prices but once weighted by the share of imports in final expenditure these at best only had a minor role to play in the subsequent pick up of inflation to 10% (**Chart A.20**).

Chart A.20: CPI inflation and contributions from unit wage costs, import prices and indirect taxes



Source: ONS and authors' calculations.

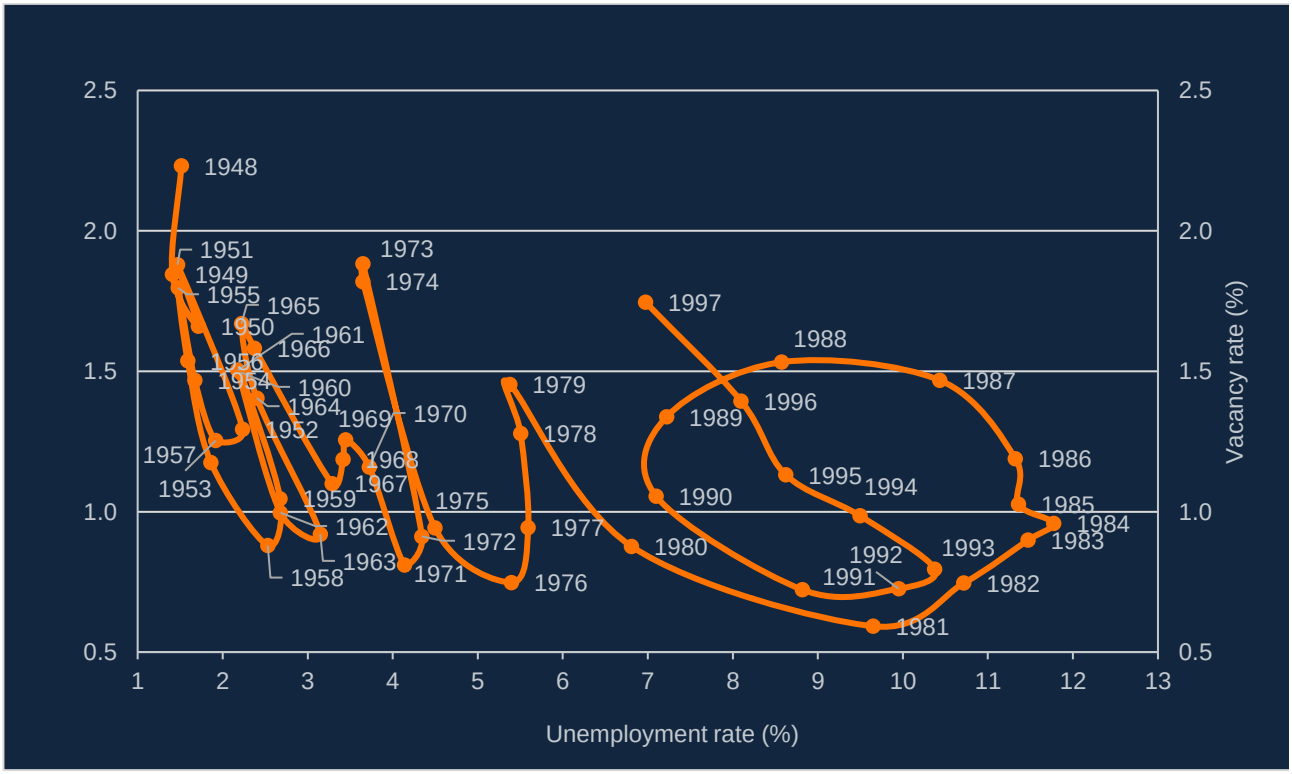
The main proximate driver was a large rise in wage inflation from around 1968 from under 5% to almost 15% per year by 1971. This was not warranted by a commensurate pickup in labour productivity growth, and so

led to a significant increase in unit wage cost growth. Once passed through with a lag this seems to be the key proximate cause of the pickup in inflation to 1971.

It is not clear why the wage explosion happened when it did. There are a number of potential factors. First, is the breakdown of the Labour government's pay policy of the 1960s following which the government shifted its focus on agreeing more general reforms with the Trade Unions. The set of proposals named "In Place of Strife" were unacceptable to the unions and key members of the Labour government and the policies were watered down. This may have strengthened the belief of unions to push for higher pay rises and remedy the distortions created under the incomes policy. Internationally there was also growing industrial unrest, with the May 1968 riots in France being the most well known, and a pickup in wage inflation was experienced in many economies.

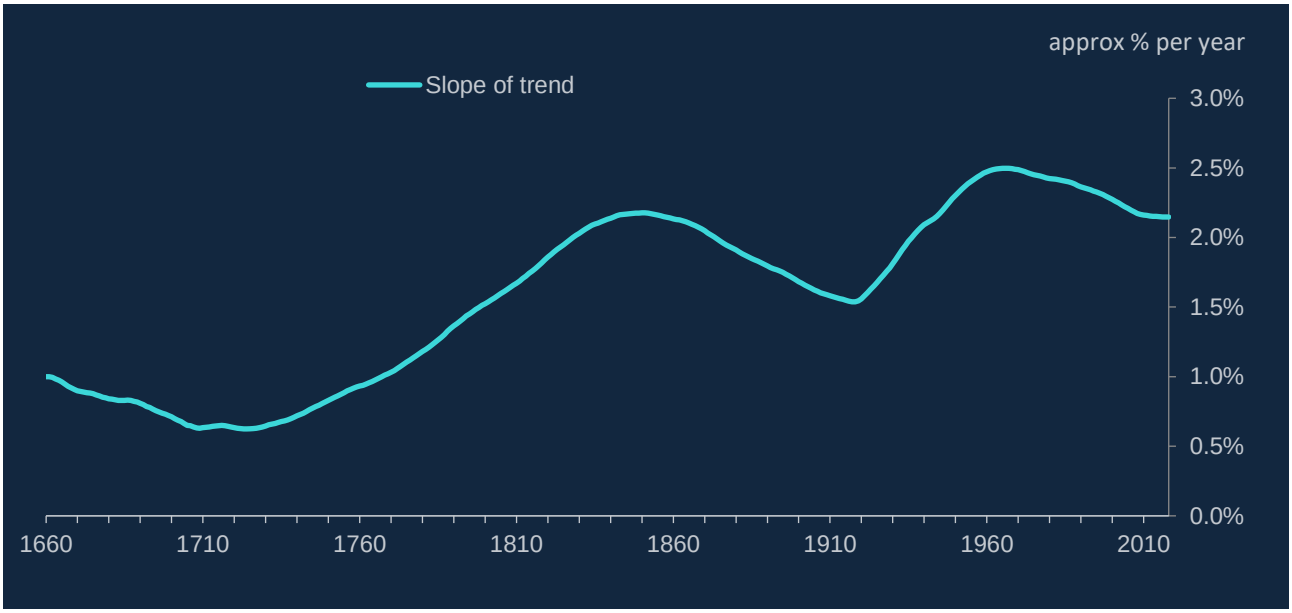
Together these influences would suggest there was a rise in the natural rate of unemployment over this period, well before the famous miners' strikes of the early 1970s and the oil price shocks. We examine this econometrically further in the next section but the late 1960s is when measures of mismatch increase. For example, the Beveridge Curve (which plots the ratio of vacancies to unemployment for each year) appears to shift outwards from 1967 to 1971 (**Chart A.21**)

Chart A.21: The Beveridge curve



Sources: Thomas and Dimsdale (2017), ONS, authors' calculations

Chart A.22: Unobserved component model – movements in trend UK growth since 1660

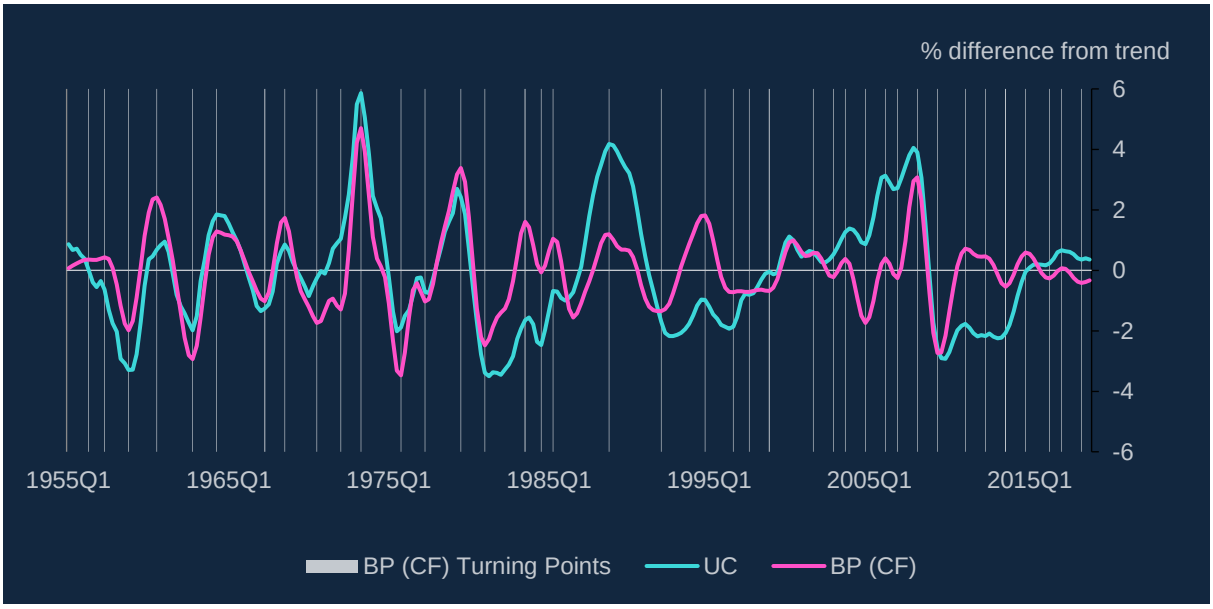


Source: Dimsdale and Thomas (2019).

More generally, these labour market influences suggest that the end to the golden age of post-war growth started somewhat earlier in the late 1960s, rather than the conventional date of 1973. **Chart A.22** shows the trend growth rate based on an unobserved components model of GDP estimated over a very long sample using the Kalman Filter, based on the local linear trend model of Harvey (1989). This is taken from the study of Dimsdale and Thomas (2019). This indeed shows the post-WW2 rate of trend output growth peaking around 1967. We return to this further in section 4.

However, both of these explanations are largely supply-side ones. When one factors in the demand side, the evidence of excessive demand is mixed. **Chart A.23** shows two measures of de-trended output over the post-war period using the Cristiano-Fitzgerald (1999) band-pass filter (BP-CF) and an un-observed components (UC) model of the business cycle, estimated on quarterly growth from 1955, assuming an AR(2) business cycle. These appear to show a peak in the cycle in the third quarter of 1968, suggestive of excess demand pressures immediately following the devaluation, before turning sharply negative in the early 1970s suggesting demand falling below potential supply growth.

Chart A.23: Post-war growth cycles using the Christiano-Fitzgerald Band-pass (BP) filter and unobserved components (UC) model



Source: Dimsdale and Thomas (2019).

Aggregate demand over the second half of the 1960s was dominated by the lead up to and aftermath of devaluation of 1967. The incoming Labour administration had faced a severe balance of payments deficit and a high level of domestic demand following Maudling's Dash for Growth in 1962/3. There was a re-introduction of restrictions on lending in May 1965 and applied to all banks and to the larger finance houses. Bank Rate was temporary reduced to 6% in June 1965, but the continuing weakness of sterling forced a rise to 7% in July 1966, which was accompanied by a tightening of lending ceilings and hire-purchase restrictions combined with reduction in public spending. This was then followed by a relaxation in the first part of 1967 as Bank Rate came down to 5.5% in May following three reductions of ½% and public spending increased from around 37% to around 40% of GDP leading to a rise in the public sector deficit to just under 4% of GDP by 1968. Broad money growth picked up to 10% in part due to banks and building societies financing the public sector deficit. This explains the movement into excess demand that carried through into 1968.

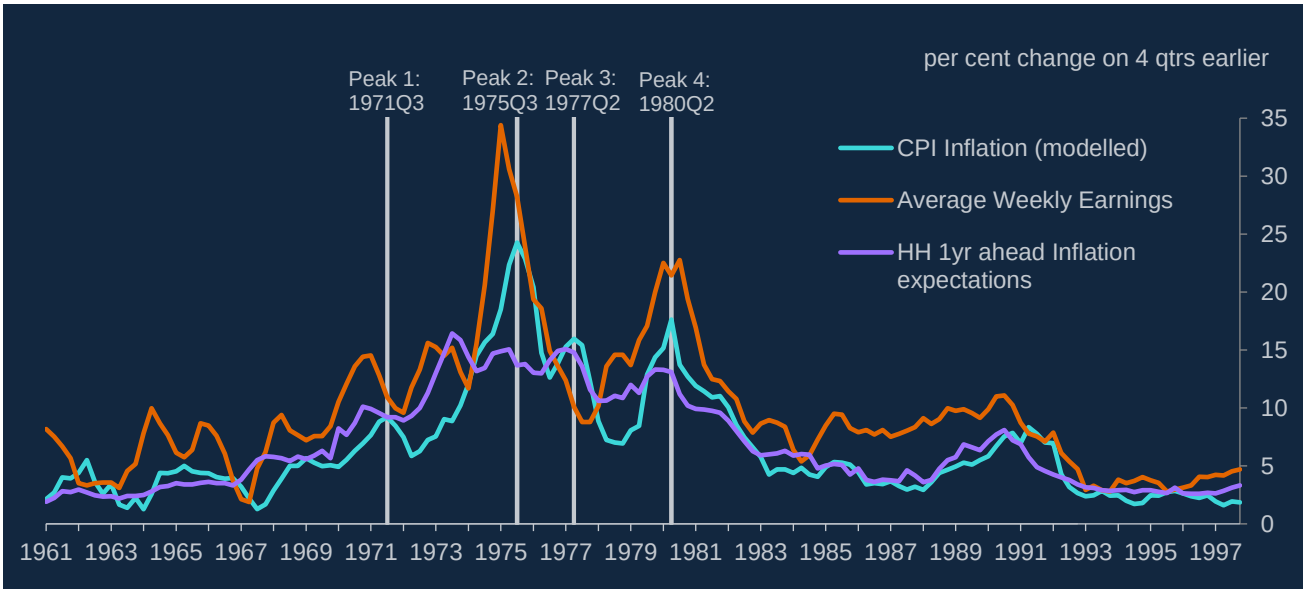
Renewed pressure on sterling, culminating in the devaluation crisis of November 1967, then forced a tightening of first monetary and then fiscal policy. First, there was a rise in Bank Rate to 8% and a re-imposition of lending ceilings. Bank Rate was then maintained within a narrow range of 7–8% from November 1967 until April 1970 and lending ceilings were in continuous operation during the period. To ensure resources moved into exports and manufacturing, fiscal policy was then tightened to try and restrain domestic demand. Roy Jenkins the Chancellor was successful in this aim and the current account of the balance of payments moved into surplus albeit with unemployment creeping up. The correction of the balance of payments following devaluation proved to be a slow process and was achieved by Chancellor Jenkins with some assistance from the IMF. He also sought to negotiate drawing rights from the IMF to support sterling. His Letter of Intent contained commitments on Domestic Credit Expansion (DCE)—a measure of the money supply adjusted for the balance of payments. In his Second Letter of Intent of May 1969, the Chancellor set a target for the growth of DCE of £400 million for 1969–1970. The implementation of the targets agreed with the IMF led to a sharp fiscal contraction which turned the Public Sector Borrowing Requirement (PSBR) of around 4% of GDP in 1967 into a surplus of around 1% of GDP in 1969. Fiscal contraction was associated with a decline in the rate of growth of sterling M3 from around 10% in 1967 to

1.7% in 1969, while the current account moved from a deficit to surplus. In his Budget statement in April 1970 Chancellor Jenkins reported that the flow of DCE had turned out to be negative in 1969–1970 because of the swing of the current account into surplus.

So the picture of excess demand over the period, given by the filtered estimates, suggests a positive output gap in 1968 was turned into a negative output gap by 1970-1971 through tighter monetary and fiscal policy. Lagged transmission can potentially explain the rise in unemployment and falling inflation experienced in 1971 to 1972, discussed in the next section.

However, a final and important piece of evidence in explaining the rise in inflation to its peak in 1971Q3 is increased inflation expectations amongst the general public. From 1961 onwards qualitative surveys of household short-term inflation expectations are available. Carlson and Parkin (1975) and Batchelor and Orr (1988) derive quantitative estimates from these using assumptions about the distribution of expectations based on earlier work by Theil (1958) (see online Appendix 2). The expectations series of Batchelor and Orr is shown against wage and price inflation in **Chart A.24** below. There is a notable pick up in expectations both immediately after devaluation and prior to the pickup in earnings and inflation once negotiations with the unions broke down in 1969. In both cases expectations appear to lead or are concurrent with wage and price inflation and so, superficially at least, this derived data would not suggest expectations were adaptive. Also, there may be too much of a time lag between expectations and the (limited) excess demand detected in 1968 for this to be the entire explanation for the increase observed in 1969. It is suggestive that the cause might be more related to shifts in household heuristics, influenced by newsworthy events such as the devaluation or the breakdown of the "In Place of Strife" initiative. Both were front page news items given their political significance.

Chart A.24: Earnings growth, CPI inflation and household inflation expectations



Sources: ONS

Phase 2: From Bretton Woods to the nadir of 1975

The years 1971-1975 in many ways mark a watershed in UK economic history. This is true across several dimensions and altered many of the trends discussed in Section II. In fact, there were so many structural

changes coupled with shocks to the economy that it makes it difficult to pin down any single underlying cause of the pickup to 25% inflation that followed.

There were three key structural changes occurring over this period.

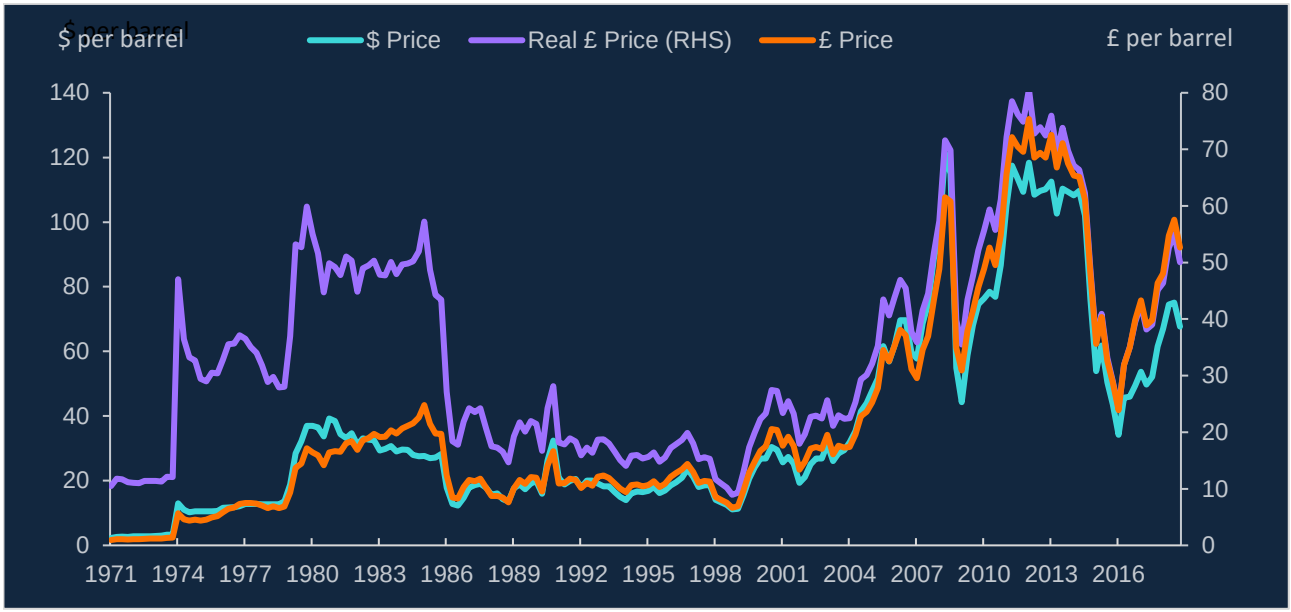
The first major paradigm shift was the collapse of Bretton Woods in 1971, which ushered in a period when the UK largely operated with floating exchange rates albeit a managed or "dirty float" at times (Bordo, Humpage and Schwartz (2015)). Movements in the exchange rate after this point were often large and provided many challenges to governments over the next twenty years. Sterling ultimately floated in 1972 and depreciated sharply. In many ways, the floatation of sterling was seen by some as an opportunity to finally break free of the balance of payments constraint on growth, but it quickly became apparent that there would be significant inflationary implications of allowing sterling to fall precipitously over this period. In particular, unlike the 1950s and 60s, there would be no automatic brake from the discipline of the exchange rate peg should there be a boom in money, credit and activity.

The second major change was the introduction of Competition and Credit Control (CCC) in 1971 on the initiative of the Bank. This was the first step in a rocky road to full financial liberalisation in the 1980s and 1990s (see Goodhart (2015)). The apparatus of direct controls on money and credit was dismantled and the compartmentalised structure underpinning banking and building society cartels began to break up. The main aim was to improve competition in the financial system and allow more effective control over money and credit through changing interest rates rather than through direct controls. However, it would also mean a much more elastic response of money and credit to changes in the demand for credit by households and firms at a given level of interest rates and would lead to the start of a series of credit booms experienced by many advanced economies after 1970 (see Jordà et al. (2016)). That meant it was important for interest rates to react promptly to any signs of inflationary pressure.

The third major change was the emergence of large global commodity price shocks which, from the early 1970s, would have major effects on the supply side of the economy given they implied large adjustments in real wages which workers might potentially resist or take time to adjust to.[5] As noted earlier, policymakers had not fully internalised the impact of such shocks on the supply side and particularly the natural rate of unemployment should there be insufficient adjustment in real wages (see **Box B**). In 1973Q4 following the start of the Yom Kippur war, the $ price of oil virtually quadrupled overnight (**Chart A.25**).

[5] Barsky and Kilian (2002) argue that oil price increases may not have been driven by shocks to the supply of oil but were rather driven by expansionary monetary policies in the early 1970s.

Chart A.25: Oil prices



Sources: FRED, US Energy Information Authority. West Texas Intermediate spot prices to 1987, Brent spot prices subsequently.

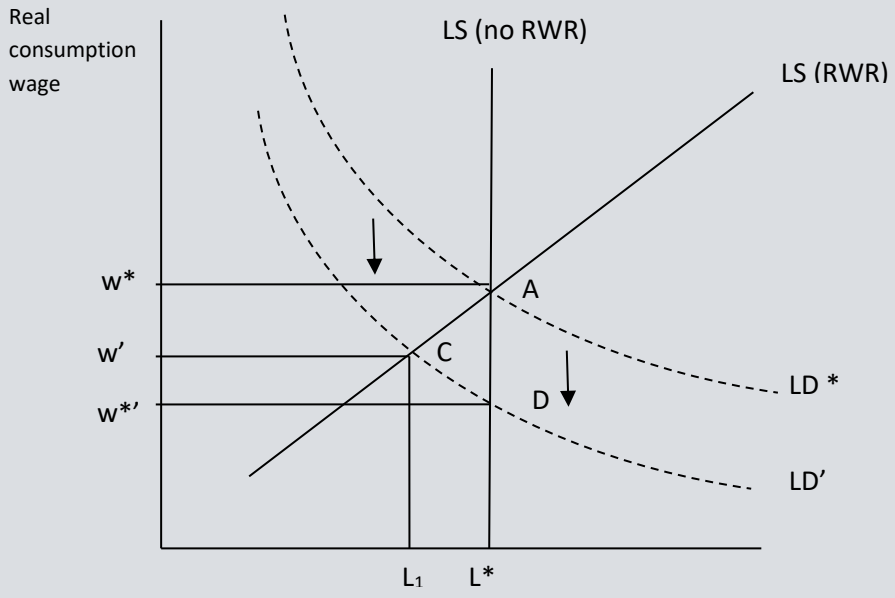
These three fundamental factors would interact with monetary and fiscal policy decisions to cause the large rise in inflation from around 10% in 1971 to 25% in 1975. The policy responses from 1971 onwards are best split into two parts. The first part covers 1971 to 1973 which includes Competition and Credit Control and the U-turn by the Heath Government from late 1971 and subsequent Barber boom in 1972/3. The second part covers the response to the first oil price shock at the end of 1973 and the second wage explosion leading up to the peak in inflation in mid-1975.

Box B: The real adjustment of the economy to higher oil prices

Figure D.1 shows how real wages respond to an energy price shock using a simple labour demand and labour supply framework with sticky wages and prices in the short run. It is assumed that, like the UK before the mid-1970s, that the economy concerned does not produce oil. On the vertical axis is the real consumption wage, ie, the nominal wage (per head) divided by the final consumption goods price rather than the GDP deflator or value-added price.

A rise in energy or import costs will lead to an increase in the wedge between the real product wage of interest to domestic firms and the real consumption wage of interest to workers. This means that at each and every level of the real product wage, the real consumption wage will be lower. So the labour demand curve (which is based on the real product wage) shifts downwards in real consumption wage space. And the 'warranted' real consumption wage, the real wage that would mean firms would be happy to carry on employing L* workers, falls to *w**' in this case at point D.

Figure B.1: Adjustment of the real consumption wage to higher energy prices



However, if workers' labour supply curve is upward sloping rather than vertical (or, in a more general framework, if their target real wage is decreasing in unemployment), workers will resist some of the fall in real wages. As a result, the economy will move towards point *C* in the medium term. At this point, employment is lower than its initial level and the real wage is higher than the new warranted real wage, *w**'. If real wage resistance is permanent or highly persistent then the economy may get stuck at point C and never return to the initial equilibrium L*, at least over an observable horizon. In practice, this means the warranted real wage is not necessarily that consistent with 'equilibrium' employment. It is merely the real wage that is consistent with unchanged employment relative to the baseline level existing prior to the shock.

The work of Bruno and Sachs (1985) and Rotemberg and Woodford (1996) show that under perfect competition the required or "warranted" adjustment in real consumption wages consistent with maintaining employment at a baseline level is given by a range based on factor shares in final output:

Range of impacts: $S_E/(1 - S_E)$ * % change in P_E/P to $S_E/(1 - S_L)$ * % change in P_E/P

where S_E and S_L are the shares of primary energy and labour in final goods production and factors are assumed to be complementary. The upper bound assumes that capital goods and non-energy imports are as energy intensive as other final goods and their prices respond to oil prices in the same way as domestic final goods prices. Rotemberg and Woodford (1996) show that under imperfect competition with fixed proportional mark ups the real consumption wage will need to adjust by more.

Given the share of final energy was just over 1% of final expenditure at the end of 1973 and that of labour in total costs around a half, the 1973/4 oil price shock, which in real £ terms rose by 2.5-3 times between end 1973 and mid-1975 (**Chart 3.3**), would have required between 3%-6% downward adjustment in real consumption wages (relative to trend productivity). A more precise calculation can be used by the application of input-output analysis to trace through the increase of primary energy costs on to final goods and prices through both the direct effect and indirect effect through the supply chain. It is also worth noting that the UK in mid-1970s was also heavily reliant on coal rather than oil or gas for fuel and electricity generation. As a result, coal miners' wages were effectively a primary energy cost to the extent their wages can be treated as exogenous and separate from the rest of the economy. This is not too strong an assumption given mining was often viewed as a "special case" in public sector wage negotiations and major increases in wages were used to resolve strikes. Input-output analysis was undertaken by Hines et. al (1975) based on the 1968 input-output tables and Table B.1 from their paper shows the impact of an increase in crude oil prices and mines' wages on final goods prices, holding other costs constant, which gives an idea of the real consumption wage adjustment to be made by other workers in the economy. This also suggests the 250-300% increase in energy prices would have increased consumer prices (and warranted a reduction in real consumption wages) by at least 3% (note this does not build in an effect of oil prices on non-energy import prices or the effect of higher capital goods prices on the cost of capital which would also affect firms' costs). Miners' wages also probably increased consumer prices directly by around 1-1.5% given the 75% rise in miners' wages in 1974/5.

Table B.1: Percentage increases on price indices of hypothetical changes in primary costs of supplying basic fuels

Source of Increases in primary costs of Supplying Basic Fuels	*Consumer Prices*	*Export Costs*	*Price of Capital Goods*	*Price of Government Purchases*
Miners' Wages				
25% increase	0.42	0.22	0.25	0.42
50% increase	0.83	0.44	0.50	0-83
100% increase	1.66	0.88	1.00	1.66
Crude Oil World Prices Price				
100% increase	1.15	2.26	0.86	1.24
300% increase	3.45	6.78	2.58	3.72

Source: Hines et al. (1975)

How the required fall in real consumption wages is split between nominal wages and prices depends on monetary and fiscal policy. A monetary policy of "full accommodation" aimed at stabilising nominal wage costs and maintaining employment would imply all of the real wage adjustment comes through a higher price level. Monetary policy would effectively "look through" the temporary increase in imported inflation and aim to stabilise the output gap and domestic inflation in the medium term. However, such a policy runs the risk of increasing inflation expectations if those are formed adaptively and might induce a Wicksellian wage-price spiral of ever declining real interest rates, increasing output gaps and upward pressure on wages and prices, should monetary policy not respond sufficiently, as discussed earlier in **Box A.**

(a) Go-stop revisited - Competition and Credit Control, the fall of Bretton Woods and the Barber Boom

The Conservative government had come into office with a non-interventionist objective. There would be no aim to attempt to stabilise the economy or control inflation through a price and incomes policy. Taxation would be reformed with an emphasis on moving away from direct taxes to indirect taxes and tax relief on debt interest, both of which would act to encourage investment. There was a rejection of incomes policy although the government adopted what was called the "N-1 approach" towards wage settlements in the public sector. Under this policy, each settlement was intended to embody a slightly lower increase than the last and was an attempt to reduce wage inflation gradually without the use of an explicit incomes policy. But it ultimately proved ineffective in reigning in settlements.

However, 18 months into the new administration there was a U-turn. In 1971 unemployment, as measured at the time, was approaching the sensitive 1mn mark in part reflecting the lagged effect of Roy Jenkins's squeeze in 1968 and 1969. This led the Heath government, which had succeeded the previous Labour administration in 1970, to relax its restrictive policies. The basic rate of income tax was reduced in 1971 but this did not reverse the downturn, and unemployment rose to more than 1 million in 1972. Chancellor Anthony Barber then adopted a more expansionary fiscal stance to reduce the level of unemployment. In the March 1972 budget he introduced tax cuts and increased public expenditure with an aim of achieving a rate of growth of GDP of 5% per annum. This it was calculated would return the economy to full employment and would spur investment growth in much the same way as Harrod had argued 10 years earlier. Indeed Harrod himself would write in the *Bankers' Magazine* of that year that "an increase in demand by easy money and tax reduction should not have any adverse effects on the wage-price spiralling that is proceeding". To keep a control on prices, the U-turn was made complete with the re-introduction of an incomes policy comprising of the three stages and the establishment of a Pay Board and Price Commission.

These fiscal policy changes occurred alongside the introduction of Competition and Credit Control which in itself was boosting money and credit growth through a re-intermediation of the conventional banking system following the end of direct controls. The competition aspect of CCC was very much in line with the Heath government's aim to improve business performance. However as Needham (2014) points out, the introduction of tax relief on debt interest went some way to undermine a key principle of CCC – that interest rates should be used to control credit. It meant that companies could write off interest rate increases against tax. This was also coupled with a reluctance by the government, and the Prime Minister Ted Heath in particular, to use the interest rate weapon at all. At several points in 1970, 1971 and 1972 he resisted the

advice of the Bank of England to raise interest rates in response to rising inflationary pressure. This is suggestive of an "active fiscal"/ "passive monetary" policy regime where fiscal policy is geared to objectives that are not consistent with debt stabilisation, accommodated by monetary policy which does not respond sufficiently to the rise in inflation.

The result of the loosening of fiscal and credit policy coupled with an inert policy rate was inevitably a boom in both asset prices and demand. There was a strong recovery in domestic demand and nominal GDP growth picked up from 10% to 20% over the course of 1972 and 1973 with real GDP peaking at a 4-quarter growth rate of just under 10% in 1973Q1 (**Chart A.26**). Public sector borrowing increased to 6% of GDP, much larger than the deficits of the 1950s and 1960s, which had generally averaged something like 2-3% of GDP (**Chart 2.9**). The balance of payments swung from a surplus of 1.6% of GDP in 1971 to a deficit of about the same size in 1973 and sterling fell some 15% following its floatation in June 1972. This pushed up the sterling value of import prices, which were already increasing globally for a number of commodities. This short-lived rapid expansion of growth has become known as the "Barber boom" (see **Box C**).

It was only in late 1972 that monetary policy responded and conditions were tightened fairly drastically. Minimum Lending Rate (MLR), which had replaced Bank Rate as the official monetary policy instrument, went up from 7.5% in November 1972 to 13% in November of the following year (**Chart A.27**) but this was barely able to reverse the decline in real rates, which had reached well into negative territory given the rise in inflation expectations that had steadily picked up, following the collapse of Bretton Woods in 1971 (Chadha and Dimsdale (1999)). This tightening of monetary policy was complemented with the introduction of the Supplementary Special Deposits Scheme or "Corset" designed to place penalties on the banks (through requiring them to place non-interest bearing deposits at the Bank) should they expand their deposit liabilities beyond certain limits. This implied a step back from the experiment in deregulation of the banking system introduced by the Bank under CCC. Growth slowed sharply and by November 1973 the economy was in recession. At the same time, the collapse in property prices had led to banking crisis among the fringe or "Secondary" banks. As the Bank noted at the time, "it thus found itself confronted with the imminent collapse of several deposit-taking institutions, and with the clear danger of a rapidly escalating crisis of confidence". The go-stop cycle had barely lasted 18 months and, importantly, the stop phase was well in motion before the sharp rise in oil prices that was about to come.

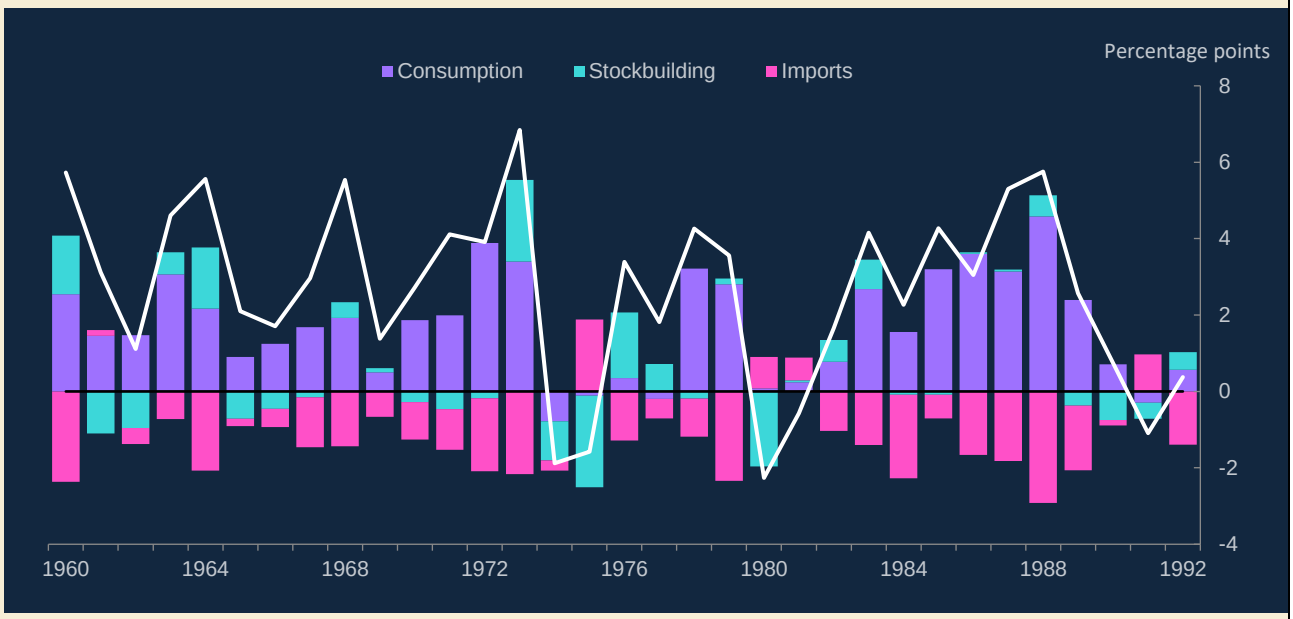
Box C: The Barber boom and bust of 1972/3 – another dash of "go-stop"

In 1971, with unemployment rising to the psychologically important 1mn mark (on the administrative claimant count measure used at the time) led the Heath government to relax the restrictive policies it had started out its administration with. Barber's aim was to achieve a growth rate of 5% for the next two years, adding 10% to the level of GDP. This would be achieved by decreasing income taxes (largely through raising allowances) by £1bn, in order to increase consumption, with an overall expansion of public sector borrowing by £3.4bn. In his Budget speech of March 1972, Barber stated "I do not believe that the stimulus to demand I propose will be inimical to the fight against inflation."

Charts C.1 and **C.2** below show the contributions to GDP growth from each component of demand split into two categories: consumption, stockbuilding and imports; and investment, government spending and exports. It shows that GDP growth reached 4% in calendar year 1972 and around 7% in 1973 fuelled by an increase in consumption and stockbuilding. This also had the effect of increasing imports and pushing the current account into deficit. This put pressure on £ which forced its formal floatation in June 1972 (**Chart**

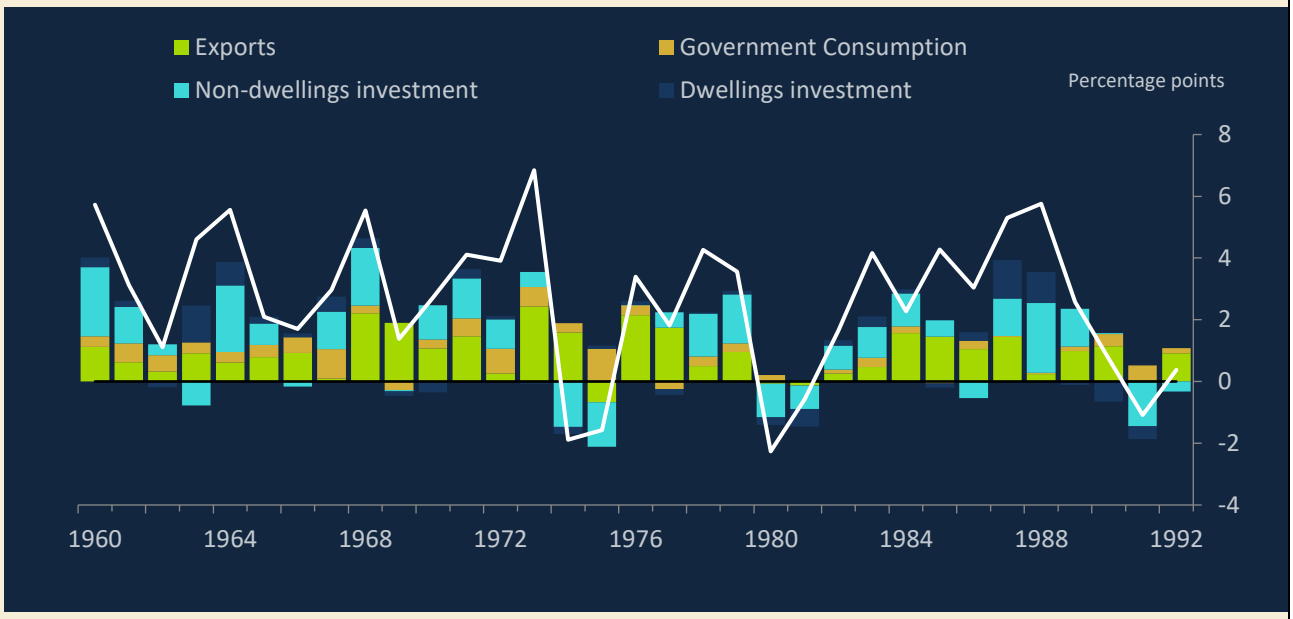
C.3). It subsequently depreciated throughout the rest of 1972 and 1973 by just under 20% in effective terms using current BIS weights. This helped to boost exports and added to demand in 1973.

Chart C.1: Contributions to annual GDP growth of consumption, stockbuilding and imports



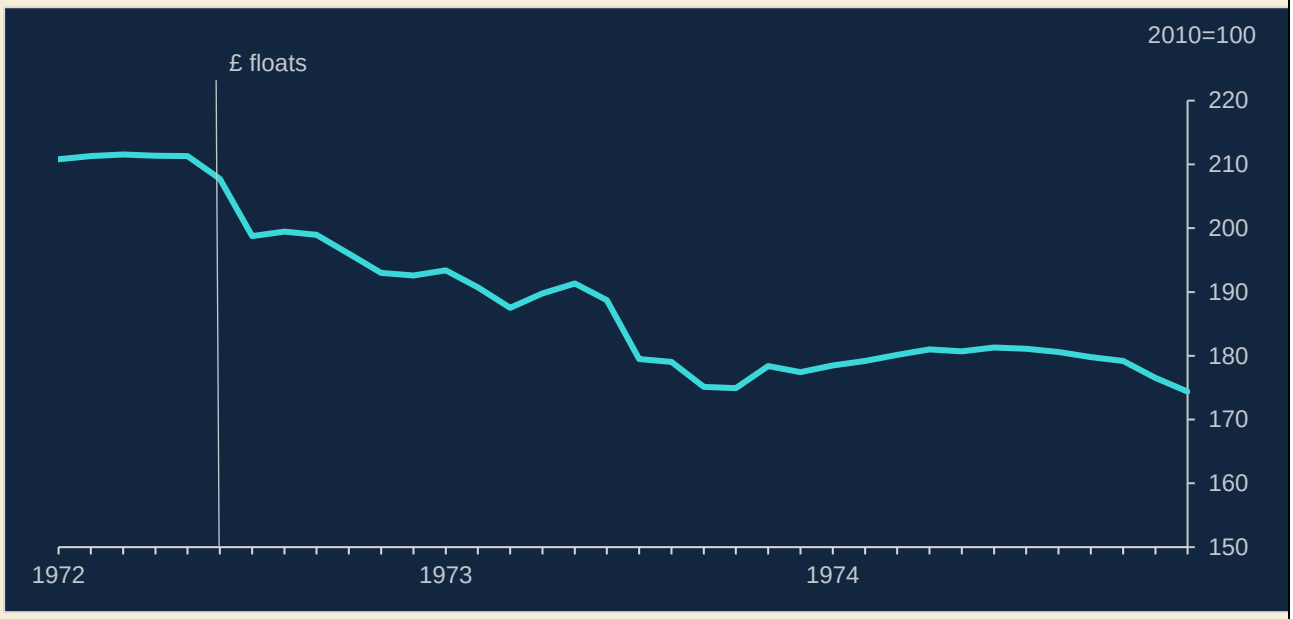
Sources: ONS

Chart C.2: Contributions to annual GDP growth of exports, government consumption and investment



Sources: ONS

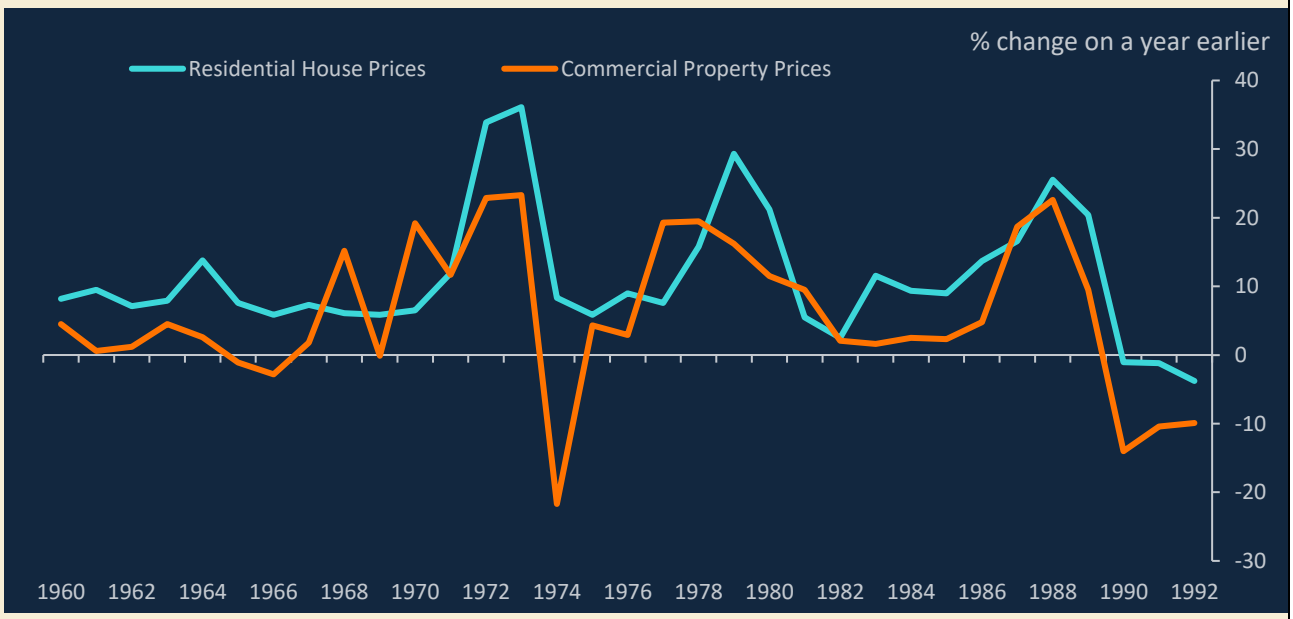
Chart C.3: Sterling ERI (current BIS weights)



Sources: BIS

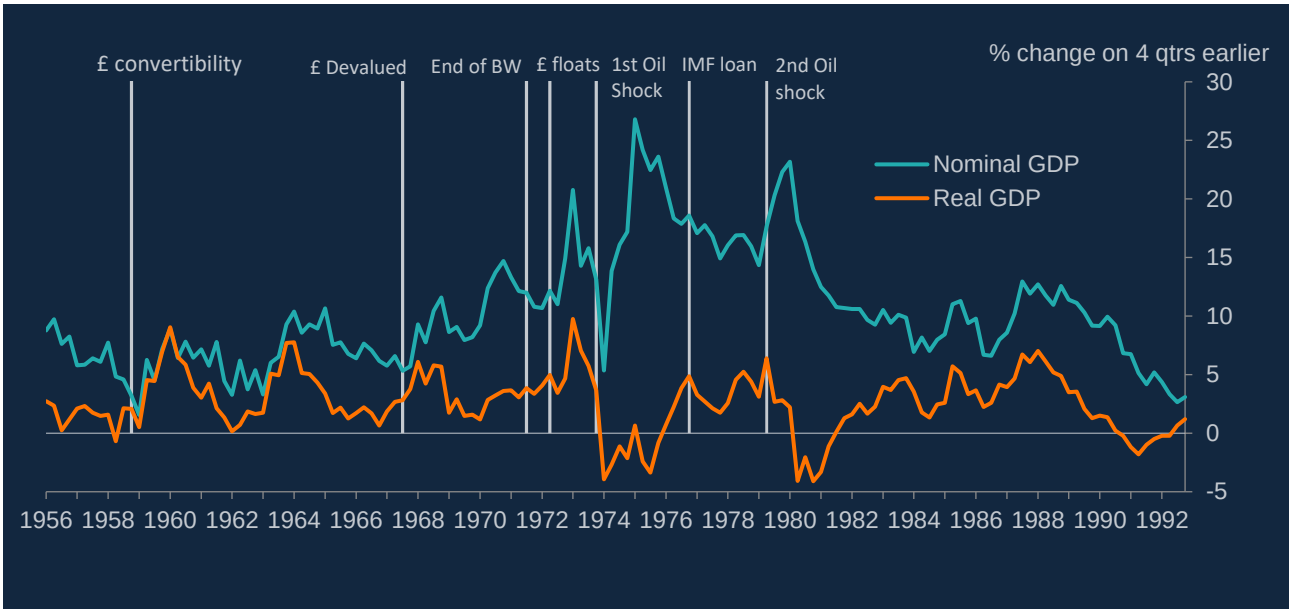
Also fuelling the boom was the impact of Competition and Credit Control on bank lending, particularly by the fringe lenders who made loans to both the residential and commercial property sectors. Residential and commercial property prices increased at record rates in 1972 and 1973 (**Chart C.4**), which then reversed sharply in 1974 as a result of the tightening of policy in 1973, from which followed the Secondary Banking Crisis discussed in the text. The impact on all the domestic demand components was significant and contributed to the recession in 1974/5.

Chart C.4: Residential and commercial property prices



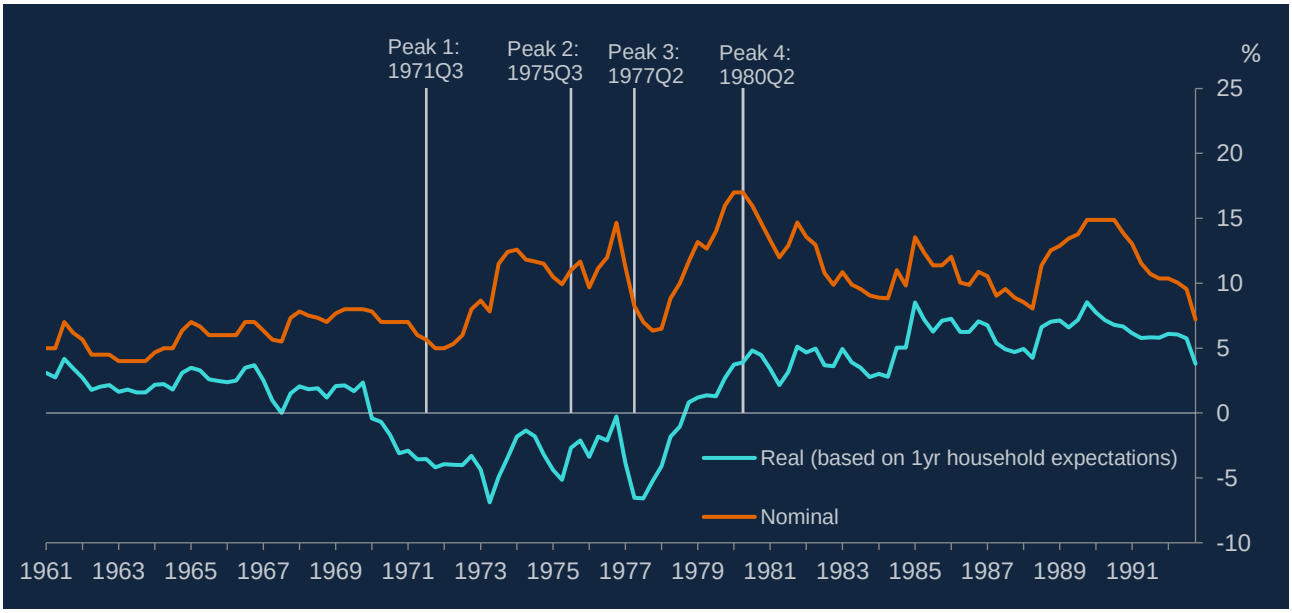
Sources: Thomas and Dimsdale (2017).

Chart A.26: Nominal and real GDP growth



Sources: ONS

Chart A.27 Nominal and real short-term rates: 1961-1992



Sources: Batchelor and Orr (1988), Thomas and Dimsdale (2017), Bank of England

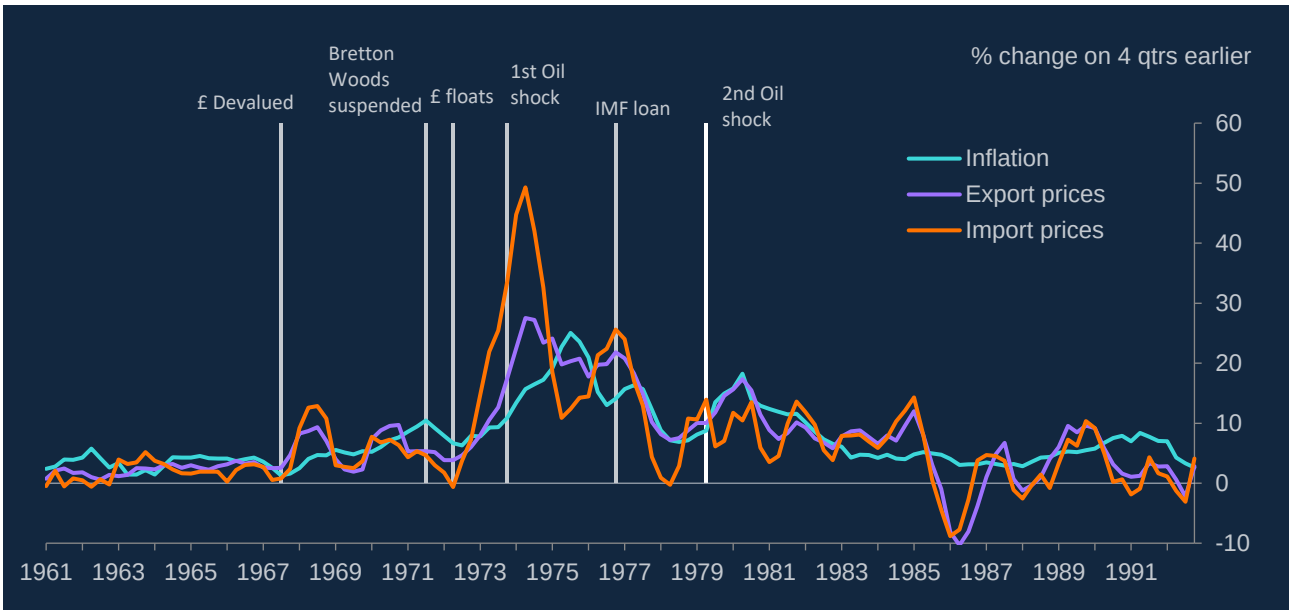
(b) The first oil price shock and policy "accommodation"

The period from 1973Q4 to the peak in inflation almost two years later was probably among the most turbulent in UK economic history. The economy was already in recession following the fallout of the Barber boom, but two events conspired to add a strong inflationary impulse that would imply huge challenges for policy makers.

In October 1973, the Government launched "Stage 3" of its pay policy. The policy was designed to limit wage increases to £2.25 a head or 7% (whichever was greater) but it also contained provisions for extra

"threshold payments" which would be triggered once the Retail Price Index (RPI) rose 7% above the level at the start of the policy. This was in effect a gamble that inflationary pressures were on the wane given the tightening of policy and an easing of commodity price inflation. Heath announced this policy on 3rd October. Literally a fortnight later Arab oil producers would cut oil production by 5% following the start of the Yom Kippur war, prompting a quadrupling in oil prices and ensuring the thresholds would be triggered. This was on top of increases in other commodity prices. Overall import price inflation would peak at 50% during 1974, contributing around 10% to inflation if passed through (**Chart A.28**).

Chart A.28: Export and import price inflation



Sources: ONS

The near simultaneity of these two events would ensure the gamble had backfired almost immediately. The Stage 3 threshold clauses have come to be viewed as one of the most disastrous (albeit unfortunate) economic policy decisions made by a UK government. The threshold agreements covered a third of the workforce and would be triggered 11 times over the next 12 months. Not only would this ensure that real consumption wages would not be able to make their required adjustment in the near term to higher energy prices, which would imply weaker profits for firms and, implicitly, a higher short-run natural rate of unemployment. But it would also reduce any lag between price changes and wage changes (Miller (1976)). This is a matter of some significance because it means real wage resistance during this period had been baked in by policy and was not necessarily endemic in union or worker behaviour.

Things got worse for the government when the miners refused to accept the initial 7% limit on wage increases under stage 3 and went on strike causing the imposition of a state of emergency and a three-day week in January 1974. This caused a large drop in output in 1974Q1 which needs to be borne in mind when interpreting the growth profile over this period. Heath called a general election on the basis of "Who governs Britain?" which the Conservatives lost and Harold Wilson, unexpectedly, formed a minority Labour government in February 1974.

The new administration placed an increased emphasis on a new incomes policy—the "Social Contract"—as a way of restraining inflation. It was a voluntary agreement with the Trades Union Congress (TUC) where the government agreed to adopt economic policies favoured by the unions in exchange for wage restraint. This

would involve policies such as rent controls and subsidies of various kinds such as food. However, they also agreed to honour the threshold payments under the Heath incomes policy and more generally, the guidance under the Social Contract was to broadly maintain living standards. That meant real wage rigidity was further baked into the system under the new voluntary incomes policy. However, the subsidies on food and prices were seen as a means by which the RPI could be kept under some control and would limit threshold payments and settlements more generally. But this just meant the public finances bore the brunt and linked government spending more closely to underlying inflation.

More generally, the oil price increase presented a major challenge to policy. The UK as an oil importer at this point would necessarily suffer a real income squeeze and it was felt the impact would ultimately be deflationary. It would also have a major impact on the balance of payments and hence would imply pressures on sterling which might add to the inflationary pressure. At the global level, it was feared there would be a downturn as a result of the distribution between oil producers and oil consumers – it was believed that oil producers would have a lower propensity to consume out of income than oil importers. There were also fears by the IMF and OECD that advanced economies would act independently to deflate their economies and, to avoid a 1930s style depression, were arguing for global accommodation.

However, the government had come in with very little plan for how to deal with the economic problems Britain faced. This is well summarised by two Treasury ministers of that government:

The real problem was the fact that we had worked out no short- medium- or long-term economic and financial policies

Joel Barnett, Chief Secretary of the Treasury

There is no comparable example of such intellectual and political incoherence in a party coming into office in the C20th history of the UK

Edmund Dell, Paymaster General

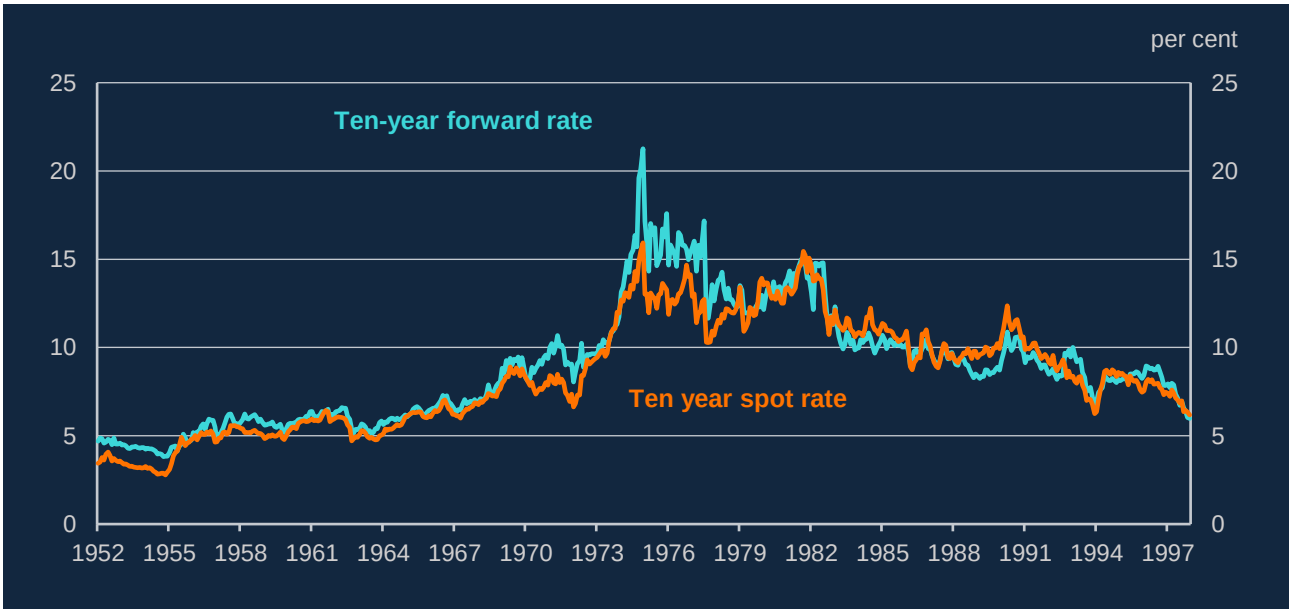
Dennis Healey, the new Chancellor, presented a mildly deflationary budget in March 1974, but with a second election in prospect his mini-budget of July 1974 reversed this and was expansionary, though a VAT cut from 10% to 8% was part of the package intended to trim off around 1% from the RPI and reduce the effect on threshold payments. In his third budget of 1974, Healey turned his attention to problems emanating in the corporate sector. The social contract had done little to limit wage increases which, together with higher energy prices, were now putting pressure on the production costs of companies who were still subject to the Price Code of the previous Heath government which was limiting increases in prices. As a result, profit margins were being squeezed hugely which is evident in **Chart A.20**. Reported corporate profits were flattered by stock appreciation, where the increase in the prospective sales prices of previously built up stocks was accounted for as an improvement in profitability. However, underlying profitability was weak. The solution in the budget was to provide tax relief on stock appreciation gains and a relaxation of the Price Code. This would improve the financial surplus of the corporate sector at the expense of the government deficit but would do little in itself to improve the balance of payments.

In summary, through a combination of subsidies on prices and tax relief on inventory appreciation, fiscal policy in 1974 went a long way to accommodate the impact of the energy price increases rather than to try

and offset the inflationary impact as in other advanced economies such as Japan and Germany. Healey later argued he was following the guidance of the IMF and OECD to support spending. It is noticeable that the only other advanced economy to follow the UK in this was Italy, and both would end up asking for IMF assistance in the following year. And, as noted earlier, both would have markedly poorer inflation performances than other advanced economies over the next few years. The public sector deficit in 1975 would increase to around 6% of GDP, mirroring that of the current account deficit.

A prevalent view in officialdom at this time was that taking the strain of the oil price increases on the balance of payments and fiscal deficits, was reasonable, because of the prospective earnings and tax revenues from North Sea Oil that would be coming on stream in the later 1970s. The UK was simply "tunnelling" through until the windfall gain could be achieved. Therefore, those in government saw the burgeoning fiscal deficits as temporary. Financial markets and, as a result, the Bank saw things differently and very much in the here and now of how such large twin deficits would be financed both internally and externally. A proxy for inflation expectations in financial markets, the forward curve, is shown in **Chart A.29**. Financial market expectations jumped by over 10p.p. to reach a peak in 1974/5. It would be financial market expectations that would cause the key difficulties in both the gilt and foreign exchange markets over the next two years.

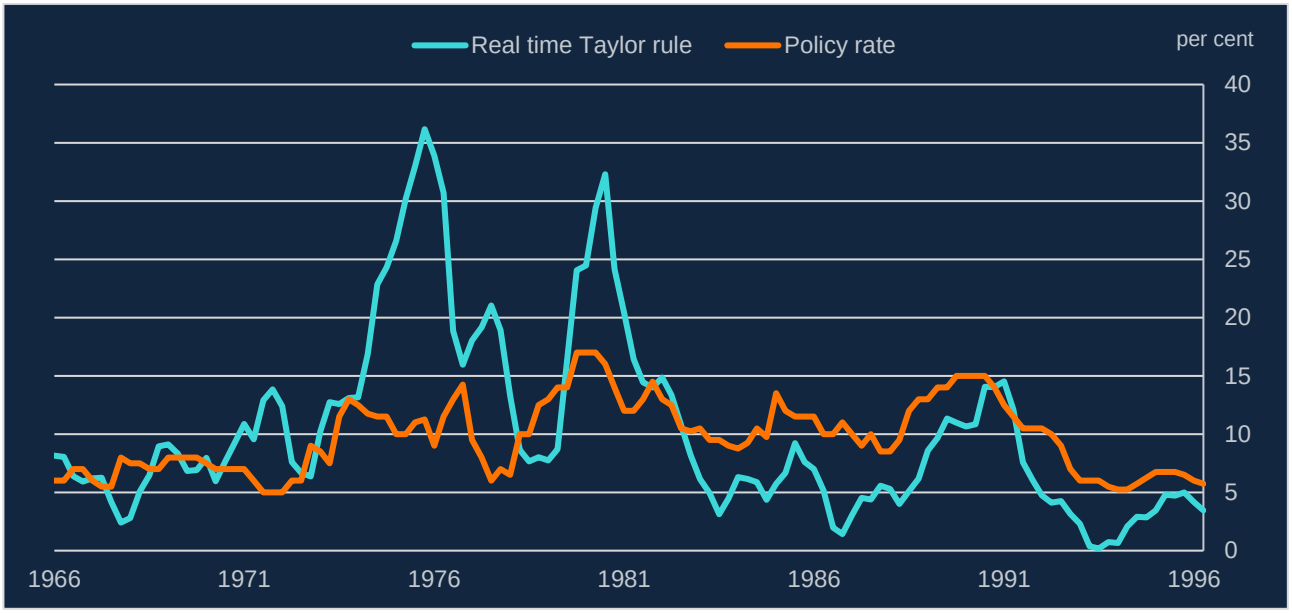
Chart A.29: Financial market inflation expectations



Sources: Bush (2024).

Focus would turn on reducing public expenditure. These factors and tensions were very evident in Healey's March 1975 budget where, although he started grasping the nettle on public expenditure, the cuts were back-end loaded into later years, and in terms of public sector debt, maturities were being structured so that redemptions would take place when oil revenues should be at their greatest during the 1980s (Needham (2014)).

Chart A.30: Taylor rule adapted from Nelson and Nikolov (2001)



Sources: Nelson and Nikolov (2003), Thomas and Dimsdale (2017), Bank of England

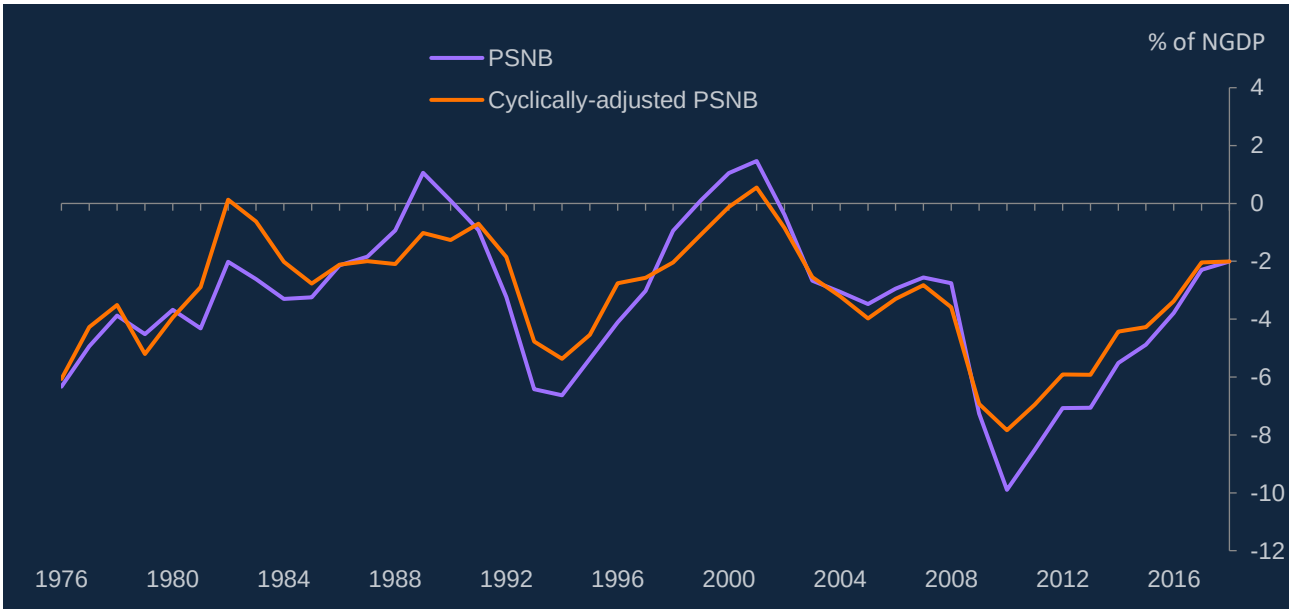
In terms of monetary policy, nominal short rates stayed in double digits in 1974 and 1975 but were cut gradually from 13% to 10% by mid-1975 as the recession, which had begun in late 1973, started to bite. In this sense, monetary policy worked to accommodate the energy price change in an attempt to avoid an even worse recession. In terms of countering inflation, the resulting path of policy was way below what a Taylor-rule prescription would have suggested given the inflation and GDP data at the time (see Chart A.30). Of course, such rules conditional on outcomes imply implausibly high short-term rates would have been required to reduce inflation and the argument is had they been embedded in expectations and understood by agents in the economy, then inflation would have been considerably lower. Indeed, one telling indicator of the government's attitude to the use of interest rates to manage domestic demand is that the government made loans to building societies to prevent them from raising mortgage rates despite the rise in the MLR. For this reason, many argue the high inflation over this period was simply one of monetary policy neglect in the absence of modern theories of how policy should operate. The implication is that inflation could have been lowered by more aggressive monetary policies which, if they had been anticipated and built into expectations, would have worked to nip any spiralling of wages and prices in the bud. However, a crucial part of the interpretation here is the behaviour of inflation expectations in **Chart A.24.** It appears from household expectations that they remained stable at around 10% and were not de-anchored further by the large increases in wage and price inflation. Therefore, despite accommodative policies, the burst in inflation to a peak of 25% was not persistent or, at least, not de-stabilising and so any wage-price spiral was limited and inflation would begin to fall back towards 10% once energy price and other import price effects had worked their way through and margins were restored (during 1975). However, the underlying double-digit rate of inflation of around 10%, experienced since the start of the 1970s, would persist.

Phase 3: The IMF crisis of 1976 and fiscal consolidation

Inflation fell back sharply following the peak of 1975 as import price inflation subsided and rising unemployment arising from the recession began to pick up. Despite the accommodation of cost pressures in

1975, there was a second recession in mid-1975 around the same time as the peak in inflation which spilled over on to employment with a lag. In 1976, unemployment picked up and reached 5% (on the modern Labour Force Survey-based measure). By this point, the Labour government decided that priority should be given to controlling inflation, even if this involved a rise in unemployment. It abandoned, at least temporarily, the post-war economic objective of full employment. The need to control inflation was also the view of the main union leaders who collectively came to the conclusion that "we can't go on like this".[6] They feared another round of wage inflation on this scale would lead to the fall of the government and a much tighter policy and a worse the unemployment problem. Therefore, co-operation between the government and the TUC on macroeconomic and incomes policy under the Social Contract would be a feature of the next few years. The Labour government aimed to achieve an inflation rate of no higher than 10% for RPI inflation and the TUC duly delivered their end of the bargain by controlling settlements in line with Stages 1 and 2 of the social contract with wage inflation falling dramatically from 35% to below 10% by 1977.

Chart A.31: Public Sector Net Lending (+) or Borrowing (-)



Sources: ONS, Office for Budget Responsibility.

The current account deficit began to improve towards the end of 1975 as world trade and exports recovered and the terms of trade improved as exporters were able to restore margins. But the improvement in the current account did not translate into a stronger pound. There was a sharp decline in sterling as the Sterling-Dollar exchange rate fell from $2.22 in 1975 to $1.80 in 1976. The authorities had viewed a depreciation as helpful to lock in the improvement in the balance of payments and to offset the higher inflation differentials between the UK and other countries. Intervention by the Bank was therefore geared to allow that to happen. However, what was viewed as a botched technical intervention by the Bank in March 1976 led to intense pressure on the pound in part because of fears about an impending funding crisis on account of the high level of the PSBR and fears about renewed monetary growth. Despite the tighter fiscal policy announced in the 1975 budget, public sector borrowing remained obstinately high at around 6% of GDP in 1976 (see Chart 3.9). In June, the government was forced to seek a swap facility with G10 central banks, organised through the Bank for International Settlements (BIS), amounting to $5.3 billion, in order to

[6] Attributed to Len Murray General Secretary of the Trades Union Congress (TUC) at the end of the TUC conference of 1974.

stabilise sterling (Schenk 2010) and led to a July package of future spending cuts which proved highly contentious both within the cabinet and the Labour party. This was not enough to placate the gilt market however. There was a gilts 'strike' in July 1976 with many buyers in the market unwilling to take on additional government debt even at yields in the region of 15% and the government was forced to borrow from the banking system, which implied a positive contribution of the public sector to money growth (see earlier **Chart A.1**).

These developments led to several important underlying initiatives that developed throughout the year that would work to impose monetary discipline and would ultimately bring inflation down. First in the March 1976 budget the Chancellor announced cash limits on fiscal policy, which the government had already been planning for as far back as 1975. Previously public spending plans had been based in volume terms and nominal spending would effectively be indexed to inflation in order to achieve that. Now plans would be set in cash terms based on the government's expected outlook for inflation. Alongside that increasing emphasis was placed on (initially unpublished) monetary targets for the broad measure of money £M3 as a disciplining device on policy. As discussed in **Box A**, the credit counterparts approach to the monetary aggregates provided a direct accounting link between the PSBR and money growth and, together with cash limits, provided a framework for linking monetary and fiscal policy with the desired inflation outcomes of the authorities.

Matters would come to a head in the second half of the year. The Prime Minister Jim Callaghan[7] gave a well-known speech at the 1976 Labour Party Conference where he effectively announced the end of the post-war consensus with the now famous words "We used to think you could spend your way out of a recession and increase employment by cutting taxes and boosting government spending. I tell you in all candour, that option no longer exists". Milton Friedman later stated he thought this was one of the most important speeches made by any government minister on economic policy.[8] In response to further heavy pressure on sterling and declining reserves, the government was then forced to turn to the IMF for emergency assistance, undertaking further tightening of fiscal policy in exchange for a loan to help repay the previous swap facility from the G10 central banks. Discussions over this both within government and with the IMF were intense. As part of this the government formally adopted targets for broad money (based on the IMF's preferred measure of Domestic Credit Expansion or DCE which was essentially the sum of private and public sector borrowing from the banking system). Monetary and fiscal policies were now co-ordinated in the effort to bring down inflation to below double figures. However, the higher import price inflation following the sharp depreciation of sterling, the effect of the severe drought of 1976 on domestic food prices and a rebuilding of corporate sector margins would mean inflation increasing into 1977 peaking in Q2 at around 17%, given they occurred alongside an accommodating cut in interest rates to under 7% by the end of the year. This is despite the success of the social contract in bringing earnings growth down to single figures.

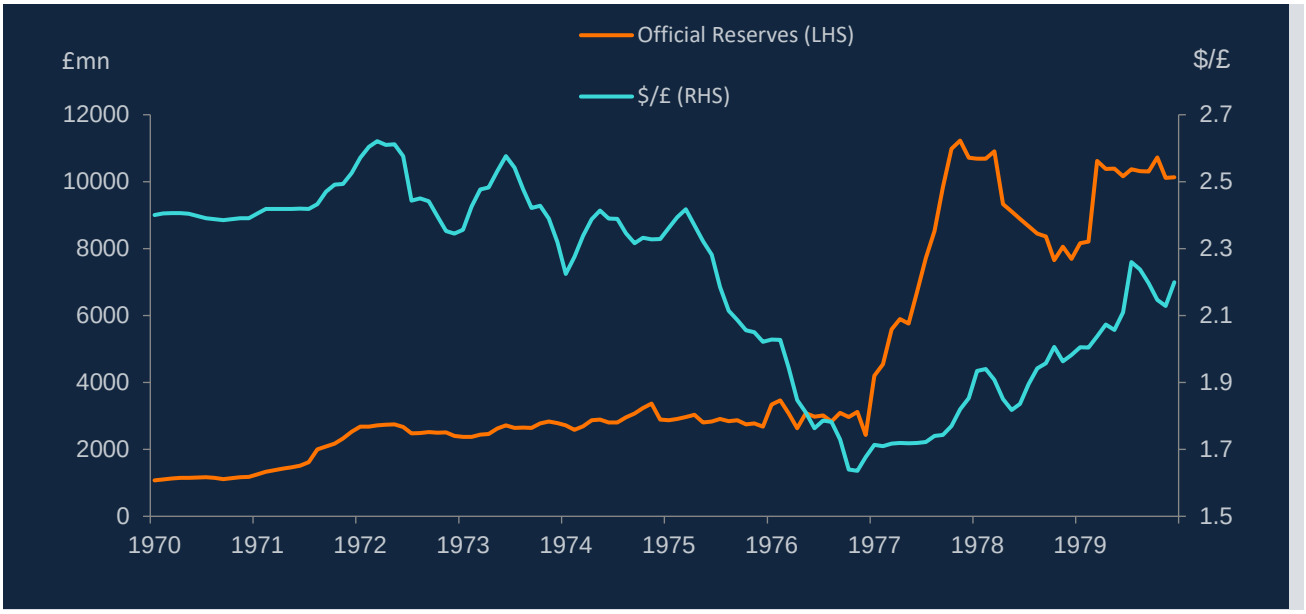
Phase 4: The Winter of Discontent and the Medium-Term Financial Strategy 1978-1983

The period from 1977 appeared to signal a major turnaround. The agreement with the IMF restored confidence in both the gilt and foreign exchange markets. The current account of the balance of payments recovered much more quickly than expected and well before the first proceeds of North Sea oil started to flow in volume in 1978. Indeed the authorities would now have to work hard to lock in the depreciation of 1976 and avoid sterling increasing in a way that would wipe out the recent gains in competitiveness. This

[7] Harold Wilson, the Prime Minister elected in 1974 had resigned earlier in March 1976.
[8] "To Jimmy from James," *Newsweek*, December 6, 1976, p. 45.

upward pressure on the pound allowed the Bank to intervene and "cream off" dollars in order to strengthen the official reserve position and this prevented sterling from rising **(Chart 3.13)**. But eventually sterling was uncapped towards the end of 1977 and it would appreciate gradually over the next two years.

Chart A.32: Official reserves and $/£ exchange rate



Sources: ONS, Bank of England.

Healey's restrictive fiscal policies continued in the budget of March 1977, but public sector borrowing turned out to be much lower than was predicted at the time of the IMF crisis in the previous year. Indeed the turnaround in the public finances had been well underway before negotiations with the Fund had commenced. The problem had been an overly pessimistic forecast of the PSBR by the Treasury. Healey in his autobiography stated

If I had been given accurate forecasts in 1976, I would never have needed to go to the IMF at all Source: The Time of My Life, Denis Healey

Indeed the IMF agreement expired on 2 January 1979 with less than half of the loan drawn. The improvement in the public finances allowed Healey some leeway in fiscal policy and he was able to meet his commitments on borrowing and the money supply with some relaxation of fiscal policy after the March 1977 budget with £1bn extra spending in 1977/1978 and around £2.5bn in the following year (Wass (2008)). Whether this fiscal easing was warranted and contributed to the pickup in inflation in 1979 and 1980 is still debated, given there was only a modest fall in unemployment. Growth, however, picked up to around 4% in 1978 and the filters shown earlier suggest a cyclical peak was reached in 1979. The expansion was in part motivated by the prospects of an election in 1978, which Callaghan eventually decided against, and by 1978 the government felt it had retail price inflation under control and into single figures.

These positive developments on retail price inflation, however, were undermined by the breakdown of the Social Contract with the unions. The first three stages of the incomes policy had worked well and wage inflation, as noted earlier, was by 1977 below 10%. Attempts by the government to keep a permanent cap on wage growth, via a suggested 5% limit on pay increases under stage 4 of the policy in 1978, ultimately failed like previous incomes policies. This led to the Winter of Discontent in 1978/9 and a further wage explosion with increases in earnings of well above 10%. The Labour government, which by this time was in a

minority in Parliament, fell after a confidence vote and was replaced by Mrs Thatcher's Conservative government following an election in May 1979.

The new government came in with a determination to control inflation once and for all. In fact the incoming government initially introduced two measures that would work to increase prices in the immediate term. They implemented the Clegg Commission recommendations on public sector pay increases, which Callaghan had instituted as part of settling the Winter of Discontent dispute. This would lead to public sector wage inflation increasing to 25% in 1980. They also implemented a shift towards indirect taxation away from direct taxation, raising the rate of VAT to 15% and standardising it across many goods and services. This, in itself, the government calculated would add around 4% to the price level. Both factors would be proximate causes of the rise in inflation from below 10% when the government was elected in 1979 to the peak of around 20% in 1980Q2.

The government also came to office at the same time as a second large increase in world oil prices. Unlike 1973 however, the rise in oil prices was now associated with an appreciation of the sterling exchange rate. This reflected the fact that Britain was now a producer rather than a net importer of oil. But the stronger exchange rate also reflected more restrictive monetary and fiscal policies. The high level of British interest rates relative to those prevailing internationally led to a sharp appreciation of the exchange rate. Both the growing perception that Britain's balance of payments was underpinned by its role as an oil producer and its high level of interest rates strengthened sterling which appreciated by 15% in 1980 and caused great difficulty for the manufacturing sector. This meant that import price inflation in sterling terms did not pick up nearly as much as in the earlier oil price shock, and so the rise in inflation is not just a story of monetary accommodation of commodity price pressures.

Tight monetary policy represented a major shift in emphasis towards monetary policy and, in particular, money supply targeting by the incoming government as part of its Medium Term Financial Strategy (MTFS). Initially, the Conservative government retained the Labour government's use of one-year monetary targets, and ceased to employ an incomes policy. But, under the MTFS it began to set medium-term intermediate targets for broad money growth (an idea which had begun under Healey), based on the £M3 measure, as the keystone of its counter-inflationary policy. So policy was now geared towards meeting declining targets for money supply growth over a number of years with a firm view of influencing inflation expectations, but in a gradualist way.

Fiscal policy and public sector borrowing were now to be firmly embedded within the MTFS through the credit counterparts approach. So control of the PSBR and tight fiscal policy was supportive of a tightening of monetary policy, even though the credit counterparts really emphasised that it was the funding of a given PSBR via the banking system (the PSBR less sales of government debt to the non-bank private sector) that contributed to money growth. Another important funding initiative in 1981 was the introduction of index-linked bonds as a credibility device geared towards lowering the government's incentive to inflate away its debt liabilities through unanticipated inflation. Fiscal policy and funding policy were now to be an important part of the toolkit to secure a low inflation environment.

What was not anticipated is just how important they would be in securing the new regime. The measure of broad money chosen as the intermediate target, £M3, remained stubbornly resilient. This was in part due to the suspension of the Supplementary Special Deposits Scheme or Corset in June 1980, following the abolition of exchange controls in 1979. As discussed earlier, the "Corset" was designed to place penalties on the banks (through requiring them to place non-interest-bearing deposits at the Bank) should they expand

their deposit liabilities beyond certain limits. The removal of exchange controls made the Corset ineffective since it could now readily be by-passed by offshore intermediation.

The abolition of the Corset opened the way for a new round of re-intermediation of the traditional banking system which was now able to lend freely and no longer faced a penalty for accumulating excessive interest-bearing liabilities. The result was that broad money grew much more rapidly than envisaged in the MTFS even though this was not reflective of loose policy. In addition, banks started to move into the mortgage market providing extra impetus to credit and money growth. MLR was increased sharply in 1980 as a result of the need to try and meet the £M3 target and the yield on Treasury bills averaged 15.1%, the highest ever recorded, pushing real short-term rates up to 5% based on household expectations. Indeed, nominal short rates remained within a range of 10-15% until the mid-1980s in order to restrain credit and money growth. This led to a large recession and rapidly increasing unemployment.

The high level of interest rates and strong appreciation of sterling made the prospect of a further tightening of monetary policy unattractive. So, in the 1981 Budget, the Chancellor Geoffrey Howe decided to tighten fiscal policy despite the severity of the recession with a view to try and retain the credibility of the MTFS through the lens of the credit counterparts relationship between the PSBR and money growth. The PSBR itself remained stubbornly high at around 4% of GDP in part due to the recession. The fiscal tightening in the teeth of a recession prompted an infamous letter by 365 economists in protest. In the Budget, taxes were raised through the non-indexation of allowances.

The impact of monetary and fiscal tightening on the level of activity was severe although real incomes were not squeezed as much as under the first oil price shock given there was not a worsening of the terms of trade. Unemployment on a Labour Force Survey basis increased from 5.4% in 1979 to 9.7% in 1981. The recession which followed the second oil price shock was therefore severe and was concentrated in the tradable goods sector. While this was not successful in achieving the stated targets of the MTFS, it had greater success in checking inflation which fell from nearly 20% in 1980 to under 5% in 1983 at the start of Mrs Thatcher's second term.

However, it took a large recession and a decimation of British manufacturing industry to return inflation back to the levels of the mid-1960s. From this point on the period of persistent double-digit inflation, was effectively over.

Phase 5: The abandonment of monetary targeting and the Lawson boom and bust 1983-1992

From 1983 to 1988 the rate of inflation remained relatively stable averaging around 5% within a range of 3-7% on an RPI basis. In effect, it was a return to the period operating in the early 1960s. However, there was a brief foray of inflation back to double figures in 1990 (in RPI space), after which inflation fell back to rates of 2-3%, consistent with the inflation target brought in 1992.[9] It is worth reviewing this period as it represented an important and final denouement in the fight to achieve a regime of effective price stability.

The failure of monetary targeting based on £M3 became apparent to the authorities very early in the MTFS during 1980 and 1981. There was then considerable debate on how to modify and restore credibility to the MTFS. Many favoured shifting towards using the monetary base or a narrower aggregate such as M1 as the

[9] This was initially a target of 2.5% specifically for the measure of inflation RPIX which was the RPI excluding mortgage interest payments. From 2003 this was switched to a target of 2% for the Consumer Price Index (CPI).

key intermediate target. Indeed, some of Mrs Thatcher's advisers such as Alan Walters, argued for a shift towards monetary base control though this was not implemented for fears it would lead to unnecessary short-term interest rate volatility. Attempts to revise the definition of money used for the monetary target met with only limited success. Overfunding of the PSBR was another device which was used in the mid-1980s to contain the growth of broad money. This implied selling more government debt to the non-bank private sector than was required to fund the PSBR, which led to the negative public sector contribution shown in Chart A1. However, this led to a drain in commercial banks' reserves and it required the Bank to intervene by buying bills in the market to maintain its ability to control short-term interest rates. Such was the scale of the required intervention, the Bank soon bought up all the Treasury bills available and switched to commercial bills, ending up with a so-called "commercial bill mountain". This was viewed as a highly distortionary intervention in the money market.[10] It was ultimately abandoned in the late 1980s. The result was what might be called MONTINO (monetary targeting in name only), with a large number of monetary indicators being monitored. Nigel Lawson however claimed that, although the record of achieving monetary targets had been disappointing, it had delivered in terms of inflation.

However, he began to turn back to the exchange rate as a possible nominal anchor and began informally shadowing the Deutschemark as a means of importing the low inflation credentials of the Bundesbank but also with a view to joining the European Exchange Rate Mechanism or ERM. This in part was influenced by the Louvre Accord of 1987, which was an international effort to stabilise the dollar and international currencies more generally. As sterling began to recover in the mid-1980s, interest rates would be set lower than otherwise to keep the level of the pound at just under a 3DM/£ rate against the Deutschemark, in part a repeat of the experience in 1977. The other complicating factor was the stock market crash, also known as "Black Monday" in 1987. Fearing a repeat of the Great Depression that followed the Wall Street Crash of 1929, there was a co-ordinated international attempt to loosen policy. A similar response in 2008 would be lauded as an example of policymakers learning the lessons of the Great Depression, but in this case such a loosening proved misconceived as the stock market fall did not lead to or reflect any fall in underlying consumer confidence or aggregate demand. Indeed underlying demand pressures had been building up in the mid-1980s in part due to financial liberalisation.

As noted above, the abolition of the Corset had relaxed restrictive conditions on bank lending through removing restrictions on the growth of interest-bearing deposits. Once banks were free from restrictions on either side of their balance sheets, they could attract funds and expand their loan portfolios. Particularly significant was the decision of banks to enter the mortgage market. Building societies which had previously dominated the market for housing finance took steps to make their activity more commercial and following the Building Societies Act of 1986 were put on a level playing field with the banks. They abandoned their previous practice of rationing mortgages and were now able to access wholesale funding markets and enter the market for unsecured credit. The result was an increased access to unsecured borrowing and the potential for households to withdraw equity from their homes via mortgage borrowing, both of which they could use to increase spending.

Starting in 1985 there appears to have been an upsurge of confidence among households, who were now willing to take on large mortgage commitments to finance house purchase and were less constrained in taking out unsecured credit. The personal sector saving ratio declined as households increased their

[10] Allen (2015).

expenditure in part financed by drawing down the equity in their homes. Rising house prices encouraged this process through increasing the value of the collateral households could use to secure home equity loans. A similar degree of optimism increased the commercial and industrial demand for loans. The strong sense of optimism resulted in a house price boom with strong growth in both consumption and investment. Overall domestic demand was the key driver of the recovery during the mid-to-late 1980s.

Despite the emerging boom both monetary and fiscal policies remained relatively loose. Chancellor Lawson made major reductions in income tax in the 1986, 1987 and 1988 budgets, while at the same time reducing public sector borrowing by sales of public sector assets under government privatisations schemes. The expansionary effects of a booming private sector combined with the relaxed stance of economic policy led to renewed inflation and a growth rate of GDP of around 5% per annum that ultimately proved unsustainable. This unsustainable position was not recognised at the time despite a significant current account deficit emerging in the balance of payments. The deficit was viewed as the natural counterpart to improved productivity in the UK and increased foreign direct investment in an increasingly competitive UK economy. This was known as the "Burns doctrine" named after the permanent secretary Sir Terry Burns. In particular, the government's supply-side reforms were argued to have increased the underlying performance of the economy. So again this might be viewed as the authorities attempting to "tunnel through" albeit the supply-side foundations for this had not been achieved and the current account was reflecting excess demand pressures. Similarly, the public sector finances looked sound. The unadjusted public sector borrowing requirement (PSBR) looked comfortable in 1987 and 1988, as tax receipts were boosted by the strong recovery. However, the level activity in 1988–9 was in fact in excess of the potential capacity of the economy. While tax receipts increased and the accounts showed a surplus, the sustainable level of output was well below actual GDP. In other words, although there appeared to be a budget surplus, there was in fact an underlying budget deficit.

The strength of output growth began to put upward pressure on inflation, which increased to around 8%. There was a tightening of short-term interest rates, in part to rein in demand but also to match European interest rates leading up to Britain's entry into the ERM in October 1990. Following Lawson's resignation in late 1989, due to disagreements with Mrs Thatcher's adviser Alan Walters about the exchange rate policy, John Major became Chancellor and he pushed through full ERM membership in October 1990. Household income gearing (debt service payments as a % of household income) reached unprecedented levels given high interest rates and the build-up of debt in the boom. This tightening of monetary policy ultimately led to a significant recession in the early 1990s. The economy which had become accustomed to the ready availability of credit went into sharp reverse and led to a recession starting in 1990Q3. To prevent the decline in activity proceeding too far, there was a large relaxation of fiscal policy. From 1990 to 1993 the cyclically-adjusted public sector deficit increased to 6.3% of GDP. As discussed in Clark and Dilnot (2004) this was a degree of discretionary expansion unmatched at any point in the post-war era except during the mid-1970s but this was not fully appreciated at the time. Part of this reflected tax cuts in advance of the 1992 election. Ultimately pressure soon built up on sterling (which was viewed by many as overvalued as in 1925) and interest rates remained in double digits to defend sterling despite the ongoing recession. In September 1992 the UK was forced to suspend its membership of the ERM when ongoing speculation put enormous pressure on sterling and at one point had forced the government to raise interest rates to 15%.

Following ERM exit, the government and the Bank now had to find a new nominal anchor and fast. This was arguably a last act of "muddling through" at short notice. Various intermediate targets had failed and there was an intellectual shift towards directly targeting the goal of monetary policy –inflation. The Rerserve Bank

of New Zealand (RBNZ) had moved to inflation targeting in 1989/90 and this was soon adopted by Canada in 1991. This appeared to provide a ready- made solution for the UK and under Bank advice was adopted. The fall in inflation induced by the recession had brought inflation down to under 3% and a target of 2.5% for the RPIX measure of inflation was adopted (later to be 2.0% on a CPI basis). This was not undermined by the fiscal position despite the large deficit emerging in the early 1990s recession. The Chancellor Kenneth Clarke introduced a series of spending cuts and managed to push the primary deficit back towards a positive position, a policy of "prudence" continued by the incoming Labour government in 1997 who had fought the election on the basis of matching Clarke's spending plans. The inflation rate between 1993 and 2021 averaged 2.0%.

Appendix 2: New data constructed for the paper

The vast majority of series used in the paper are updates of the historical data in the Bank of England's Millennium of UK macroeconomic data spreadsheet (Thomas and Dimsdale (2017)). The updated series can be obtained from the authors on request. This Appendix discusses the additional data constructed for this paper, in particular the data on public sector borrowing and net debt, the data on inflation expectations and the updated Grilli-Yang Commodity Price Indices.

I UK Public Sector Net Debt and Borrowing 1870-present

The historical fiscal accounting in section IV of the paper is based on reconstructed estimates of public sector net debt and borrowing. As discussed in the paper, it is important to assess the fiscal position over this period for the public sector as a whole rather than focus just on central government spending and debt. We attempt to reconstruct historical estimates two of the key fiscal aggregates currently used by the government to measure and assess the sustainability of the public finances. For the fiscal deficit, we attempt to construct the public sector net borrowing measure (PSNB) and for the level of debt we construct the Public Sector Net Debt aggregate (PSND) which is a measure of debt that nets off liquid assets. Given the Bank of England's quasi-public sector status over this period we estimate measures of PSND both including and excluding the Bank of England (PSNDex).

(i) Coverage of the public sector

Although the UK is blessed with long runs of historical fiscal data stretching back to the medieval period, these are largely measures of the finances of central government. Data for the public sector, including both local government and public corporations, are less extensive and requires considerable effort to ensure consistency and appropriate consolidation over time.

Reliable local government fiscal data only becomes available from around 1870 following Goschen's well-known parliamentary report of that year which recognised the growing importance of municipal government and the financing it required. From that point on, annual parliamentary reports on local government finance were made regularly, much of which was collated and reproduced in Mitchell (1988).

The first public corporations emerged in the early C20th, with the London Port Authority in 1908 recognised as the first followed by others, including the BBC in 1926 and London Passenger Transport Board in 1933. But the scale of public ownership only really became significant after World War 2, when many big undertakings such as the rail and coal industry were nationalised. The Post Office was considered part of central government and only became a public corporation in 1961. The 1980s then saw a spate of privatisations of some of the key nationalised industries. A particular challenge is the treatment of public sector financial companies: the Trustee Savings and Post Office savings banks from the C19th; the Bank of England which was officially nationalised in 1946, although had become a quasi-public sector body before then; public sector funded pension schemes, which have become increasingly important in the postwar period; and finally the so-called "public sector banks" representing the commercial banks nationalised (most notably RBS and Lloyds) in the immediate aftermath of the Great Financial Crisis. It has often been convenient to classify the liabilities of these bodies as lying outside the boundary relevant for the public sector finances.

(ii) Public Sector Net Borrowing, 1870-present

Current official data on public sector borrowing exist from 1945 onwards in the Public Sector Analytical Tables (PSAT) tables published by the ONS. It reports two distinct but related measures of public sector borrowing: first the PSNCR (or "public sector net cash requirement") which is a "cashflow"-based measure of the deficit; and second, Public Sector Net Borrowing (PSNB), which measures the fiscal deficit on an "accruals" basis and is consistent with the measurement of the fiscal deficit in national accounts (more on this distinction below).

Before 1945, many researchers have relied on the fiscal data for central government and, for the most part, the expenditure and revenue of the "Exchequer" which, in effect, was synonymous with the Consolidated Fund, the government's main expenditure and revenue account held at the Bank of England[11]. Until the mid-1960s, the main budgetary measures were related to the surplus or deficit of the Exchequer or consolidated fund. But since the start of the C20th the consolidated fund has not been representative of total central government spending. In particular, it does not cover the spending and receipts of other government funds, such as the national insurance funds which came into existence in the early C20th to manage the old age pension and unemployment benefits[12]. Although the consolidated fund always made a contribution to the national insurance funds, those funds were additionally financed from national insurance contributions which were not part of the receipts paid into the consolidated fund as revenue. The Radcliffe Report of 1957 recognised this deficiency and initiated the move towards publishing more comprehensive measures of the deficit for both the central government sector and the public sector as a whole.

Initially, the emphasis in the budget was on the cashflow-based measure of the deficit, known then as the PSBR (or public sector borrowing requirement) which would later be re-christened the PSNCR. However, from 1998 onwards the emphasis switched to the national accounts measure of the financial surplus or deficit of the government which under the ESA10 system of accounts was re-christened Public sector net lending or borrowing depending on the sign (PSNL or PSNB). In particular, PSNB was more attuned to the fiscal rules introduced by the government at the time, especially the distinction made between current and capital spending[13].

There are two main difference between the two measures. One is the method of recording transactions. The PSNCR reports transactions on a "cash basis" so when cash payments are actually made and revenues are received. The PSNB is based on the national accounts and recorded on an accruals basis, based on when the exchange of ownership of a goods, service or financial asset occurs. For example, income tax or Value

[11] In 1968 a separate account called the National Loans fund was set up. This was subsequently used to manage the government's borrowing and debt repayments. From that point the aim was for a zero end-of-day balance on the consolidated fund. Any surplus on the consolidated fund would be swept to the national loans fund and used to repay the national debt. Similarly any deficit on the consolidated fund would be automatically plugged by the national loans fund through issuance of debt instruments and other borrowing.

[12] Other funds include the Exchange Equalisation Account.

[13] The Government introduced two fiscal rules: the sustainable investment rule which stated that net public sector debt, as a proportion of GDP, would be held at a stable and prudent level over the economic cycle and the "golden rule", which stated that over the economic cycle, the Government would borrow only to invest andnot to fund current spending. So the changes were made primarily to focus on a measure of budget balance that excludes financial transactions, and to separate the current and capital accounts. In line with this, the emphasis moved away from the Public Sector Net Cash Requirement (PSNCR renamed from the PSBR) to PSNB.

Added Tax (VAT) "accrues" when the expenditure on which it is charged takes place, but the government only receives the cash for either revenue stream some time later. Two other accruals adjustments are also worthy of note. One is the treatment of capital uplift on index-linked bonds (introduced in 1981) that arises from positive inflation. This adds to the interest payments of the government as measured by the PSNB, as the inflation uplift accrues at that point. But the capital uplift on index-linked gilts Is not actually payable to the gilt holder until redemption, so it is not countered as interest payments in the PSNCR. The other is the treatment of the trade credit (or accounts payable/receivable) of public corporations. Again this item is treated on an accruals basis in PSNB, so sales/receipts need to be accounted for when the goods and services involved are exchanged rather than at the point of cash payment.

The second difference between the two deficit measures is that the PSNCR reflects changes in the net cash requirement of the government (broadly speaking, its borrowing net of any change in its liquid assets). So, the PSNCR finances not only the gap between public sector spending and tax receipts, it also finances the government's accumulation of illiquid financial assets, such as loans to the private and overseas sector or the purchase and sale of shares. These financial transactions affect the level of borrowing but not the public sector's overall net financial indebtedness. PSNB reflects the net accumulation of total financial assets and liabilities and is viewed as a better underlying measure of the public sector deficit for this reason. Two good historical examples of the financial transactions that drive a wedge between PSNCR and PSNB are the loans the UK government made to its allies in World War 1 and the privatisation receipts of the government in the 1980s. In World War 1, the government needed to borrow to finance loans to its allies and the dominion countries, in addition to the gap between its own spending and receipts. However, the PSNB increased by less than the PSNCR because the loans to allies represented an accumulation of financial assets that offset the amount of bonds issued to finance them. In the 1980s, the PSNCR showed less borrowing than suggested by the PSNB because the government was receiving cash receipts from the sale of shares in the nationalised industries. That helped to mask the true gap between the government's spending and its revenues.

PSNB = Public sector expenditure – Public sector current and capital receipts

= accumulation of financial liabilities minus the accumulation of financial assets

= accumulation of debt liabilities - minus the accumulation of liquid assets

+ accumulation of other liabilities – accumulation of illiquid assets

= PSNCR + accruals adjustment

- net increase in loans to private and overseas sector - net purchases of shares

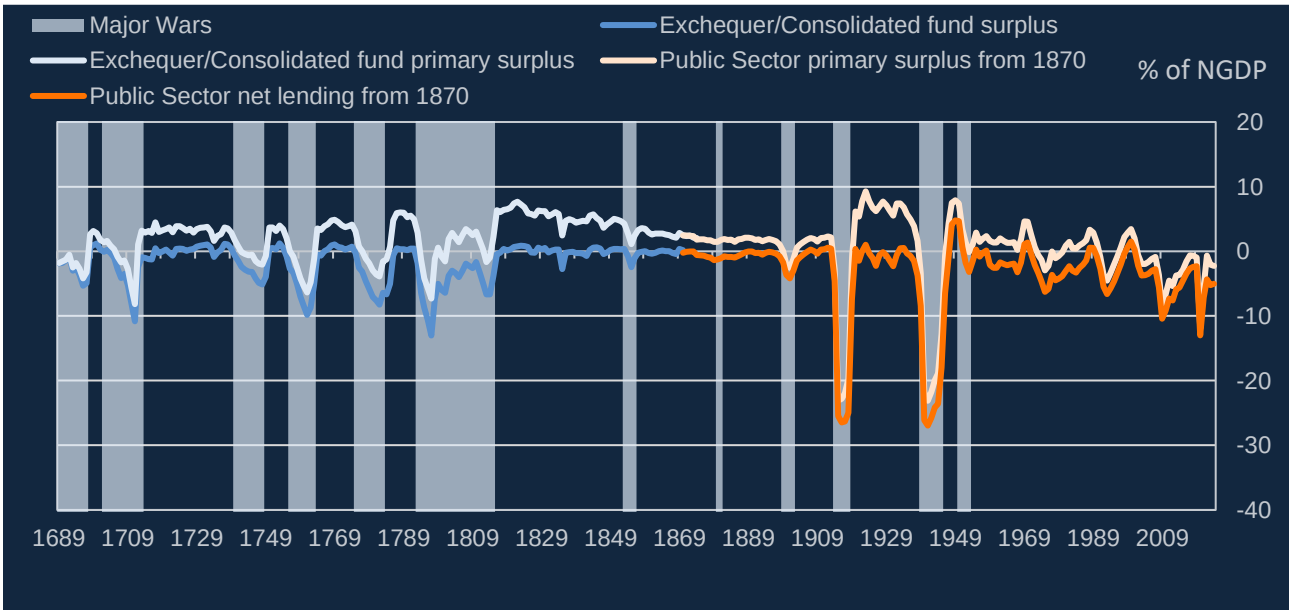
These various issues mean that care is required when reconstructing the government's deficit in periods before the official data begin. Luckily much of this careful work has been done back to 1900 on a calendar year basis. The data on PSNB between 1900-1946 used in the paper are from Middleton (1996). These were calendar year estimates based on an enhancement of Feinstein's (1972) estimates for central and local government spending and receipts used for reconstructing the historical national accounts of the UK. These were themselves based on unpublished work by Utting. Before 1900 it is then case a of using Feinstein's (1972) estimates of general government consumption of goods and services and taxes on expenditure,

which he constructed back to 1870, and retropolating the other components back to that point, using published central government and local government accounts (most of which can be found in Mitchell (1988)) , with suitable conversions from financial year to calendar year data and using as far as possible the methods Feinstein used to construct the post-1900 data. A breakdown for both central government and local government net borrowing can also be constructed (CGNB and LGNB) from 1900.

Data on the PSNCR are available on a consistent quarterly basis from 1963 in the PSAT. Older data exist back to 1952 for the public sector and 1945 for the central government borrowing requirement (CGNCR). Before this point an approximate estimate of CGNCR can be constructed back to 1870 on a financial year basis following the methods of Middleton (1979). This involves taking the published data for the consolidated fund balance and making suitable adjustments to ensure it covers both investment spending funded by debt as well as extending the scope to include the social insurance funds from 1911 onwards. But additional adjustments need to be made for the net cash required to fund the net accumulation of other illiquid assets. Note, the war loans to allies are already included in the consolidated fund balance as they were funded as part of special votes of credit during the war period.

Below we show the data for the public sector net lending/borrowing measure from 1870 and before that the balance on the Exchequer or Consolidated Fund (Chart A.33). In both cases we also show the primary surplus by excluding debt service payments. As can be seen, the break between the consolidated fund measures and the public sector net lending data is not all that large, suggesting 1870 is a reasonable point to make the switch to assessing the fiscal position on a full public sector and national accounts basis.

Chart A.33: Public Sector net lending/borrowing (excluding public sector banks from 2007)



Sources: See Text

(iii) Public Sector Net Debt, 1870-present

Public sector net debt (PSND) is currently defined as the consolidated debt liabilities of the public sector less holdings of liquid assets. So, it is effectively the stock equivalent of the PSNCR rather than PSNB. The relevant stock equivalent to PSNB is total public sector net financial liabilities or PSNFL including net holdings of illiquid instruments. PSNFL was introduced as the key debt measure for the government's fiscal rules in

the 2024 Budget. But before that PSND was (from 1990-91) the key measure of debt used when assessing public sector finances, although General Government Gross Debt (GGGD) had also been monitored following the UK signing the Maastricht treaty in 1992. PSNFL includes including the assets and liabilities of public sector employment-related funded pension schemes. Both PSND and PSNFL measure the debt liabilities of the government at nominal or face values (the contractual payment on redemption) rather than current market values. An even broader measure of the public sector balance sheet known as public sector net worth (PSNW) also takes into account public sector tangible assets.

Current official data on public sector net debt are only available on a financial year basis from 1975 and a full breakdown of components on a quarterly basis is only available from 1997 onwards, in line with many other ONS series. Earlier data on gross public sector debt began to be published in the *Annual Abstract of Statistics* from 1960 with backdata going back to 1952 and an estimate for 1935. This was then continued forward in the ONS publication *Financial Statistics* and the Bank of England's *Quarterly Bulletin* from 1986 and its *Statistical Abstract* from 1992. The official financial year data between 1975 and 1997 are based on these data but there are some discrepancies between the different sources that we highlight later. Our paper makes an attempt to reconstruct the components of public sector debt in the period 1870-1997.

Before the official data on public sector debt being many researchers rely on the historical "National Debt" series to measure public sector indebtedness. This series has the advantage it exists all the way back to the foundation of the Bank of England in the late C17th[14]. It specifically measures the liabilities of the consolidated fund and, after the re-organisation of the public sector accounts in 1968, the liabilities of the National Loans Fund (NLF). So, it has a similar relationship to public sector net debt as the Exchequer deficit does to the PSNCR. Although it is reliable as a guide to general swings in public sector debt over the very long run, it becomes more unsatisfactory as other parts of the public sector grow in importance over time. The measure was discontinued in 1998, although it can still be reconstructed from the NLF published accounts. In particular, the national debt series not only excludes the indebtedness of local authorities and public corporations, it is also unsatisfactory as a measure of central government debt. This is mainly because it does not net off official holdings of government debt by other parts of central government and also excludes certain other central government liabilities. It also is a gross measure of debt and does not net off liquid assets.

For this paper an attempt has been made to reconstruct the public sector net debt series back to 1870 on a financial year basis (end March) as well as sub-aggregates such as the gross debt of central, local and general government and measures excluding the Bank of England and public sector banks. This represents a first attempt to construct the historical record and it is likely that improvements can be made with future work. We reconstruct the series up until 1997 which is when our study ends and also when the current official data for each component of public sector net debt on a quarterly basis is available. The overlap between 1975 and 1997, where official data for total PSND are published, can then be examined for consistency with our reconstructed estimates. An approximate end calendar year estimate is then derived from that for the fiscal accounting table in the paper, which uses calendar year estimates for PSNB. Broader measures such as PSNFL and PSNW require more detailed historical information on public sector funded pension schemes and non-financial assets which are not readily available and would require considerable time to attempt to estimate or reconstruct.

[14] Thomas and Dimsdale (2017) uses this as their measure before 1975 to create a long-run series for public sector debt back to the late C17th for the Bank of England Millennium dataset.

Reconstructing public sector net debt requires several steps to build up to the required series. The essential idea is to build up an estimate of gross debt for Central Government, Local government and Public Corporations netting off any holdings within each sector. Then cross holdings of debt between each of the different sectors needs to be eliminated to get consolidated debt for the public sector as a whole. Then net holdings of liquid assets need to be removed.

For central government gross debt we start off with the components making up the old series for the national debt and then net off "official" holdings of by other parts of central government to get what was called "market holdings". For example, the National Debt Commissioners have held various amounts of government stock on behalf of other central government funds as do government departments. Much of the historical data is available to do this with a reasonable degree of accuracy.

(a) Central Government Gross Debt

One complication here is the classification of the Bank of England and in particular, the treatment of the Issue Department of the Bank. For much of the official post-WW2 data, the Issue Department of the Bank was treated as part of the central government sector until the ESA95 classifications were brought in during 1998. That meant, for example, Bank of England note issuance constituted part of central government debt in the official data between 1952 and 1998. From ESA95 and beyond the Bank of England is treated as a public sector MFI (monetary financial institution) and its contribution to public sector debt is treated separately from central government. So, we proceed by estimating a measure of central government gross debt excluding Issue Department's liabilities (which consist entirely of the Bank's note issue).

A further complication is the role of government-guaranteed securities which represent debt guaranteed by the Treasury and historically issued to finance central government loans to local authorities (e.g. Local Loans stock issued by the Local Loans fund which was on lent to local government via the Public Works Loan Commissioners) or guaranteed issuance of public corporations. These securities (in issuance until 1985) were often grouped together with gilts and were treated by the market as part of the same class of assets. So for the historical data we construct central government gross debt including government guaranteed securities, making sure not to double count these when constructing public corporations debt at a subsequent stage.

We start by taking totals for the national debt and government guaranteed securities using the National Debt Returns, the comprehensive and admirable statistics compiled by the stockbrokers Pember and Boyle (1950, 1976) for the period 1900-1975 and the *Statistical Abstract of the United Kingdom* (later *Annual Abstract of Statistics*). The national debt covers gilts, Treasury bills, Ways and Means advances, National saving securities issued by the government and other historic liabilities of the Consolidated Fund (and from 1968 the National Loans fund). But, as mentioned, the national debt does not cover all central government debt instruments so these need to be added later.

The next step is to net off official holdings of the national debt and other government guaranteed securities by central government bodies such as the National Debt Commissioners (NDCs) and other central government departments. This delivers what was called "market" holdings of government debt where "market" also includes Bank of England holdings under the post-ESA95 central government definition being followed here. The National Debt Commissioners, for example, invested funds in government securities on behalf of other central government funds, most notably the Post Office and Trustee Savings banks (who in turn had received deposits from the general public, which need to be accounted for in a subsequent step).

From 1878 to 1915 the holdings of central government bodies were reported in annual Parliamentary papers with a detailed breakdown by both instrument and department. But thereafter they have to be gleaned from other reports and accounts. From 1900-75 the holdings of the National Debt Commissioners were collated by the stockbrokers Pember and Boyle (1950, 1976) derived from the published accounts of the individual funds on whose behalf the NDCs invested. But these accounts refer to different financial years so the totals here are only an approximation to the end-March totals. The holdings of the Currency Note Redemption account, which was used to manage the note issuance by the Treasury between 1914 and 1928, are available from Kirkaldy and Gibson (1921) and Howson (1975). The Radcliffe Report of 1957 reported the holdings of other central government bodies, including the Exchange Equalisation Account (who held sterling assets in the form of Treasury bills from its inception in 1932), but only for selected years. So some estimation and interpolation is required to get holdings between 1915 and 1957 but the numbers involved are relatively small. From 1958 a series for total official holdings was published in the *Annual Abstract* and *Bank of England Quarterly Bulletin*. But this series includes the holdings of the Bank of England, which need to be deducted from the total. We implement this using the published weekly return of the Bank which gives the holdings of government debt by the Banking and Issue Departments (Huang and Thomas (2016)). These estimates are at book value for the last Wednesday in March so these are approximate and might be improved with further archival work. From 1975 official estimates of market holdings on an ESA95 basis are available, where the Bank is treated as outside the central government sector in line with ESA95.

Once official holdings of central government debt are netted off, the additional central government liabilities then need to be added to get central government gross debt. Additional adjustments need to be made to account for National Savings over and above the securities that were included as part of the "national debt" measure. First the accrued interest on national savings needs to be added. Second, the ordinary deposits of the Post Office Savings Bank (later the National Savings Bank) and (up to 1986[15]) the ordinary deposits of the Trustee Savings banks need to be added which, as noted, the NDCs then invested in government securities on their behalf (recalling that these were netted off total government securities and not included in the market holdings of government securities discussed above, to avoid double counting). Next, in order to be consistent with the current official definitions of central government gross debt, coin in circulation and the notes of the Treasury issued through the Currency Note Redemption Account between 1914 and 1928 need to be added[16]. These of course are the monetary liabilities of the government and might be separated out in an economic treatment of the balance sheet. Note for the coin estimates here we include only token issues of coin, so gold coin (in circulation prior to WW1) are not included. Additional liabilities that need to be added, but are relatively small, are market holdings of Northern Ireland government debt (principally Ulster Savings Certificates), the balances of certain public corporations with the Paymaster General, deposits with the National Debt Commissioners of funds lodged in courts, other third party deposits (from the Insolvency Service), funds held on behalf of the European Commission, and net liabilities guaranteed by government of the Guaranteed Export Finance Company (following its reclassification to the central government sector in 1987).

[15] From November 1979 Trustee savings banks' ordinary department and new department were amalgamated. The deposit liabilities of the former were accounted for as a diminishing claim on the fund for banks for savings until 1986.

[16] After 1928 these note liabilities and the government securities backing them were transferred to the Issue Department of the Bank of England.

(b) Local government gross debt

Data on local authority gross debt is available from 1888 in Mallet (1913) and the *Statistical Abstracts of the United Kingdom* (and later, the *Annual Abstract of Statistics* (AAOS)). The only gaps are over World War 2 and these have been filled in using the annual parliamentary report *Local Government Financial Statistics of England and Wales* with some interpolation required for Scotland and Northern Ireland. We have also crosschecked our UK estimates against those of Solomou and Weale (1997) (who imputed a market value to their estimates) and on a nominal basis they are very close. Before 1888, when Scottish and Irish data are not available, we use the debt of English and Welsh authorities in the Hartley-Fowler parliamentary report of 1893 to project the total for UK local authorities back to 1870. The reported local authority debt data implicitly include a small amount loans made between local authorities. Estimates of intra-local authority borrowing become available from the 1950s onwards from surveys of local authority borrowing that were published in *Economic Trends* (e.g. ET80 and ET183) and Financial Statistics (e.g. Nov63 and Dec 65). So, we adjust gross loan debt for inter local authority lending, but no allowance is made before financial year 1948/9 given the relatively small amounts involved.

(c) Public Corporations Gross Debt

For public corporations we need construct estimates of debt in excess of the government-guaranteed securities that we already accounted for as part of central government debt. Estimates are available in the *Annual Abstract of Statistics* from 1952 onwards. Before then we use estimates of borrowing by nationalised industries from British Banks published in the *Bank of England Statistical Abstract Volume 1*. We also add in borrowing by the British Transport Commission (BTC) from its own superannuation fund as published in its Annual Reports (on the basis that this fund is treated as part of the financial company sector) for the current PSND measure. This takes the series back to 1948. Before then the debt of the public corporations is minimal and the observation for 1935 supplied in the 1960 edition of the AAOS gives a zero figure.

(d) Cross-holdings of debt

In order to construct a consolidated measure of public sector net debt we next need to eliminate cross-holdings of debt between each of the subsectors. This also gives us estimates of debt held outside the public sector for the central, local government and public corporation sub-sectors. Local government and public corporations' holdings of central government debt are relatively small and estimates go back to 1939, which can be obtained from the Radcliffe Report and AAOS, with some interpolation required. Before 1939 a declining allowance for some local government holdings is made back to 1914. Similarly public corporations and local authority holdings of each other's debt are also relatively small. The biggest cross-holdings are of central government holdings of LG and PC debt, both of which were substantial in the post-war period. Central government loans to local authorities were made via the Local Loans Fund and administered by the Public Works Loan Board. This lending data can be traced back almost all the way back to 1870 from the SAUK and the Local Loans Fund published accounts. Central government holdings of public corporations debt are given back to 1952 from the AAOS and retropolated back to zero in 1948.

Once cross holdings of debt have been eliminated between central, local government and public corporations we end up with an estimate of Public Sector gross debt excluding the Bank of England and public sector banks.

(e) Public Sector Liquid Assets and Public Sector Net Debt excluding the Bank of England

To obtain public sector net debt (excluding the Bank of England and public sector banks) we need to net off public sector liquid assets. These largely consist of official foreign exchange reserves and public sector deposits with the banking system (including holdings with the Bank of England under this definition of public sector net debt). Official reserves are available back to 1932 with the founding of the Exchange Equalisation Account (EEA). Before then gold and foreign exchange reserves were held by the Bank of England, largely in the Issue Department. Some gold and foreign currency before 1932 was held by both the Currency Note Redemption Account (CNRA) between 1914-1928 and the Exchange Account set up by the Treasury in 1915 to acquire the foreign exchange needed to finance purchase war materials and supplies. So allowance needs to be made for these items. CNRA data is obtainable from the weekly returns published in the London Gazette. From this we also know the amount of Bank of England notes held by the Currency Note Redemption Account. As Feinstein (1972) notes, data on the pre-1932 Exchange Account are incomplete but we are able to work out a series from 1923 using his data and the amounts in Howson (1980). Data on deposits and other liquid assets held by the public sector only go back to 1957 when they were relatively small. Data on public sector deposits at the Bank of England however are available all the way back to 1870. We assume that total public sector deposits with commercial banks grow in line with overall level of M4 deposits in the economy prior to 1957. In 1914 this gives a total for public sector liquid assets that suggests most of the liquid assets pre-WW1 were deposits were held with the BoE, so we use the data on public deposits at the Bank of England between 1870 and 1914. This estimate could possibly be refined further with more archival work but would make little difference to the overall values of public sector net debt.

(f) Public Sector Net Debt including the Bank of England

The Bank of England was nationalised in 1946. So we exclude the Bank from the definition of the public sector before that point. ONS data on the Bank of England's contribution to PSND begins in 1984. Between 1946 and 1984 we assume that the contribution is given by the amount of illiquid assets minus the Bank's published capital in its Annual Report which, by definition, is equivalent to its debt liabilities minus liquid assets from the balance sheet identity. This is a relatively small amount given the Bank's note and deposit liabilities were largely matched by government securities and high-quality commercial bills for much of this period.

(g) Comparison with official measures and the national debt

Chart A.34 below shows our estimates of public sector net debt on a calendar year basis. The use of calendar year estimates is to line up with the calendar year estimates for PSNB. We compare them with the older national debt series. Note the official data on public sector net debt and the older national debt series prior to 1998 are only published on a financial year basis. The official public are also scaled by a centred 12-month moving sum of monthly GDP on the denominator. So compared to our calendar year estimates this involves a mild phase-shifting of the data.

However, our reconstruction of public sector net debt has revealed some differences over the period 1975-1997 reflecting what appears to be a variable treatment of some items in the older official data that was produced at the time. This relates to the treatment of government guaranteed securities, Trustee Savings Bank ordinary deposits and the consolidated fund's liability to the Post Office Superannuation fund. Up until the mid-1990s the published figure for central government gross debt in the *Annual Abstract of Statistics*

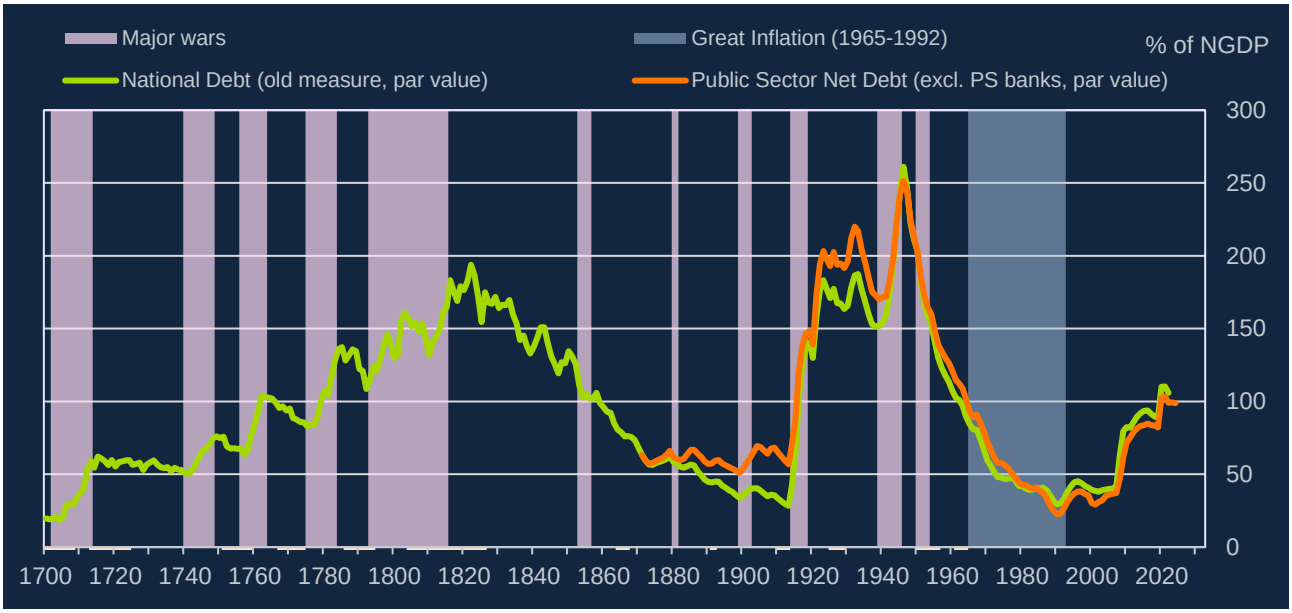
included government guaranteed securities in the back data up to 1986, when the last securities were redeemed. It also included an amount for the deposits on ordinary accounts of Trustee Savings Banks up to 1979. Following the reclassification of the TSBs to the private sector after 1979, a liability to the Trustee Savings Bank of the Fund for the Banks for Savings (a government fund operated by the National Investment and Loans Office) was also included, which was wound down at the end of June 1986. The Annual Abstract figures also included a liability to the Post Office Superannuation fund from 1968 up until 1982, though this was later classified as a liability outside the scope of PSBR financing in the 1992 AAOS alongside funds lodged in court.

From 1992 onwards, the figures for central government gross debt in the tables for public sector net debt were also published in the *Bank of England Statistical Abstract*. The historical figures for public sector net debt from 1975-1997 currently published by ONS are consistent with the Bank's Statistical Abstract figures published in 1999 and 2002. It is not clear whether the government guaranteed securities or TSB liabilities were included in that back data (going back to 1975). The notes to the Bank of England Statistical Abstracts from 1992 onwards suggest that they should still be classified as part of central government debt over that period, but the row included for savings banks deposits, for example, clearly does not include the TSB deposits from 1979 or the liabilities to the TSB thereafter. For government guaranteed securities it is possible that these were included in public corporations rather than central government gross debt from 1975 onwards, but given revisions to the data it is hard to be sure. Funds in court are also included in the Bank of England Statistical Abstract measure of public sector net debt, but there is no record of the liability to the Post Office Superannuation fund. We have been unable to find any further documentation that would help resolve the issues of how these items were treated. However, our historical reconstruction before 1975 is based on the sub-components from the Annual Abstract of Statistics figures published at the time which explicitly include total government guaranteed securities, the TSB-related liabilities and the liability to the Post Office Superannuation fund. So it makes sense to include these liabilities until 1986, to avoid a break in the series in the crucial year (for the study in hand) of 1975. The change in net debt over this financial year is then much more comparable with public sector borrowing figures. Given these components are all zero from 1987 onwards, these adjustments are effectively just a "tapering" device that allow a smooth transition from the older figures before 1975 to the current official figures. The differences are shown in the spreadsheet Appendix, sheet A4 for clarity.

From 1987 onwards, our reconstructed figures for central and general government gross debt are consistent with the published official data. But there is one further accounting issue to mention. The current ONS figures for public sector net debt are generally closed for revision before 1997Q2 which is when the ONS's current systems start. However, there have been some historical revisions to the official general government gross debt series between 1987 and 1997, reflecting legacy reporting of this measure for EU statistical purposes. Those revisions have not been incorporated in the historical pre-1997 series for total public sector net debt and no other revisions have been made for general government or public corporations' liquid assets or the cross-holdings of debt between general government and public corporations. So, there is currently a small accounting residual between public sector net debt and its sub-components in the financial year figures between 1987 and 1996. For our purposes, we take the published data for general government gross debt and then add on the unrevised components for cross holdings and public sector liquid assets, so our figures for public sector debt are marginally higher than the official figures for this period.

We can compare the resulting series with the older national debt series. This is shown in Chart A.34. The post-WW2 period shows few major differences, suggesting the use of the old national debt series has not been a misleading guide to trends on overall public sector debt. The main differences arise in the late C19th and interwar periods, reflecting local authorities need to finance local public infrastructure and utilities especially in urban areas as the economy industrialised. In the interwar period, local authority housebuilding also became important. Some of this investment by local authorities was financed via government guaranteed securities (Local Loans Stock, as discussed earlier). Public sector net debt as a percentage of nominal GDP reached an interwar peacetime peak of 214% in 1933.

Chart A.34: Public Sector Net Debt and the old National Debt series compared



Sources: See Text.

(iv) Debt decomposition method

The debt decomposition method used in the paper follows that of Escalano (2010):

$$d_t - d_{t-1} = \frac{i_t}{1+\gamma_t} d_{t-1} - \frac{\pi_t}{1+\gamma_t} d_{t-1} - \frac{g_t}{1+g_t} d_{t-1} - s_t + residual_t$$

Where:

s_t = Public sector primary surplus based on the PSNL/PSNB measure at time t, as a ratio to nominal GDP at t.

d_t = Public sector net debt at the end of period t, as a ratio to nominal GDP at t.

i_t = Effective nominal interest rate on debt in period t; paid in period t on the debt stock outstanding at the end of $t-1$. This is based on the effective interest rate on PSNB debt service payments which include the capital uplift on index-linked gilts.

π_t = Per cent change in the GDP deflator between $t-1$and t.

γ_t = Nominal GDP growth rate between t – 1and t.

g_t = Real GDP growth rate between t – 1 and t

where $1+\gamma_t = (1+g_t)(1+\pi_t)$.

The residual reflects the discrepancy between the PSNB and PSNCR measures of the deficit discussed earlier. It will also reflect the fact that the public sector net debt measure is measured at nominal redemption values. So when gilts are issued at a premium or discount, the cash raised from issuance will be different to change in the nominal value of the debt. Foreign currency revaluations of official reserves also affect the residual.

II Grilli-Yang updated commodity price indices

For this paper we have updated the seminal commodity price indices of Grilli and Yang (1988) using similar methods to the updates provided by Pfaffenzeller et al. (2007). The Grilli and Yang indices begin in 1900 and Pfaffenzeller et al. (2007) updated these to 2003. They provide an invaluable guide to future researchers wishing to update the series and we refer users of the data to this paper. We have updated the series to 2024 using a range of commodity price data. As in Pfaffenzeller et al. (2007), the data sources used to update the series are a compromise between continuity with the original Grilli and Yang data and accessibility. The indices and sub-indices are provided in sheet A5 of the Data Appendix spreadsheet with the formulae for the indices provided in the sheet so that updates can be easily made. World Bank Commodity Price Data (also known as The Pink Sheet) is the main source of the data to update the various commodity price components. However, as in Pfaffenzeller et al. (2007), the data for Beef, Wool and Hides are sourced from the International Monetary Fund (IMF) commodity price tables and the data for Jute is based on United National Food and Agriculture Organisation data.

III Household Inflation expectations measures

The household inflation expectations data for the 1960s, 1970s and early 1980s are derived from qualitative surveys. A technique for quantifying the results of the three-category qualitative Gallup (1961) survey was developed by Carlson and Parkin (1975), building on earlier work by Theil (1958) and others. The assumption is that a respondent to a survey taken at time t implicitly forms a subjective probability distribution function (p.d.f.) for future inflation and answers the survey questions in the light of this distribution. There are three types of empirical assumption necessary to infer the parameters of the p.d.f.s from the survey responses. These concern the expectations distribution, the response function and the scaling technique. Layered on to this is the need to pool data from the various surveys. Batchelor and Orr (1988) were able to construct an estimate of 1-year ahead household inflation expectations from the following qualitative series (the specifics of the calculations can be found in their paper).

The Gallup (1961) survey

This was instituted in January 1961 by Social Surveys (Gallup Poll) Ltd and the question concerning inflation expectations was:

Q1 Over the next six months do you think that prices will go up, go down, or stay the same?

Information on the fraction of respondents, excluding 'don't knows', who think prices will fall (A), stay the same (B) or rise (C) was used by Carlson and Parkin (1975) in their earlier survey.

The Gallup (1974) survey

In January 1974, as part of a more comprehensive monthly survey, Gallup Poll introduced two different questions about inflation:

Q2a Over the past twelve months do you think prices have risen a lot, risen a little, stayed the same or fallen?

Q2b Over the next twelve months do you think that prices will rise a lot, rise a little, stay the same, or fall?

This allowed four response proportions A, B, C and D for expectations and perceptions measuring the fractions of the sample answering in the 'fall', 'same', 'rise a little' and 'rise a lot' categories.

The EEC survey

In May 1974, the EEC commissioned the Office of Population Censuses and Surveys to conduct a UK survey as part of its programme of harmonized consumer surveys in member countries. This was run thrice yearly, in January, May and October, until 1979. In January 1980 conduct of the survey was transferred to Gallup Poll, and the survey was run monthly. Two questions about inflation were asked in these surveys:

Q3a Compared to what they were twelve months ago, do you think that prices in general are now much higher, moderately higher, a little higher, about the same, or a little lower?

Q3b By comparison with what is happening now, do you consider that in the next twelve months prices will increase more rapidly, increase at the same rate, increase at a slower rate, be stable, or fall slightly?

This yields five response proportions A, B, C, D and E for expectations measuring the fractions of the sample with successively higher inflation forecasts.

The Gallup (1981) survey

In October 1981, Gallup Poll piloted a new survey of consumer expectations. This was run intermittently through the first half of 1982, and monthly from January 1983 onwards. In contrast to the earlier surveys, it asked for a quantitative estimate of expected inflation:

Q4 Over the next twelve months, what do you think the rate of inflation will be?

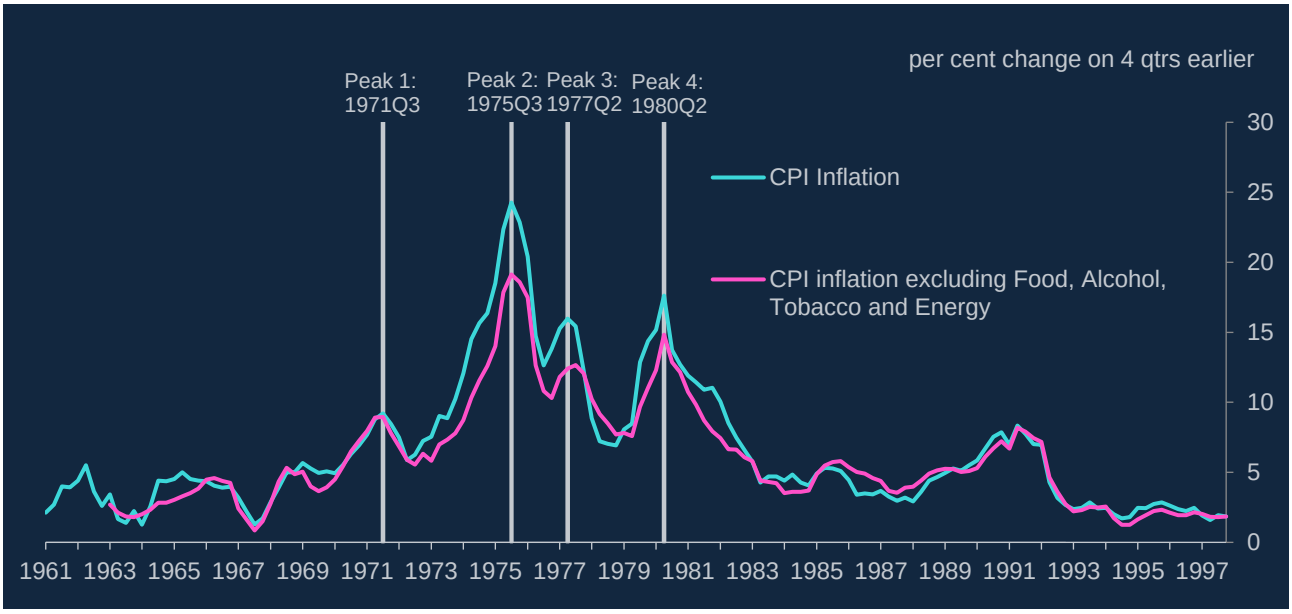
This allows direct calculation of the mean and standard deviation of expectations across individuals.

The data for mean expectations are shown in Table Q1 in the data Appendix together with a range of other inflation expectations data.

IV Core inflation – CPI excluding energy, food, tobacco and alcohol

This series was used in Chart 1.8 of the main paper and reproduced in **Chart A.35** below. The monthly series can be found in sheet M1 of the data appendix and may prove useful for other purposes. The aim is to recreate the current ONS series for CPI inflation excluding Food, Alcohol, Tobacco and Energy back to the 1960s (CDID: DKC6). However, we are unable to exclude VAT and other indirect taxes. The challenge is to get the correct weights and components to appropriately exclude these elements from the ONS' modelled historical CPI index before 1996 which provided divisional level sub-indices but not at lower levels of aggregation. Food, Alcohol and Tobacco provided no problems as the divisional components and weights for these items were constructed as part of the ONS work on creating historical estimates from the historical RPI components. Excluding the energy components is more difficult and necessarily more approximate. Coal, gas and electricity are contained within the Housing, water and fuel divisional component and Petrol is contained within the Transport divisional component. For the former we use the RPI index for Fuel and Light to project back the current CPI index for Electricity, Gas & Miscellaneous energy (DK9U) and we use the change in the RPI weight for Fuel and Light to retropolate the CPI weight. For petrol, we only have a monthly published RPI index back to 1974 even though petrol costs formed part of the overall RPI transport basket before that point. However, we have annual data on retail petrol prices from a series produced in the Economist which we interpolate with the monthly producer price series for 2-star motor spirit (including duty) published in the *Board of Trade Journal* and later *Trade and Industry*. For the weight we take 0.24 of the total Transport component weight for CPI until 1974 as indicated in the modelled historical CPI exercise until 1974 and 0.29 thereafter until the official data begin in 1988. Before 1962 the Transport component of the modelled CPI index places no weight on petrol and oil. With all the weights and components reconstructed back to 1962 we then apply the standard CPI chain-linking formula to remove the components from the total CPI index.

Chart A.35: CPI and core CPI inflation



Sources: ONS and see Text.

Appendix 3: Extra Results

I Diagnostics on regime shifts

Table A.2 and Chart A.34 show some additional diagnostics on the regime shifts identified in Section III of the paper.

Table A.2 – Markov Switching and Step-indicator saturation results

Markov Switching Regression – 3 Regimes

Sample: 1961Q1 2019Q4

	Mean inflation rate	Std. Error
Regime 1	3.0508	0.0888
Regime 2	7.2669	0.4665
Regime 3	13.1790	0.4108

Step-indicator Saturation (SIS) tests

Sample: 1961Q1 2019Q4
Indicator Saturation: SIS, 235 indicators searched over 8 blocks
6 SIS variables detected

Variable/Step Shifts	Coefficient	Std. Error	t-Statistic
C	2.9162	0.1971	14.792
1967Q2	2.7310	0.3566	7.6579
1970Q1	3.7001	0.4114	8.9930
1973Q1	5.0847	0.4024	12.6357
1976Q1	-2.6479	0.3434	-7.6975
1982Q3	-6.2818	0.2537	-24.7621
1991Q3	-2.5847	0.1884	-13.7160

Chart A.34: Regime probabilities

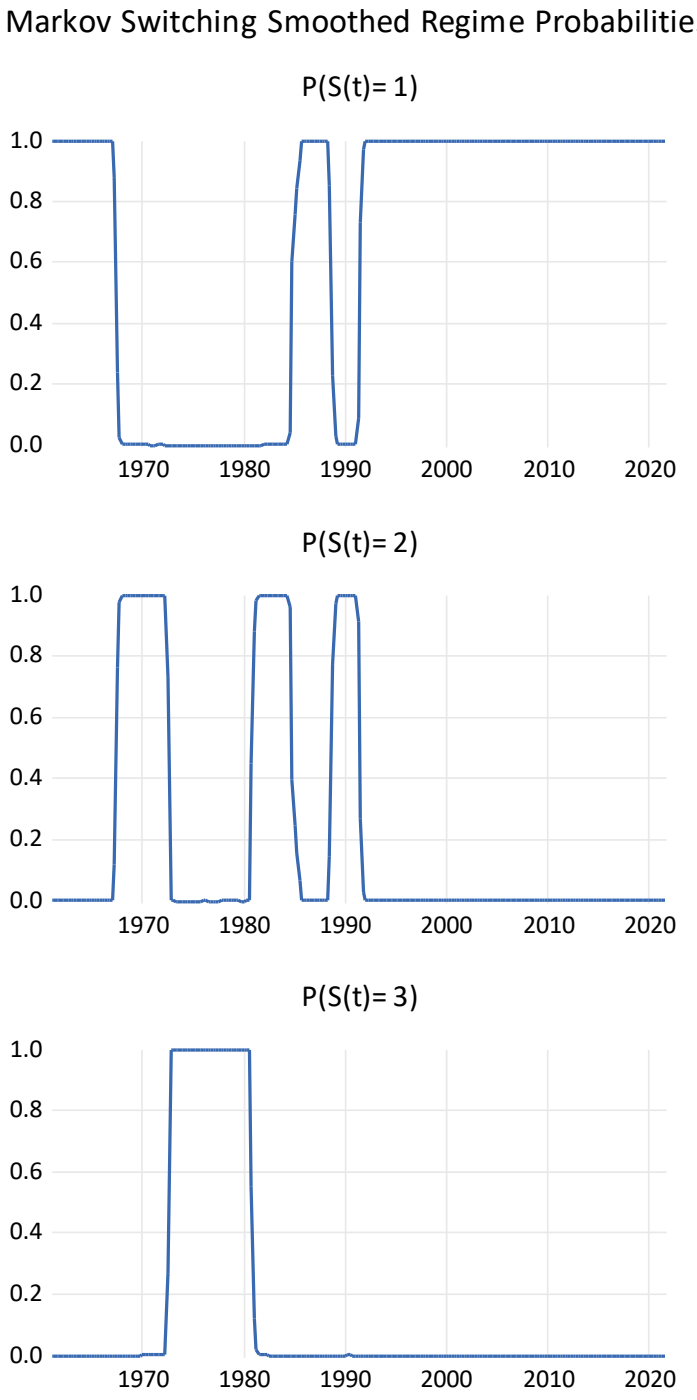


Table A.3 – Testing the stationary of the SiS regime-adjusted inflation expectations series

Null Hypothesis: SiS regime-adjusted inflation expectations has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on Schwarz information criterion)			
		t-Statistic	**P-value**
Augmented Dickey-Fuller test statistic		-5.9662	0.0000
Test critical values:	1% level:	-3.4581	
	5% level:	-2.8736	
	10% level:	-2.5733	
Adjusted R-squared	0.12880	S.D. dependent var	0.7039
S.E. of regression	0.6570	Akaike info criterion	2.0063
Sum squared resid	100.57905	Schwarz criterion	2.0357
Log likelihood	-233.7352	Hannan-Quinn criter.	2.0181
F-statistic	35.5957	Durbin-Watson stat	1.8852
Prob(F-statistic)	8.9581		

II Co-breaking tests

We present three sets of results here relating to the co-breaking tests discussed in section 3 (iii) of the paper. These are shown in Tables A.4 to A.6.

The first set of results (**Table A.4**) shows the cointegration and co-breaking results from the three equation VAR of unit wage cost inflation, CPI inflation and household 1-year ahead inflation expectations discussed in Section 3 (iii) of the main paper. The results shown are from a multivariate cointegration analysis using the methods of Johansen (1988). Household inflation expectations are restricted in the cointegration analysis to depend only on the shift dummies identified in the step-indicator saturation tests. Unit wage cost and CPI inflation then depend only on the inflation expectations with a coefficient restricted to be unity. Additionally, the loading vectors for the cointegrating relationships are restricted so that neither the unit wage cost or CPI inflation cointegrating relationships enter the inflation expectations equation, nor does the inflation expectations cointegrating vector enter the unit wage cost or CPI inflation expectations. These restrictions test whether the long-run movements in inflation expectations depend solely on the identified regime shifts and that both unit wage cost and CPI inflation depend on solely on their long-run (one-for-one) relationship with household inflation expectations with no additional influence from regime shift terms over and above that. This implies sixteen overidentifying restrictions on the data which cannot be rejected according to a χ^2 test. This demonstrates the co-breaking property with regime shifts in household expectations causing equivalent shifts in unit wage cost and CPI inflation.

The second set of results demonstrate the same cointegration and co-breaking property with two rough proxies for short and long-run inflation expectations: professional forecasts of inflation produced by the National Institute of Economic and Social Research (NIESR) and 10-year forward rates derived from the yield

curve, both with and without an adjustment for the equilibrium real interest rate component. To adjust for the real interest rate component of 10-year forward rates we take the ex-ante short-term real rate measured as Bank Rate minus household inflation expectations and use the same SiS technique to work out a sequence of regime shifts to proxy the long-term (steady-state) real interest rate. We then remove this from the measure of 10-year forward rates to get implied inflation expectations.

In the first case (**Table A.5**) we find similar cointegrating properties between these measure of expectations, albeit we cannot restrict a one-for-one long-run relationship between 10-year forward rates and household inflation expectations given forward rates also have a real interest rate component. When we do adjust for the real interest rate component (**Table A.6**) the cointegrating relationship can be restricted to have a one-for-one relationship with household inflation expectations. So this gives us some comfort that our measure of household inflation expectations, derived from qualitative surveys, appears to have a one-for-one cointegrating relationship with other proxies for inflation expectations.

In addition we then test for co-breaking across the measures by adding into both systems the shift dummies that drive breaks in household expectations and applying the same test as in **Table A.3**. This is a much tougher test suggesting that regime shifts in household inflation expectations are common to those of professional forecasters and financial markets. In both cases the key restrictions for co-breaking cannot be rejected at the 5% level in the first case and the 1% level in the latter case. This suggests the regime shifts we identify for household expectations may reasonably also apply to professional forecasters and financial markets' expectations. This provides some justification for using them as a proxy for long-term inflation expectations in the semi-structural model of wage and price setting.

Table A.4: Cointegration results with co-breaking restrictions

Cointegrated VAR with 4 lags:
Endogenous variables: π^{UWC} π^{CPI} π^{E}_{t}
The estimation sample is: 1962Q1 – 1997Q4
Restricted exogenous variables: Shift 67Q2, Shift 70Q1, Shift 73Q1, Shift 76Q1, Shift 82Q3, Shift 91Q3
Number of lags used in the analysis: 4

Cointegrating vectors (β 's) with zero restrictions imposed

	β_1	β_2	β_3
π^{UWC}	1.0000	0.0000	0.0000
π^{CPI}	0.0000	1.0000	0.0000
π^{E}_{t}	- 1.0000	- 1.0000	1.0000
Shift 67Q2	0.0000	0.0000	- 2.9985
Shift 70Q1	0.0000	0.0000	- 4.7948
Shift 73Q1	0.0000	0.0000	- 4.3750
Shift 76Q1	0.0000	0.0000	4.3873
Shift 82Q3	0.0000	0.0000	5.5010
Shift 91Q3	0.0000	0.0000	2.3412

Standard errors of β

π^{UWC}	0.0000	0.0000	0.0000
π^{CPI}	0.0000	0.0000	0.0000
π^{E}_{t}	0.0000	0.0000	0.0000
Shift 67Q2	0.0000	0.0000	1.0058
Shift 70Q1	0.0000	0.0000	1.1230
Shift 73Q1	0.0000	0.0000	1.1638
Shift 76Q1	0.0000	0.0000	1.1158
Shift 82Q3	0.0000	0.0000	0.7123
Shift 91Q3	0.0000	0.0000	0.6974

Loading matrix α

π^{UWC}	- 0.2541	- 0.1087	0.0000
π^{CPI}	0.1145	- 0.3590	0.0000
π^{E}_{t}	0.0000	0.0000	- 0.2095

Standard errors of α

π^{UWC}	0.0553	0.1234	0.0000
π^{CPI}	0.0310	0.0691	0.0000
π^{E}_{t}	0.0000	0.0000	0.0330

LR test of restrictions: χ^2 (16) = 22.302 [0.1337]

Table A.5: Cointegration results between inflation expectations measures with co-breaking restrictions: unadjusted forward rates

Cointegrated VAR with 4 lags:
Endogenous variables: $\pi_{PF}{}^{E}{}_{t}$ $\pi_{FM}{}^{E}{}_{t}$ $\pi^{E}{}_{t}$
The estimation sample is: 1966Q1 – 1997Q4
Restricted exogenous variables: Shift 67Q2, Shift 70Q1, Shift 73Q1, Shift 76Q1, Shift 82Q3, Shift 91Q3
Number of lags used in the analysis: 4

Cointegrating vectors (β 's) with zero restrictions imposed

	β_1	β_2	β_3
$\pi_{PF}{}^{E}{}_{t}$	1.0000	0.0000	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0000	1.0000	0.0000
$\pi^{E}{}_{t}$	- 1.0000	- 0.7236	1.0000
Shift 67Q2	0.0000	0.0000	- 2.1853
Shift 70Q1	0.0000	0.0000	- 5.0523
Shift 73Q1	0.0000	0.0000	- 3.7531
Shift 76Q1	0.0000	0.0000	3.6231
Shift 82Q3	0.0000	0.0000	6.1580
Shift 91Q3	0.0000	0.0000	2.2923

Standard errors of β

$\pi_{PF}{}^{E}{}_{t}$	0.0000	0.0000	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0000	0.0000	0.0000
$\pi^{E}{}_{t}$	0.0000	0.0468	0.0000
Shift 67Q2	0.0000	0.0000	1.7083
Shift 70Q1	0.0000	0.0000	1.3346
Shift 73Q1	0.0000	0.0000	1.3554
Shift 76Q1	0.0000	0.0000	1.2471
Shift 82Q3	0.0000	0.0000	0.8192
Shift 91Q3	0.0000	0.0000	0.8155

Loading matrix α

$\pi_{PF}{}^{E}{}_{t}$-	0.3577	- 0.1111	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0616	- 0.3112	0.0000
$\pi^{E}{}_{t}$	0.0000	0.0000	- 0.1891

Standard errors of α

$\pi_{PF}{}^{E}{}_{t}$	0.0673	0.0551	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0548	0.0449	0.0000
$\pi^{E}{}_{t}$	0.0000	0.0000	0.0321

LR test of restrictions: $\chi^2(16) = 28.632$ [0.0696]

Table A.6: Cointegration results between inflation expectations measures with co-breaking restrictions: forward rates adjusted for real interest rate component

Cointegrated VAR with 4 lags:
Endogenous variables: $\pi_{PF}{}^{E}{}_{t}$ $\pi_{FM}{}^{E}{}_{t}$ $\pi^{E}{}_{t}$
The estimation sample is: 1966(1) - 1997(4)
Restricted exogenous variables: Shift 67Q2, Shift 70Q1, Shift 73Q1, Shift 76Q1, Shift 82Q3, Shift 91Q3
Number of lags used in the analysis: 4

Cointegrating vectors (β 's) with zero restrictions imposed

	β_1	β_2	β_3
$\pi_{PF}{}^{E}{}_{t}$	1.0000	0.0000	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0000	1.0000	0.0000
$\pi^{E}{}_{t}$	- 1.0000	- 1.0000	1.0000
Shift 67Q2	0.0000	0.0000	- 2.2989
Shift 70Q1	0.0000	0.0000	- 5.0491
Shift 73Q1	0.0000	0.0000	- 3.5416
Shift 76Q1	0.0000	0.0000	3.8855
Shift 82Q3	0.0000	0.0000	5.8823
Shift 91Q3	0.0000	0.0000	2.4109

Standard errors of β

$\pi_{PF}{}^{E}{}_{t}$	0.0000	0.0000	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0000	0.0000	0.0000
$\pi^{E}{}_{t}$	0.0000	0.0000	0.0000
Shift 67Q2	0.0000	0.0000	1.7950
Shift 70Q1	0.0000	0.0000	1.3922
Shift 73Q1	0.0000	0.0000	1.3677
Shift 76Q1	0.0000	0.0000	1.3046
Shift 82Q3	0.0000	0.0000	0.8625
Shift 91Q3	0.0000	0.0000	0.8608

Loading matrix α

$\pi_{PF}{}^{E}{}_{t}$-	0.3278	- 0.1048	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.1513	- 0.1396	0.0000
$\pi^{E}{}_{t}$	0.0000	0.0000	- 0.1740

Standard errors of α

$\pi_{PF}{}^{E}{}_{t}$	0.0673	0.0551	0.0000
$\pi_{FM}{}^{E}{}_{t}$	0.0548	0.0449	0.0000
$\pi^{E}{}_{t}$	0.0000	0.0000	0.0321

LR test of restrictions: $\chi^2(16) = 28.632$ [0.0265]

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