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Monetary versus macroprudential policies: causal impacts of interest rates and credit controls in the era of the UK Radcliffe Report
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Monetary versus macroprudential policies: causal impacts of interest rates and credit controls in the era of the UK Radcliffe Report

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Abstract

We have entered a world of conjoined monetary and macroprudential policies. But can they function smoothly in tandem, and with what effects? Since this policy cocktail has not been seen for decades, the empirical evidence is almost non-existent. We can only fix this shortcoming in a historical laboratory. The Radcliffe Report (1959), notoriously sceptical about the efficacy of monetary policy, embodied views which led the UK to a three-decade experiment of using credit policy tools alongside conventional changes in the central bank interest rate. These non-price tools are similar to policies now being considered or used by macroprudential policymakers. We describe these tools, document how they were used by the authorities, and craft a new, largely hand-collected data set to help estimate their effects. We develop a novel empirical strategy, which we term Factor-Augmented Local Projection (FALP), to investigate the subtly different impacts of both monetary and macroprudential policies. Monetary policy innovations acted on output and inflation broadly in line with consensus views today, but tighter credit policy acted primarily to modulate bank lending whilst reducing output and leaving inflation unchanged.

Key words: Monetary policy, macroprudential policy, credit controls.

JEL classification: E50, G18, N14.

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Changes in the complex of interest rates . . . should not be precluded, . . . and should, as a rule, be regarded as secondary to the technique of rationing the volume . . . of credit . . . .

— John Maynard Keynes[1]

But, when all has been said on the possibility of monetary action and of its likely efficacy, our conclusion is that monetary measures cannot alone be relied upon to keep in nice balance an economy subject to major strains from both without and within. Monetary measures can help, but that is all.

— The Radcliffe Report[2]

1. Introduction: Macropru in the Rear-View Mirror

The Global Financial Crisis and its disappointing aftermath are widely viewed as a case of macroeconomic policy failure from which lessons must be learned. Yet agreement on the precise failures and, thus, the necessary lessons, has been elusive in many areas, from mortgage regulation to fiscal policy, and from global imbalances to central banking. In the latter case, the role of macroprudential policies remains fraught, with doubts about whether they should exist, if they work, and how they should be designed and used.[3]

Reflecting this range of scepticism, several countries have recently taken quite varied courses of action in retooling their policy regimes since 2008. For example, facing a heating up of their housing markets in 2010–12, Sweden and Norway took quite different policy actions. Sweden's Riksbank tried to battle this development using monetary policy tools only, raising the policy rate, and tipping the economy into deflation, as had been predicted by the dissident Deputy Governor Lars Svensson, who subsequently resigned. Across the border, the Norges Bank implemented some cyclical macroprudential policies to crimp credit expansion and moderate mortgage and house price booms, without relying as much on rate rises, and they managed to avoid an out-turn like that in Sweden. Elsewhere, other countries display differing degrees of readiness or willingness to use time-varying macroprudential policies. The Bank of England now has both a Financial Policy Committee and a Monetary Policy Committee, and the former has already taken actions under Governor Mark Carney. As Governor of the Bank of Israel, Stanley Fischer utilized macroprudential policies against perceived housing and credit boom risks, but subsequently as Vice-Chair at the Federal Reserve his speeches lamented the lack of similarly strong and unified

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[1]Keynes (1978), page 397.
[2]Committee on the Working of the Monetary System (1959), page 183.
[3]See, e.g., Cochrane (2013); Crockett (2000); Economist (2014); Kennedy (2014); Milne (2014); Tarullo (2013).

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macroprudential powers at the U.S. central bank.[4] Yet as one surveys these and other tacks taken by national and international policymakers, two features of the post-crisis reaction stand out: the extent to which these policy choices have proved contentious even given their limited scope and span of operation, and the way that the debate on this policy revolution has remained largely disconnected from any empirical evidence. Of course, the two features may be linked.

This paper seeks an analytical approach that might address both of these shortcomings, by bringing a new and unique array of formal empirical evidence to the table based on UK experience. To that end, we turn to the last great era of central bank experimentation with instruments similar to those now being used for macroprudential policy: the postwar decades from the 1950s to the early 1980s when many types of credit controls were put in play. In these years – particularly the 1950s and 1960s – economic discourse and policymaking in the UK were dominated by Keynes' legacy. The Radcliffe Report is the most famous example of Keynes' followers' scepticism of using short-term interest rates for macroeconomic control and it endorsed other instruments, notably credit controls, instead. In our examination of this period, which we dub the "Radcliffe era", we construct by hand new quantitative indicators over many decades on the application of such policies in the UK, including credit ceilings, hire-purchase controls, special deposits, and the "Corset".[5]

To evaluate the impacts of these policies, and to compare them with the impacts of the standard monetary policy tool of Bank Rate, we then implement a state-of-art econometric estimation of impulse response functions (IRFs) by developing a new empirical approach that is also original to this paper, one that we shall refer to as Factor-Augmented Local Projection (FALP). Our approach unites the flexible and parsimonious local projection (LP) method of estimating IRFs (Jordà 2005) with the Romer and Romer (2004) approach of using forecasts to mitigate the selection bias arising from policymakers acting on their expectations of future macroeconomic developments. To ensure greater robustness, we also borrow from the factor augmentation approach that has been employed in the VAR literature (Bernanke, Boivin and Eliasz 2005) as a means to control for other information correlated both with changes in policy and future macroeconomic developments. As part

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[4]See Fischer (2014), who compares macroprudential regimes in Israel and UK with the US, and states: "It may well be that adding a financial stability mandate to the overall mandates of all financial regulatory bodies, and perhaps other changes that would give more authority to a reformed FSOC, would contribute to increasing financial and economic stability."

See also Fischer (2015): "The need for coordination across different regulators with distinct mandates creates challenges to the timely deployment of macroprudential measures in the United States. Further, the toolkit to act countercyclically in the face of building financial stability risks is limited, requires more research on its efficacy, and may need to be enhanced."

[5]We follow Hodgman (1973) and Miller (1973) in referring to instruments such as these as "credit controls" and use the term "credit policy" to describe these policies taken as a whole.

of this project, we unearthed high quality data, both quantitative and qualitative, which are crucially important to the credibility of our identification strategy and results. We subject our results to a range of robustness tests, most of which give us little reason to doubt our main results.

What do we learn from this study – about these policies in their own time, and in terms of lessons for today? In one respect, our econometric evidence suggests that the policies from the Radcliffe era were actually a bit of a failure judged on their own terms, when we recall that the policymakers at the time viewed credit policy tools as a *substitute* for monetary policy. That is, in the old days the Bank of England thought that it could use credit controls to fine-tune macroeconomic outcomes in line with the government's stated objectives for output, inflation, and so on. But we find only mixed evidence for this belief. Changes in credit controls did strongly depress lending, and with a much shorter lag than changes in Bank Rate; but their effects on output (dampened) are somewhat less robust; and credit controls did not have a significantly negative impact on consumer prices. At the same time, we find that changes to the policy rate delivered their usual impacts of conventional sign and magnitude on output and inflation, in full accord with today's consensus views and empirical evidence.

As for today, if a similar set of macroprudential tools were to operate as it did in the Radcliffe era, it might fairly be said that "it does exactly what it says on the tin". It would more strongly modulate credit creation, and yet would have weaker impacts on nominal GDP and prices than conventional monetary policy.[6] Since the underlying IRFs span different outcome spaces, a major claim by proponents of macroprudential policies now has at least some evidence behind it. That is, a non-duplicating but complementary mix of monetary and macroprudential policy tools might curb the credit cycle, and so moderate financial instability risks, without otherwise pushing the economy unduly off target, or less so than with only a pure monetary policy action like a leaning-against-the-wind rate hike.

1.1. Related literature

The effects of credit controls in Britain At the time credit controls were being used, several British economists studied their macroeconomic effects, albeit using rather dated techniques. The majority of papers found that the application of credit controls was

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[6]In addition, today's macroprudential authorities typically emphasise that their tools have a direct impact on the *resilience* of the financial system, which is over and above any impact they may have on credit dynamics and the financial cycle. That is, by requiring banks and other intermediaries to have higher buffers of capital and liquidity when risks are judged to be elevated, the financial system will be better placed to weather an episode of out-sized losses without curtailing essential lending and other intermediation services to the real economy. See Bank of England (2009) for discussion.

followed by lower bank lending, and although very few papers looked at the impact on overall activity, a handful found that hire-purchase controls reduced durable goods consumption. According to Coghlan (1973), for every £1 of special deposits (similar to remunerated reserve requirements, see Section 3.1) called, lending fell by 62p, although this effect appeared to be temporary. Subsequently, Melitz and Sterdyniak (1979) reported evidence that an increase in reserve holdings by the commercial banks (which could be driven by a call for special deposits) was associated with a rise in the rate of interest on bank lending. Norton (1969), Artis (1978) and Savage (1978) all found statistically significant and economically large impacts of credit ceilings on bank lending, while quite a number of papers reported that hire-purchase controls temporarily depressed both hire purchase credit and consumption.[7]

This paper broadly confirms the results of this literature using modern techniques, but also goes far beyond it in terms of questions asked and responses examined.

The effects of credit controls across countries   The modern literature on credit controls, which uses more sophisticated econometric techniques, remains small. Largely comprised of country-specific studies, it tends to find that credit controls depressed lending, while evidence on other effects is more sparse. Romer and Romer (1993) identify five periods of credit policy restraint in post-WWII USA from the narrative evidence, which they call "credit actions". In response to a credit action, the credit spread rose and the ratio of bank lending to total credit fell, suggesting a bank lending channel. Industrial production also fell, although the estimate is not statistically significant. Elliott, Feldberg and Lehnert (2013) build on this by constructing a US credit policy index with more variation. The authors' preliminary analysis finds that tighter credit policies lowered consumer debt, while loosening did not raise it. Zdzienicka, Chen, Kalan, Laséen and Svirydzenka (2015) extend this work, finding that both monetary and credit policy had a dampening effect on financial conditions, but the effect of credit policy was more immediate and shorter-lived.[8]

Elsewhere, Monnet (2014) studies the impact of post-WWII macroeconomic policy in France, using a narrative measure similar to that of Romer and Romer (1993). In periods of credit restraint, the French authorities used reserve and liquidity requirements and credit ceilings, as well as non-standard monetary measures such as individual bank discount ceilings. He finds that a tightening in non-price monetary and credit policy led to a fall in lending, output and prices and an improvement in the current account balance. In other work, Monnet (2016) describes the widespread use of similar credit policies in other

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[7]E.g., Ball and Drake (1963), Stone (1964), El-Mokadem (1973), Garganas (1975), Cuthbertson (1980), and, recently, Aron, Duca, Muellbauer, Murata and Murphy (2012) and Scott and Walker (2017).

[8]Other papers including Koch (2015) study individual credit policies in the US such as Regulation Q.

European countries, with the notable exception of Germany. Sonoda and Sudo (2016) study Japan's experience of using credit controls called "Quantitative Restrictions". Although there is not much variation in the policy, the authors find that these controls reduced lending and output and raised prices. Emerging markets have for a long time continued to use credit controls, particularly reserve requirements. Glocker and Towbin (2015) examine the Brazilian experience and also find that activity falls and prices rise in response to a tightening in reserve requirements.

Our study complements this strand of work and goes beyond it in terms of the range of responses to monetary and credit policy innovations and the techniques we use. Furthermore, Britain is a particularly good case to study for two reasons. First, it is probably the most comparable case study to most countries using monetary and macroprudential policies today. This is because, unlike in most European countries at the time, British monetary policy worked through relatively modern techniques (such as open market operations), but unlike the US (then and now), credit controls were not very prone to leakages because most household and business credit was intermediated through banks and near-banks subject to regulation. Second, we have excellent data, not least the archival evidence we exploit on the policies themselves, the banks' responses to these policies, and on the forecasts made by the Treasury.

The effects of financial shocks Our paper also contributes to a broader debate about the macroeconomic impact of financial shocks. Whereas in the 1990s, the literature focussed on the bank lending and broad credit channels of monetary policy, more recently researchers have analysed financial shocks as an independent source of economic fluctuations.[9]

Several papers have focussed on the impact on firms, and through them, aggregate supply. A subset of these predict that contractionary financial shocks reduce firms' ability to borrow, in turn reducing investment and output. Depending on the reaction of monetary policy, consumer prices can end up rising after a lag (Bernanke, Gertler and Gilchrist 1999; Gilchrist and Zakrajšek 2011). Firms also require finance for working capital, for instance because they need to pay for inputs of production before they receive payment for their product. Models of the working capital channel tend to find that a reduction in the credit supply forces firms to produce less, and in turn firms react by raising prices (Carlstrom, Fuerst and Paustian 2010; Gilchrist, Schoenle, Sim and Zakrajšek 2017). A closely related literature examines the macroeconomic impact of financial shocks via a household demand channel. Papers in this literature tend to focus on mortgage borrowing, and predict that financial shocks move output and consumer prices in the same direction (e.g., Iacoviello

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[9]Indeed Romer and Romer (1993) was a response to other key papers in this literature such as Kashyap and Stein (1994).

2005). Another recent theoretical paper with relevance for our analysis is Bahadir and Gumus (2016), in whose setup controls do not directly affect mortgage lending as was true in the UK in the era we study.[10]

While the literature contains evidence in favour of the existence of both the household demand and firm supply channels, only recently have researchers started to ask which channel dominates – though the answer might vary, of course, by time and place. Mian, Sufi and Verner (2017)'s work stresses the household demand channel as a dominant factor in the US in the 1980s. However, our findings, and those of Glocker and Towbin (2015), Sonoda and Sudo (2016), and Meeks (2017),[11] find little response of consumer prices to tighter credit policy, suggesting perhaps no clearly dominant channel. In a similar vein, Barnett and Thomas (2014), who study bank lending and economic activity in post-WWII Britain using a structural VAR, conclude that "credit supply shocks behave more like aggregate supply shocks than aggregate demand shocks", while Bassett, Chosak, Driscoll and Zakrajšek (2014) report that lending standards shocks in the US in the 1990s and 2000s did not have an economically or statistically significant impact on prices.

Empirical strategy   Along with the data we uncover in this paper, our final contribution is methodological. We build on the massive literature on estimating impulse response functions by proposing a Factor-Augmented Local Projection (FALP) approach. We will wait to set out the related literature alongside the details of this approach in Section 4.1.

2.   CREDIT POLICY IN THE RADCLIFFE ERA

Why were credit controls used and how were they co-ordinated with monetary and other policies? Answering these questions is important both in designing an empirical strategy to analyse the effects of monetary and credit policies and in drawing conclusions for monetary and macroprudential policies today. There are three important pieces of historical context which shed light on these questions.[12]

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[10]The authors discriminate between shocks to the supply of credit to the household, tradable and non-tradable sectors in an open economy. Households borrow consumer credit, which is rationed by a loan-to-income limit. Firms borrow to pay wages before they receive payment from their clients, up to a fraction of their physical capital. As above, shocks to the supply of household credit move output and consumer prices in the same direction on impact. An exogenous fall in the supply of credit to the non-tradable goods sector reduces output and raises the price of non-tradable goods relative to tradable goods. Assuming the law of one price holds for tradables, this implies an increase in consumer prices. A reduction in the supply of credit to the tradable sector again reduces output but now raises the price of tradable goods relative to those of non-tradables, implying a reduction in consumer prices assuming the law of one price holds.

[11]Meeks (2017) studies the macroeconomic impacts of microprudential regulation in the UK from the 1990s onwards.

[12]Excellent broader overviews of British monetary policy since 1945 include Dimsdale (1991) and Howson (2004).

First, policymakers were highly sceptical about using the central bank interest rate for macroeconomic control. Although the debate shifted in the 1970s under the influence of monetarism, it was not until the arrival of the Thatcher government that conventional interest rate–based monetary policy became the primary tool of macroeconomic policy. This scepticism was most famously set out in the Report of the Committee on the Working of the Monetary System (1959), universally known as the Radcliffe Report. Commissioned by the Chancellor of the Exchequer, and the outcome of two years of hearings, the Report was a wide-ranging survey of the structure and operation of the UK monetary and financial system. Its central messages concerned the objectives and instruments of monetary policy. The number of scholarly citations it received within ten years of publication – around 2000, including a paper marking its tenth anniversary by Anna Schwartz (Schwartz 1969) – is testament to the stir it caused in academia.[13] Whether or not it led to immediate significant changes in UK policymaking, it merits a chapter in the official history of the Bank of England (Capie 2010), not least because it is an excellent guide to official thinking at the time. Ten years on from its publication, the Bank of England stated clearly that "the approach to policy has been similar to that of the Radcliffe Committee".[14]

The Radcliffe Report's prescriptions for the objectives of policy were not controversial. Above all, policymakers should aim to achieve full employment, stable prices, and external balance, although the Committee recognised that there may be trade-offs between these objectives. However, viewed from today's perspective, the Committee's views on the instruments of policy were deeply unorthodox (Batini and Nelson (2009) give an excellent account of the development of monetary policy doctrine over the period of our study). It argued that other financial assets were good substitutes for money, so an increase in money would fall predominantly on demand for financial assets (and hence interest rates) rather than demand for goods. In favour of this, it cited survey evidence which it claimed showed that inventories and investment were not particularly responsive to the short-term interest rate. Or, to paraphrase using a simple model of the time, it believed that the IS curve was steep (Howson 2004). While a steep IS curve does not imply that traditional monetary policy is ineffective, this belief did lead to a view that large movements in short-term interest rates would be needed for a given impact on output.

The second important piece of historical context cemented the aversion to using short-term interest rates. This is that the public debt to GDP ratio was extremely high – over 150 per cent of GDP at the beginning of our study and only falling below 50 per cent by the mid-1970s. Given the public debt position and the fact that a significant portion was owed to foreigners, the Treasury was extremely keen to avoid macroeconomic policies which

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[13]Citation count from a Google Scholar search.
[14]Bank of England (1970).

would raise the debt service burden (Hodgman 1973; Fforde 1992; Allen 2014). Although the Radcliffe Committee refrained from giving a clear view on how the macroeconomy should be controlled if not via conventional monetary policy, contemporary commentators agreed that fiscal policy was to be preferred (see, e.g., Gurley 1960; Kaldor 1960).

Finally, the exchange rate regime – the third key piece of context about the period – is instrumental in understanding why credit controls were used. Britain had a dollar peg until 1972, and even after the end of the Bretton Woods regime, the exchange rate was still heavily managed.[15] Britain lurched from one balance of payments crisis to another in this era (Schenk 2010; Kennedy 2016) as it was unable consistently to run sufficiently tight macroeconomic policy to maintain its foreign exchange reserves position. The Radcliffe Committee did acknowledge a role for Bank Rate and credit controls in such "emergency circumstances". It could be difficult to achieve the political consensus to tighten fiscal policy sufficiently in the heat of a crisis, when Bank Rate and credit controls might act faster anyway. Given the Treasury's aversion to using Bank Rate, it naturally looked for alternatives, the most prominent of which were credit controls.

The choice of instrument was a source of ongoing friction between the Treasury and the Bank of England over this period. This tension led, in Kareken (1968)'s view, to a kind of game of chicken, where the two authorities were inclined to put off tighter policy until the last minute (leading to stop–go policy) as the Treasury did not want higher interest rates and the Bank did not want to apply controls. The reason for the Bank of England's distaste of credit controls is clear – they were difficult to administer, required ongoing attention to limit leakages, and above all the banks (to which the Bank was close) did not like them. In the end, the authorities often responded with a policy package which included higher Bank Rate, tighter credit controls, tax rises, and other tools such as incomes policies.[16]

This stop–go pattern can be seen in Figure 1 which shows four key UK macroeconomic indicators used in our analysis: manufacturing output; consumer price inflation; bank lending; and Bank Rate. There were pronounced fluctuations in all these variables over the period. It is particularly noticeable that real activity exhibited very short cycles: activity peaked locally in 1953, 1955, 1957, 1960, 1964, 1968, 1973, 1976, 1978-79, and 1982.

The end of the formal peg did give policymakers more autonomy, which they exploited in 1971–73. A liberalisation of the banking system in 1971 called "Competition and Credit Control" and Chancellor Barber's 1972 "dash for growth" budget sparked a vigorous boom

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[15]Particularly before and after the 1976 crisis.

[16]A series of papers written in the 1960s and 70s examined the authorities' reaction function and confirmed that Bank Rate, credit controls and tax rates were all used forcefully in response to movements in foreign exchange reserves and also in reaction to unemployment and consumer prices (Fisher 1968, 1970; Pissarides 1972; Coghlan 1975). Interestingly, Pissarides (1972) finds some evidence of sluggish policy adjustment (possibly because of political costs of changing policy).

Figure 1: *Behaviour of key macroeconomic variables over the period*

The figure presents time series of four macroeconomic indicators over our sample period.

(a) *Manufacturing output*
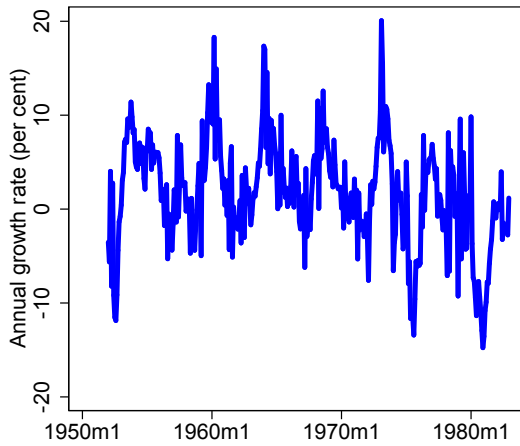
(b) *Consumer prices*
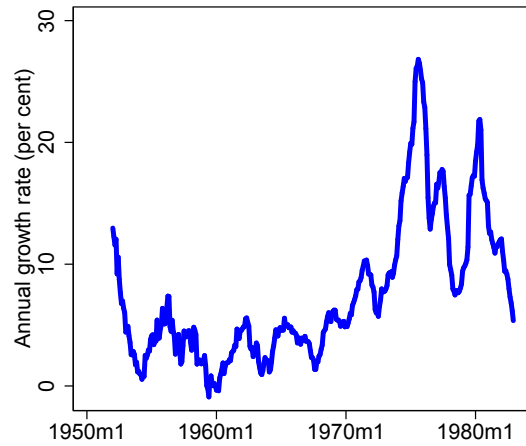
(c) *Bank lending*
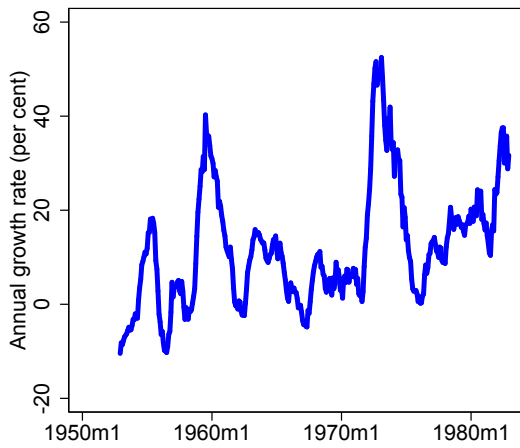
(d) *Bank Rate*
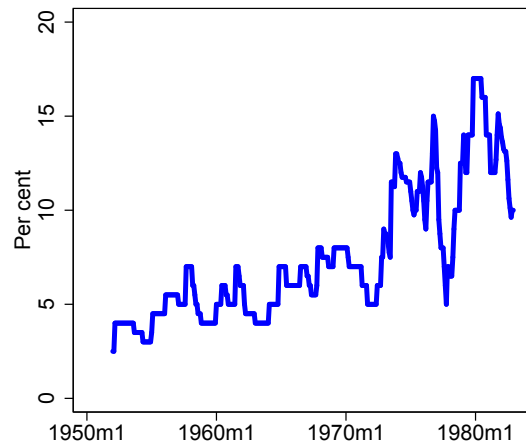
Notes: See text.

in both bank lending and output. Inflation, which had been in the 0–10 per cent range for most of the 1950s and 60s then rose rapidly and peaked at over 25 per cent in 1975.[17] The British authorities adopted monetary targets as a constraint on policy in the 1970s and although the exact timing is disputed,[18] there is broader consensus that they were not effective constraints.[19] Instead, balance of payments concerns still played an important role, particularly in 1976 when an IMF loan was accompanied by a significant policy tightening, and in 1977 when the Bank of England cut the policy rate and accumulated reserves rapidly in an effort to prevent sterling appreciation. Furthermore, nonmonetary policies including credit controls and incomes policies continued to be deployed in response to high inflation. As Goodhart (1989) notes, by the end of the 1970s, "critics were arguing that the authorities' adoption of 'pragmatic monetarism' and monetary targets had not represented a real change of heart or of approach".

In conclusion, monetary and credit policies were used systematically over the period of this study, with the balance of payments a key objective. They were used together, along with fiscal policy and other policies such as wage and price controls. This means that our empirical strategy must take into account the correlations of monetary and credit policies with the current and prospective state of the economy, and with each other and other policies. In terms of policy implications for today, researchers should take account of changes in the structure of the economy between then and now, particularly the monetary policy regime.

3. Description and Use of Credit Policy Tools

In this section we set out the details and our measurement of the four main cyclical credit policy tools used in Britain in the era we study:

- Hire-purchase controls;

- Special deposits;

- Credit ceilings; and

- The supplementary special deposits scheme (the "Corset").

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[17]The surge in inflation from 1973 to 1975 was not helped by the policy-induced indexation of wages to retail prices which came in to operation around the same time as the first the oil shock (Miller 1976).

[18]Needham (2015) argues that informal monetary targets came in as early as 1971, in contrast to Capie (2010) who puts the date at 1976 when the first hard public commitment was made.

[19]Indeed Nelson and Nikolov (2004) attribute the Great Inflation in the UK to monetary policy neglect.

Table 1: *A summary of credit policy tools used by the UK authorities*

Policy instrument	Description	Responsible authority	Scope	Usage
Hire-purchase controls	Restrictions on terms of hire purchase (instalment) lending for different categories of consumer goods, including minimum down payments and maximum repayment periods	Board of Trade (UK government)	Market-wide	Used through the 1950s, 1960s and 1970s, until their removal in 1982
Credit ceilings	Short-term quantitative ceilings on the level of credit extended to the private sector and overseas. Export finance usually excluded and lending to households and hire purchase lenders usually particularly discouraged	Bank of England	London and Scottish clearing banks and other listed banks; restraint letters also sent to finance houses, acceptance houses and discount market participants	Scheme used on various occasions in all three decades until abolition in 1971
Special deposits	Requirements to place interest-bearing deposits at the Bank of England	Bank of England	London and Scottish clearing banks; all retail banks from 1971	First used in April 1960, used frequently in 1960s and 1970s
Supplementary special deposits scheme (the "Corset")	Requirements to place non-interest bearing deposits at the Bank of England if interest-bearing eligible liabilities grew faster than a specified rate	Bank of England	All listed banks and deposit-taking finance houses; small institutions and Northern Irish banks were exempt	Scheme activated on three occasions: December 1973; November 1976; June 1978

Table 1 provides a summary of these tools, including the authority responsible for setting each tool, the institutions to which they applied, and their use over the period we examine. Banks were also subject to various other liquidity requirements, including a uniform minimum liquidity ratio and cash ratio (Bank of England 1962*a*). However, the calibration of these requirements was largely unchanged over the period, and so they have been excluded from this analysis, aside from robustness tests.[20]

3.1. Description of credit policy tools

Hire-purchase controls By the late 1950s, hire purchase, the practice of purchasing durable goods via instalment credit, had become an increasingly important source of finance for commercial vehicles, cars, and other consumer durables. For instance, nearly a quarter of all new cars purchased at this time – and a much higher proportion of second-hand vehicles – were bought on hire purchase. The Board of Trade, a govern-

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[20]From 1946, the clearing banks agreed to maintain a minimum cash-to-deposit ratio of 8%. From 1951, the clearing banks agreed to maintain a liquid asset ratio of reserves, call money and Treasury and commercial bills of 28%–32% of their deposit liabilities; from 1957, this agreement was made more precise when the liquid asset ratio was set at a minimum of 30%; in 1963, this was reduced to 28%. This system was replaced by a single reserve asset ratio of 12.5% in 1971. The definition was in between the cash and liquid asset ratios and turned out to constitute a modest easing of the constraint on most banks. In 1981 the reserve asset ratio requirement was abandoned.

ment department, exercised control over the terms of hire purchase credit by stipulating minimum down payments and maximum repayment periods for different categories of goods. These controls were used actively for much of the 1950s, and despite the Radcliffe Report's verdict that they were suitable for use only for short periods at times of emergency, continued to be used throughout the 1960s and 70s until their removal in 1982.

The principal advantage of hire-purchase controls lay in the reach they provided beyond the clearing banks to the specialist hire purchase finance companies that funded approximately three quarters of the stock of hire purchase debt. While the larger finance houses took some advances from banks, the majority of their funding came from issuing deposits.[21] Controls on clearing banks' lending therefore had only a small effect on the provision of hire purchase credit by finance companies. A second purported advantage of hire-purchase controls was that they could be targeted: policy changes were frequently directed at particular classes of good (e.g., cars, furniture, etc.).

Credit ceilings   Credit ceilings were used frequently from 1955 to 1971 as an emergency tool to reduce aggregate demand when balance of payments deficits reached crisis proportions. The modalities of these ceilings were typically set out in letters from the Governor of the Bank to the main banking and finance associations. The first such request was made in July 1955, with the banks asked to reduce their lending by 10 per cent by the end of the year. Typically, the ceilings were accompanied by a request to focus restraint on lending to the household sector and to maintain or expand lending to export or import-competing sectors. Usually the banks complied with the ceilings, but on one occasion (in 1969) the banks were fined for exceeding a ceiling.[22] The scope of the ceilings varied over time in terms of the institutions and types of lending covered, but it was always wide.

The practical difficulties of implementing credit ceilings were colossal. One problem lay in extending the scope of the restraint beyond the clearing banks to relevant non-bank financial intermediaries. Restraint letters were sent to the Finance Houses Association, the Acceptance Houses Committee, and the London Discount Market Association – but the Bank had no formal power to enforce its requests to these non-banks. A second problem arose when the clearing banks repeatedly overshot their lending targets, a fact that they plausibly put down to customers making use of existing credit facilities (Goodhart 2015).[23]

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[21] In June 1962, deposits accounted for nearly two thirds of large finance houses' liabilities; smaller finance houses, by contrast, were more reliant on bank advances to fund their balance sheets (Bank of England 1962*b*).

[22] On 31 May 1969, the Bank announced that the rate of interest payable on special deposits would be halved until the ceiling at the time was met.

[23] The lending targets had no statutory basis, as was common with most financial regulation of the time. According to Capie (2010), the possibility of issuing a formal directive was raised, but dropped for fear of "changing the nature of the relationship between the Bank and the banks".

Special deposits   Special deposits were introduced as a less intrusive replacement for ceilings in 1958. They were akin to a remunerated reserve requirement. Banks were requested to place varying amounts of deposits at the Bank of England, in an amount proportional to their deposit bases, at an interest rate close to the Treasury bill rate.[24] Banks were given about 60 days on average to meet requests for additional deposits, and about 20 days to comply when policy was loosened. The scheme initially applied to the London and Scottish clearing banks only but was broadened in 1971.

The tool was intended to influence banks' ability to expand credit by acting on their minimum liquidity ratios: special deposits did not count as liquid assets for the purposes of calculating these ratios, so a bank whose ratio was near the minimum when the tool was applied would be forced either to curtail lending or sell investments (typically government securities). Over time, the authorities tried to restrict banks' freedom in adjusting to these calls by requesting that they were not met by selling investments. The tool was first used in April 1960 and, despite being initially seen as "a temporary arrangement" (Capie 2010), was frequently used until its abandonment in 1980.

Supplementary special deposits   The supplementary special deposits scheme – otherwise known as the "Corset" – was a second attempt to replace ceilings after they were brought back in the 1960s. First used in 1973, it was a system of non-remunerated reserve requirements tied to the rate of growth of each bank's interest-bearing sterling deposits or "eligible liabilities".[25] If eligible liabilities grew faster than the prescribed rate, banks were required to place non-interest-bearing supplementary special deposits with the Bank. The deposit requirements were progressively larger the greater the overshoot over the prescribed rate, ranging from 5 to 50 per cent of the incremental excess eligible liability growth. This had the effect of forcing banks either to accept lower profits or even losses on their marginal lending, or else to widen their lending spreads. The scheme applied to all listed banks and deposit-taking finance houses operating in the United Kingdom, but small institutions and Northern Irish banks were made exempt.

3.2.   Creating an aggregate credit policy index

To analyse the effects of these instruments, we sum up the overall stance of credit policy via an aggregate index. We create this index in two steps: first, we code subindices that characterise the stance of each of the four instruments listed above; second, we summarise variation across the subindices by combining them using a simple weighting scheme.

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[24]There was no statutory basis for these requests either.

[25]Interest-bearing sterling deposits were taken to be the marginal source of funding to meet fluctuations in the demand for credit. For further detail, see Bank of England (1982).

Coding the individual credit controls   It is straightforward to characterise the stance of special deposits, as the tool was varied on a continuous scale.[26] The source for the data is the *Bank of England Quarterly Bulletin* (various issues).

For hire-purchase restrictions, we create a continuous subindex following the same method as Cuthbertson (1980). This combines the minimum down payment and the maximum repayment limit (in months):

$$HP_t^i = d_t^i + \left(\frac{100 - d_t^i}{T_t^i} \right),$$

where i is the type of good (cars, commercial vehicles, radios and televisions, or furniture), d_t^i is the required down payment on good i, and T_t^i is the maximum repayment period on good i in months. The final subindex is the sum of all the HP_t^i weighted by the amount of credit subject to hire-purchase controls financing good type i. The data on minimum down payments and maximum repayment periods are taken from the Crowther Report and the *National Institute Economic Review*.[27] For the weighting, we use fixed weights from the Crowther Report on credit extended in 1966 (around the middle of our sample).[28]

Figure 2a presents the time series of these first two continuous subindices, hire-purchase controls and special deposits.

We code the other tools in our set – credit ceilings and the supplementary special deposits scheme – using a binary 0–1 index. Decisions about ceilings were not always made in public, so we have consulted the Bank of England archives. For example, in December 1969, the Bank of England told the banks privately that they would not be held to the publicly-announced credit ceiling,so we code this and subsequent months "0" until the ceiling was next activated in April 1970.[29] Tables 2 and 3 set out the policy changes that occurred and the mapping from these into index values.

Aggregating the subindices   We next aggregate the subindices because we expect the macroeconomic impacts to be similar and because the resulting credit policy index gives us more variation to exploit than would the four individual subindices.[30]

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[26]One complication is that banks were given around 60 days' notice of calls for special deposits before they were binding. So we could use either announcement dates or implementation dates in our subindex. We choose the former as we expect that forward-looking banks would have begun adjusting their portfolios immediately after announcements.

[27]Crowther (1971a), National Institute of Economic and Social Research (1960) and National Institute of Economic and Social Research (1984).

[28]Crowther (1971b).

[29]Extract from Mr. Hollom's memo dated 1.1.70 on his talk 31.12.69 with Mr. Wilson and Mr. Piper (C.L.C.B.), 1st January 1970, Bank of England Archive 3A8/6

[30]In a macroeconomic model, one would most likely model all of these controls as an increase in the cost of intermediation.

Figure 2: *Time series of credit policy indices*

The upper panel presents the time series of special deposit rates set by the Bank of England (blue line) and our index of hire-purchase restrictions set by the Board of Trade (red line). The lower panel presents the credit policy index.

(a) *Special deposit rate and hire-purchase controls index*
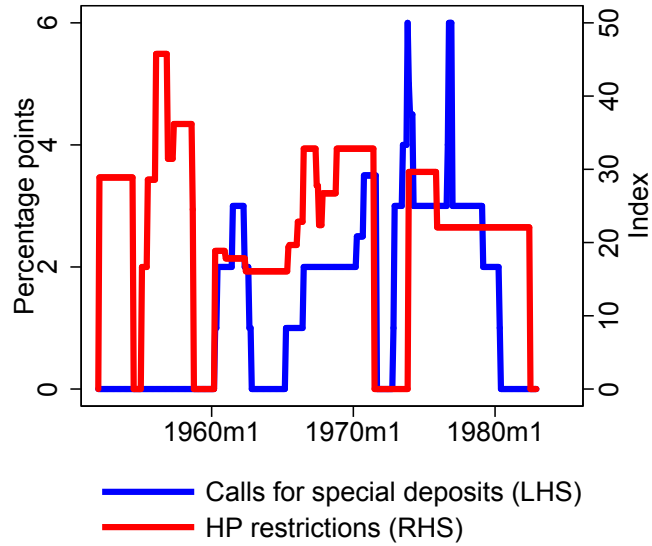
(b) *Aggregate credit policy index*
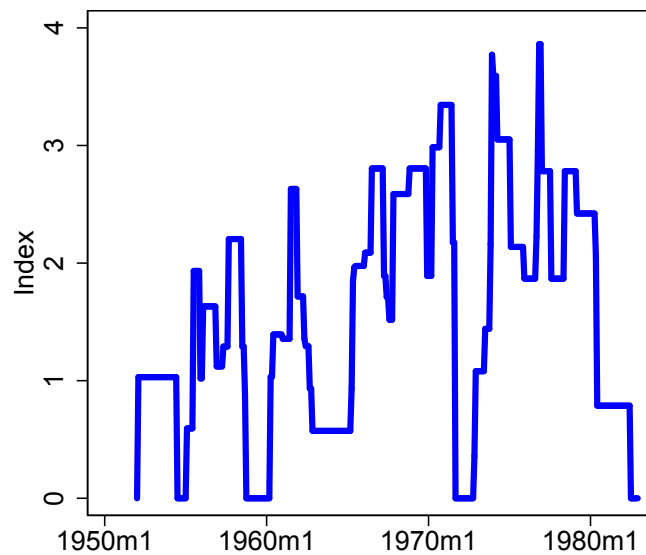
Notes: See section 3.2 for details.

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Table 2: *Classifying credit ceiling notices*

Date	Description of the policy	Classification
1955 Jul 25	Chancellor asks the banks to "achieve a positive and significant reduction in the total of bank advances outstanding", which is interpreted as a 10% reduction before the end of the year	1
1955 Dec 31	End of the ceiling	0
1957 Sep 19	Chancellor asks the banks that "the average level of bank advances during the next twelve months should be held at the average level for the last twelve months"	1
1958 Jul 31	End of the ceiling	0
1961 Jul 25	Governor's letter to Committee of London Clearing Bankers: the level of advances at the end of the year should not exceed that of June"	1
1961 Dec 31	End of the ceiling	0
1965 May 5	Governor's letter to Committee of London Clearing Bankers: advances to private sector should not increase more than 5% during twelve months to March 1966. Letters also sent to other main banking associations	1
1966 Feb 1	Governor's letter to Committee of London Clearing Bankers: until further review, advances, acceptances and commercial bills should not rise above March 1966 levels. Letters also sent to other main banking associations	1
1967 Apr 11	Chancellor's Budget statement: ceiling on lending to private sector would be discontinued forthwith for London and Scottish clearing banks, and discontinued for other banks as and when suitable new arrangements had been worked out	0
1967 Nov 19	Government announced new measures of credit policy: lending at the latest date for which figures are available will become the ceiling until further notice	1
1968 May 23	Bank credit restriction notice: the restrictions requested last November should be modified so as to achieve a greater reduction in lending to non-priority borrowers than has so far taken place. Banks are asked not to allow lending to exceed 104% of the Nov 1967 level (i.e., roughly current level) until further notice	1
1968 Aug 30	Bank credit restriction notice: lending has fallen below the 104% ceiling; current restrictions must continue to be rigorously enforced over the period ahead	1
1968 Nov 22	Bank credit restriction notice: the clearing banks are now asked to reduce lending to 98% of its mid-Nov 1967 level by mid-Mar 1969; other banks are asked to ensure their lending does not exceed 102% of its Nov 1967 level by Mar 1969	1
1969 Jan 31	Deputy Governor's letter to Committee of London Clearing Bankers: little progress has yet been made towards meeting the revised target for private sector lending set last November; we must now re-emphasise the importance to achieving this target	1
1969 May 31	Bank credit restriction notice: latest data show sharp reversal in progress in meeting lending ceiling; Bank has decided to halve the rate of interest payable on special deposits from June 2 until banks comply with the ceiling	1
1969 Dec 31	Bank of England informs the Committee of London Clearing Bankers in private that it would be content to see lending growth	0
1970 Apr 14	Chancellor's Budget statement: a gradual and moderate increase in lending that has hitherto been subject to ceilings would be consistent with economic objectives; bank lending should not rise by more than about 5% over 12 months from Mar 1970	1
1970 Jul 28	Bank credit restriction notice: latest data indicate lending is increasing at a faster pace than April guidance. Clearing and Scottish banks reminded that April guidance remains in force and have been asked to reduce lending growth accordingly	1
1971 Mar 30	Chancellor's Budget statement: intention to put forward proposals to change techniques of monetary control, but for now necessary to maintain guidelines on lending. Clearing and Scottish banks asked that lending should not rise to mid-Jun 1971 by more than 7.5% above its mid-Mar 1970 level	1
1971 Jun 30	Bank notice: proposed changes in monetary policy techniques not yet complete, so necessary to extend the guidelines on lending. Clearers asked that lending in mid-Sep 1971 should not exceed its mid-Mar 1970 level by more than 10%. Similar restraint applied to other banks	1
1971 Sep 16	Quantitative ceilings abandoned as part of Competition and Credit Control reform package	0

Sources: Bank of England *Quarterly Bulletin*, Bank of England Archive and authors' calculations.

It is not obvious how to weight the four controls. We consulted the clearing bank archives to look for evidence on how the banks reacted to them.[31] Interestingly, the banks appear to have reacted to the different controls in a similar way. Following the application of a ceiling in 1955, Westminster Bank told its branch managers that "in general, no new or

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[31]The evidence from commercial bank archives is presented in more detail in Bush (2018).

Table 3: *Classifying announcements under the supplementary special deposits scheme*

Date	Base period	Permissible growth, per month	Rate of deposit	Classification
1973 Dec 17	Oct–Dec 1973	8% over first 6 months; 1.5% thereafter	Until Nov 1974: 5% for excess of up to 1pp 25% for excess of 1–3pp 50% for excess of over 3pp From Nov 1974: 5% for excess of up to 3pp 25% for excess of 3–5pp 50% for excess over 5pp	1
1975 Feb 28	—	Scheme terminated	—	0
1976 Nov 18	Aug–Oct 1976	3% over first 6 months; 0.5% thereafter	As from Nov 1974	1
1977 Aug 11	—	Scheme terminated	—	0
1978 Jun 8	Nov 1977–Apr 1978	4% during Aug – Oct 1978; 1% thereafter	As from Nov 1974	1
1980 Jun 18	—	Scheme terminated	—	0

Source: Bank of England *Quarterly Bulletin* and authors' calculations.

increased advances can be made unless they are specifically required for the production of exports, for the saving of essential imports, for necessary seasonal commitments or for the essential requirements of the defence programme. In particular, advances should not be made for capital expenditure or for stockpiling or for increasing production of consumer goods".[32] Following the call for special deposits in April 1960, the National Provincial instructed its branch managers that "advances which are regarded as analogous to the 'Personal Loans' of our competitors must in future be granted in very exceptional cases" and that applications for advances to fund capital expenditure should be referred elsewhere.[33] In December 1973, Barclays reacted to the "Corset" announcement by informing its branch managers that it was prepared to see a rise of 5 per cent in borrowing limits in priority sectors (industry, agriculture, and construction) and it wanted to see a 10 per cent reduction in lending to non-priority sectors (banks and other financial companies, property companies, and households).[34] Hire-purchase controls of course did not directly apply to the banks, but even so, they sometimes amended their lending policies accordingly as for example in the case of Midland Bank in 1960 which told its branch managers that "it is important that attention should be paid to the provisions of the Hire Purchase and Credit Sale Orders in those cases where they would apply had the transaction been arranged through hire-purchase finance instead of by Personal Loan".[35] Interestingly, from the perspective of the bank lending channel literature cited above, we found no evidence of banks reacting to

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[32]"Advance Policy", Circular A.54-1955, 3rd August 1955, Royal Bank of Scotland Archives WES/1302/14.
[33]"Advances", Circular No. 1960/10, 29th April 1960, Royal Bank of Scotland Archives NAT/914/10.
[34]"Advances", Head Office Circular No. A.9,955, 21st December 1973, Barclays Archives 29/1603 .
[35]"Personal Loans Service", S.A.126/1960, 28th May 1960, HSBC Archives UK 1493.

changes in Bank Rate other than via interest rates on loans and deposits.[36]

On the basis of this evidence, and in an effort to keep things simple, we give each of the four controls an equal weight in the credit policy index. Specifically, we divide the hire-purchase and special deposit subindices by their mean values when they are on, so that each of the four controls has a mean value of 1 for periods when they were active. Then we sum the four subindices and divide by the resulting series' standard deviation. The resulting aggregate index is presented in Figure 2b. Of course, this weighting does contain a healthy dose of judgement, so we use different weighting schemes in robustness tests described in Section 4.1.

3.3. Usage of monetary and credit policies

To compare monetary and credit policy actions in our sample, Figure 3a shows the time series data for annual changes in Bank Rate and annual changes in our aggregate credit policy index. Monetary and credit policies were clearly used jointly over the period, but the relationship is far from a one-to-one correspondence even when we look at annual changes. The correlation between monthly changes in these variables is much lower still, with a contemporaneous correlation coefficient of 0.3, as seen in Figure 3b.

Table 4 presents a range of sample statistics on the usage of these policy tools. Over the full sample, changes in the credit policy index are evenly distributed between tightenings and loosenings, whereas the distribution of changes in Bank Rate is skewed, with almost twice as many loosenings as tightenings. Bank Rate hikes are typically twice as large as cuts, however. Consistent with Figure 3a, the instruments were often adjusted in the same direction: over the full sample, there were 22 within-month moves in the same direction; the policies were moved in opposite directions on only 3 occasions. However, there were still 116 cases where one policy moved but not the other, indicating little correlation overall.

4. Identification Strategy and Data

The primary goal of this paper is to estimate the effects of monetary and credit policies on the macroeconomy and the financial system. Our empirical approach is motivated by three challenges we face in achieving this goal. The first – measuring the stance of credit policy – is discussed in Section 3.2. This section sets out two further challenges and explains how we overcome them, in so doing introducing *Factor-Augmented Local Projections* (FALPs)

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[36]While far from decisive evidence, this supports Romer and Romer (1993)'s claim that the bank lending channel of monetary policy is not quantitatively important.

Figure 3: *The co-movement of monetary policy and credit policy*

The upper panel presents twelve-month changes in Bank Rate (blue line) and the credit policy index (red line). The lower panel presents the cross-correlation between the monthly change in Bank Rate and leads and lags of the month change in the credit policy index.

(a) *Bank Rate and the aggregate credit policy index*
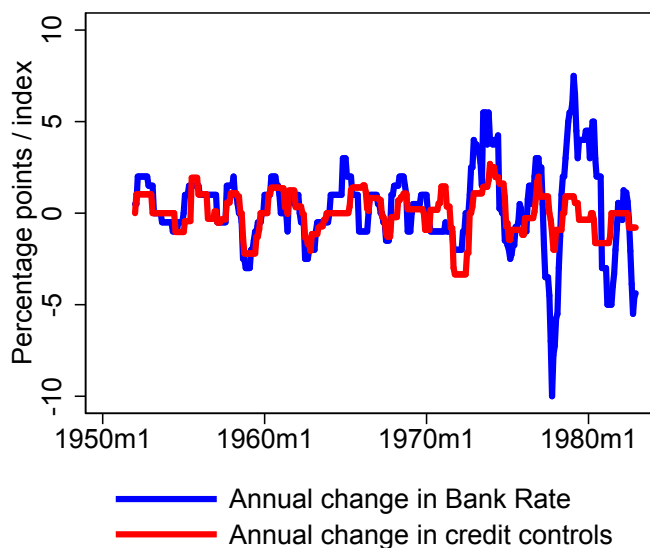
(b) *Lead-lag relationship between Bank Rate and credit policy index*
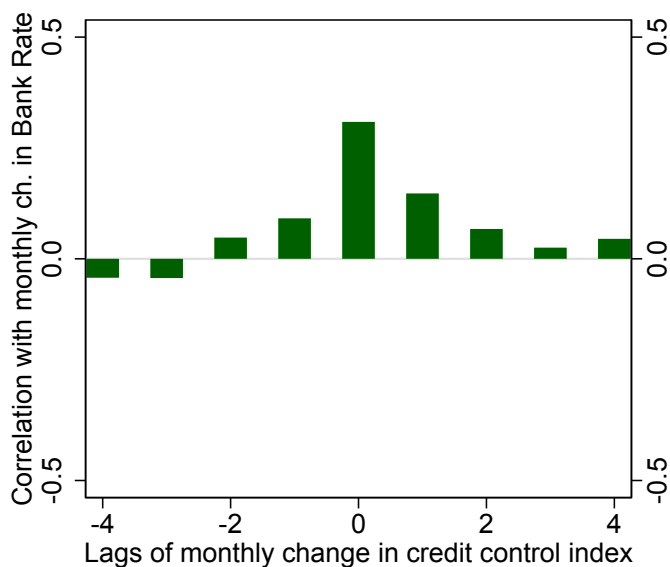
Notes: See text.

Table 4: *Summary statistics on the usage of monetary and credit policy tools*

Bank Rate	Standard deviation	3.5
	Number of tightenings	38
	Average tightening size	1.4
	Number of loosenings	72
	Average loosening size	0.6
Credit policy index	Standard deviation	1.0
	Number of tightenings	28
	Average tightening size	0.7
	Number of loosenings	28
	Average loosening size	0.7
Both policies	Months with moves in same direction	22
	Months with moves in opposite direction	3
	Months when only one of the two moves	116
	Months when neither of the two moves	231

Source: Authors' calculations.

into the literature.[37] We also present our new monthly macrofinancial data set for the UK, which we hope will be used widely by other researchers.

4.1. Identification strategy

Motivation for our approach Our second challenge is that monetary and credit policy were quite often used together and also in combination with other macroeconomic policies. As described in Sections 2 and 3, there were 25 occasions when monetary and credit policies were used together;[38] there were also 23 occasions when fiscal policy was used with one or both of them. To reflect this, we always regress our macroeconomic outcome variables on a vector of monetary, credit, and fiscal policy variables. In principle, there should be no bias resulting from this specification. But if we have mismeasured the policies, any correlation between the policy variables may be a source of bias. To check for this, we dummy out months with more than one type of policy action in a further set of robustness tests. Other policies such as incomes policies could also be a source of bias, so we follow the same dummy strategy in another set of robustness tests.

The third challenge is that policy actions were taken at least in part in response to actual or prospective macroeconomic developments. Omitting the information used to set policy could lead to biased estimates of its impact. We follow Romer and Romer (2004) by regressing our policy variables on macroeconomic forecasts made at the time in a first-stage regression. As pointed out by Cochrane (2004), in principle the *only* right-hand-side variables which are needed in the first-stage regression are forecasts of the dependent

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[37]We also note that, even though the papers were written independently, in a similar spirit to our paper the survey chapter by Ramey (2016) (p. 41 and Figure 3.2B) also briefly explores among several identification schemes the idea of combining recursive LPs with FAVAR controls.

[38]22 in the same direction and 3 in opposite directions from each other.

variable in the second-stage regression. In practice, policymakers might react to information not reflected by forecasts that is also correlated with future macroeconomic developments. For this reason and because there are some policy changes in months without forecasts, we supplement forecasts with factors estimated from a new set of macroeconomic and financial data. We note that Stock and Watson (2002) showed that factors produce good forecasts while Bernanke and Boivin (2003) found that Federal Reserve Board forecasts could have been improved by incorporating such information. We are following Bernanke, Boivin and Eliasz (2005) in using factors to identify the impact of economic policy.

First stage: constructing policy innovation series In the first stage, we regress Bank Rate and our credit policy index on macroeconomic forecasts and factors to create policy innovation series which are no longer correlated with expectations of future macroeconomic outcomes:[39]

$$\Delta\text{policy}_{i,t} = \alpha_i + \sum_{k=1}^{K}\sum_{l=0}^{L}\gamma_{i,k,l}E_t[\Delta x_{k,l,t}] + \delta_i i_t + \sum_{m=1}^{M}\zeta_{i,m}F_{m,t} + \sum_{j=1}^{J}\theta_{i,j}\text{policy}_{j,t-1} + \epsilon_{i,t},$$

where $\text{policy}_{i,t}$ refers to our measures of monetary or credit policy (indexed by i, and j towards the end of the equation),[40] $E_t[\Delta x_{k,l,t}]$ is the forecast made at time t of the change in macroeconomic variable x (indexed by k) between the quarter in which the forecast was made and the forecast horizon l, i_t is an indicator variable set to zero when forecasts are available and one otherwise, and $F_{m,t}$ is one of a number of macroeconomic factors indexed by m.

The forecasts used are GDP and the consumer price deflator (i.e., $K = 2$). We pick these variables because they correspond closely to the outcome variables in which we are interested. These variables are reported for quarterly data. In months when forecasts were produced, we use forecasts for the quarter-on-quarter change in GDP and CPI, zero, one and two quarters ahead (i.e., $L = 2$).[41] In months without forecasts, we pick the latest available forecast and adjust the timing as necessary. Before December 1959 we have no forecasts of quarterly GDP and prices at all. We use a dummy to remove any differences in means, but rely only on factors for identification over this period.

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[39]Romer and Romer (2004) first employed this approach in the literature and Cloyne and Hürtgen (2016) is a recent application to UK monetary policy.

[40]i and j both contain monetary and credit policies – i.e. the innovations are based on regressions of each policy on lags of both policies.

[41]There are two reasons for this choice. First, the data availability is worse for longer-term forecasts. Second, although the forecasts were generally made under the assumption of unchanged policy, the interpretation of "unchanged policy" changes over time. So we follow Romer and Romer (2004) in using only near-term forecasts which are likely to be invariant to the policy assumption used, as policymakers thought there were lags in the effects of policy.

The macroeconomic factors are estimated from a large data set described below using principal component analysis. We use information criteria developed by Bai and Ng (2002) to guide our choice of factors. Their first three information criteria suggest a range of four to six factors. We use the first six principal components in our main specification but four in a robustness exercise.

Our specification assumes that policymakers observed the current state of the economy, as measured by contemporaneous factors. This is the conventional timing assumption, as discussed in Christiano, Eichenbaum and Evans (1999). We explore an alternative timing assumption – that policymakers observe data with a one-month lag – in a robustness test.

Second stage: Factor-Augmented Local Projection (FALP)   In the second stage, we regress macroeconomic response variables of interest on the policy innovations estimated in the first stage, along with control variables. Romer and Romer (2004) and Cloyne and Hürtgen (2016) used vector autoregressive (VAR) specifications to do this. We use local projections for two reasons.[42] First, local projections do not require the researcher to take a stance on the number of autoregressive lags to include, and are therefore more robust. Coibion (2012) showed that the results in Romer and Romer (2004) were quite sensitive to this choice. Second, local projections allow more flexibility, especially in using more controls without losing too many degrees of freedom.[43] We exploit this advantage in the robustness tests.

Our specification is:

$$
\begin{aligned}
\Delta y_{n,t,t+h} = \iota_{h,n} + \sum_{i=1}^{I} \beta_{h,i,n} \epsilon_{i,t} + \sum_{k=1}^{K} \sum_{l=0}^{L} \kappa_{h,k,l,n} E_t[\Delta x_{k,l,t}] + \lambda_{h,n} i_t \\
+ \sum_{m=1}^{M} \mu_{h,m,n} F_{m,t} + \nu_{h,n} \mathrm{fisc}_t + \sum_{j=1}^{J} \xi_{h,j,n} \mathrm{policy}_{j,t-1} + \eta_{n,t,t+h} \,,
\end{aligned}
$$

where $\Delta y_{n,t,t+h}$ is the change in a response variable (indexed by n) between months t and response horizon $t + h$, $\beta_{h,i,n}$ is the coefficient of interest used to plot impulse response functions (the responses are composed of a series of $\beta_{h,i,n}$ coefficients, one for each horizon h, policy impulse variable indexed by i, and outcome variable indexed by n) and fisc_t is a control for fiscal policy discussed in Section 4.2.

Because we assume that policymakers observed the economy contemporaneously, we also assume that policy affected the economy with a lag of one month. We explore this assumption in the robustness test mentioned above.

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[42]Jordà (2005) formally introduced local projections into the literature, but Cochrane (2004) also suggested using a local projections approach (without using the name) in his comments on Romer and Romer (2004).

[43]In an autoregressive setup, one would presumably need to use several lags of each control.

In the second stage, we control for all of the controls used in the first stage. This means that we do not need to worry about using regressors generated in the first stage leading to biased standard errors. This is an application of the Frisch-Waugh-Lovell Theorem. Standard errors are calculated using the Newey-West estimator because our errors are serially correlated. The lag correction is increasing in the horizon in question.

4.2. Data

Constructing a high quality data set was essential to implementing our identification strategy. This took considerable effort, and roughly three quarters of the 116 monthly data series collected were copied out by hand, at least in part, from statistical publications. Beyond this paper, we hope many other researchers will make use of these data in future.

Policy variables   Bank Rate and its replacement, Minimum Lending Rate, are sourced from the Bank of England website. The sources and construction of the credit policy index are described in Section 3. The fiscal policy variable shows the expected first-year impact of fiscal policy announcements such as Budgets on the central government primary surplus, scaled by expected central government revenue. It is therefore a summary metric of the change in the fiscal stance. The sources were *Financial Statements* and speeches made in Parliament announcing changes in fiscal policy.[44]

Forecasts   We collected forecasts of UK output and consumer prices between 1959 and 1982. As official forecasts of quarterly GDP and consumer prices were not published over this period, we transcribed unpublished HM Treasury forecasts by hand from the National Archives. Treasury forecasts were typically produced three times a year, although they became more frequent in the 1970s and 1980s.[45]   To fill in some of the gaps, we supplemented official forecasts with those of the National Institute of Economic and Social Research (NIESR), a prominent independent research institute, which were published each quarter.[46]   In total, our data set contains 114 Treasury forecasts and 71 NIESR forecasts. Finally, we also use policy dummies in robustness tests. These dummies cover other financial policies (e.g., one-off reforms such as the Competition and Credit Control liberalisation in 1971) and incomes policies, as well as dummies for fiscal policy changes. The sources were

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[44]These data are the basis of Cloyne (2013)'s measure of fiscal policy shocks and are similar to the data used in Romer and Romer (2010)'s study of the impact of tax policy.

[45]Regular forecasts tended to be in February, July and November. For most of the years in our sample, these were recorded in Cabinet Office Committee files. However, HM Treasury files also have a number of draft forecasts, some of which we also include.

[46]NIESR forecasts were published quarterly, except in 1960–61 when they were published every 2 months.

Figure 4: *Forecasts*

The figure presents time series of the forecasts of GDP growth and inflation produced by HM Treasury and the National Institute for Economic and Social Research (NIESR). Each forecast is the sum of the nowcast and the one- and two-quarter ahead forecasts and we have annualised them for ease of interpretation.

(a) *GDP growth*   **(b)** *Consumption deflator growth*
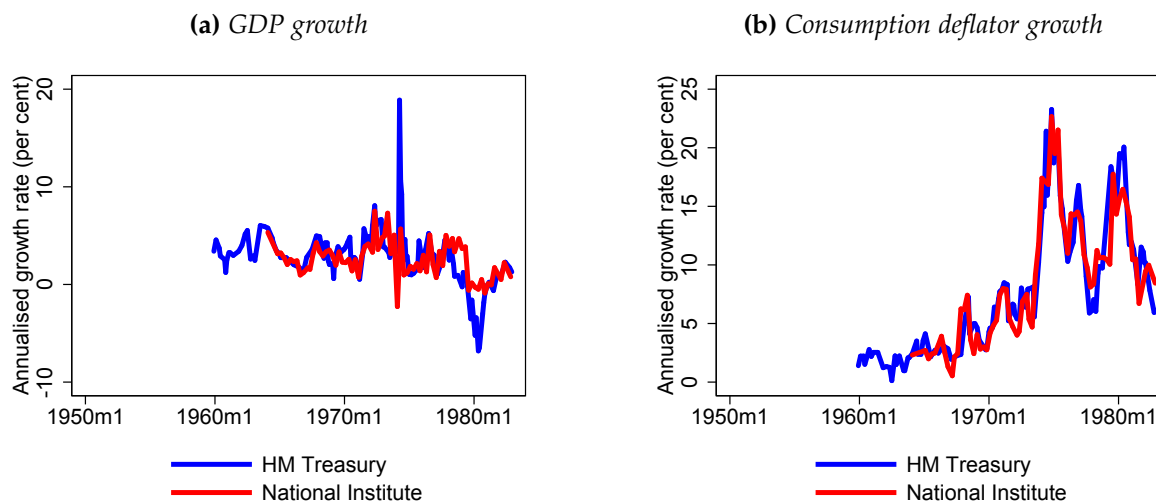
Notes: Missing data are interpolated. See text.

official government documents, various issues of the *National Institute Economic Review*, the Bank of England, Ingham (1981), and Capie (2010).

Figure 4 presents the forecasts we use in the analysis. While there are some exceptions – notably the 1980 growth forecasts – Treasury and NIESR forecasts are highly correlated over the period (the correlation coefficient for the GDP forecasts in Figure 4 is 0.70 and for the inflation forecasts it is 0.96), suggesting that the latter are good proxies when official forecasts are unavailable.[47] This is similar to the finding of Cloyne and Hürtgen (2016), who find that NIESR forecasts are highly correlated with the Bank of England's *Inflation Report* projections for the period in which both are available. Appendix 1 summarises a series of articles reviewing the quality of NIESR forecasts over this period, finding that they were comparable in quality with other leading forecasts.

Factors We have also constructed a new monthly macroeconomic data set for the UK from 1951 to 1982. This 78 variable data set was deployed using principal components analysis to estimate the factors used as additional controls in the local projections. The data span most of the key series which policymakers followed then and now, although because the data set is monthly it is somewhat light on measures of demand and output, many of which are

[47]The other significant deviation occurs in April 1974 when the Treasury believed that the three-day week had severely depressed GDP in Q1, so there would be a large bounce-back in Q2.

only produced at quarterly frequency. Table A1 in Appendix 2 lists the full data set used to construct the factors in the FALPs, and describes the transformations we performed before estimating the factors. Series were seasonally adjusted when necessary using Census X13. The response variables are all included in this data set, with one exception.[48]

The series in the monthly data set were pulled together from a wide variety of intermediate sources, although a high proportion of the series was originally published by the Central Statistics Office (CSO) or the Bank of England. The most frequently used secondary sources were Thomas and Dimsdale (2017) and Thomson Reuters Datastream.[49]

5. Main Results

In this section, we describe the main results of the paper. After showing the innovations in Bank Rate and credit controls, we focus on characterizing the responses of lending, output, and inflation. We also summarise the results of the battery of robustness tests described above. A Supplementary Appendix presents full results from these exercises.

5.1. Innovations in monetary and credit policy

In Section 4.1, we described how we constructed two monetary and credit policy innovations series, using a first-stage regression. The top row of Figure 5 shows the monthly residuals from this regression for each policy, and the bottom row shows the twelve-month rolling sum compared with the twelve-month change in the policy series. The top row shows that we have a lot of variation in our policy innovations series. Indeed, it is immediately clear from the bottom row that most of the movement in Bank Rate and especially credit controls is not explained by the right-hand-side variables in our first-stage regression. This probably reflects policy changes which were driven by exchange rate concerns, and which may not have been strongly correlated with expected developments in the domestic economy. This source of variation is very useful in helping us estimate the causal impact of policy.

The Bank Rate innovation series broadly matches up to the historical narrative, with policy becoming significantly looser in the early 1970s as Heath blocked monetary tightening during the Barber Boom (Needham 2015), and again in 1977 when policymakers sought to prevent sterling appreciation, while the late 1970s saw an abrupt move towards contractionary policy. The credit control series has a number of mini-cycles, but the loosening in 1971 stands out.

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[48]The lending to GDP ratio is the exception. To construct this series, we used as the denominator a monthly nominal GDP series created using a temporal disaggregation technique.

[49]Other secondary sources were Capie and Webber (1985), Denman and McDonald (1996), Huang and Thomas (2016), O'Donoghue, McDonnell and Placek (2006), and Reinhart and Rogoff (2004).

Figure 5: *Innovations in monetary and credit policy*

The figure presents innovations in monetary and credit policy.

(a) *Bank Rate (monthly change)*

(b) *Credit controls (monthly change)*

(c) *Bank Rate (annual change)*

(d) *Credit controls (annual change)*
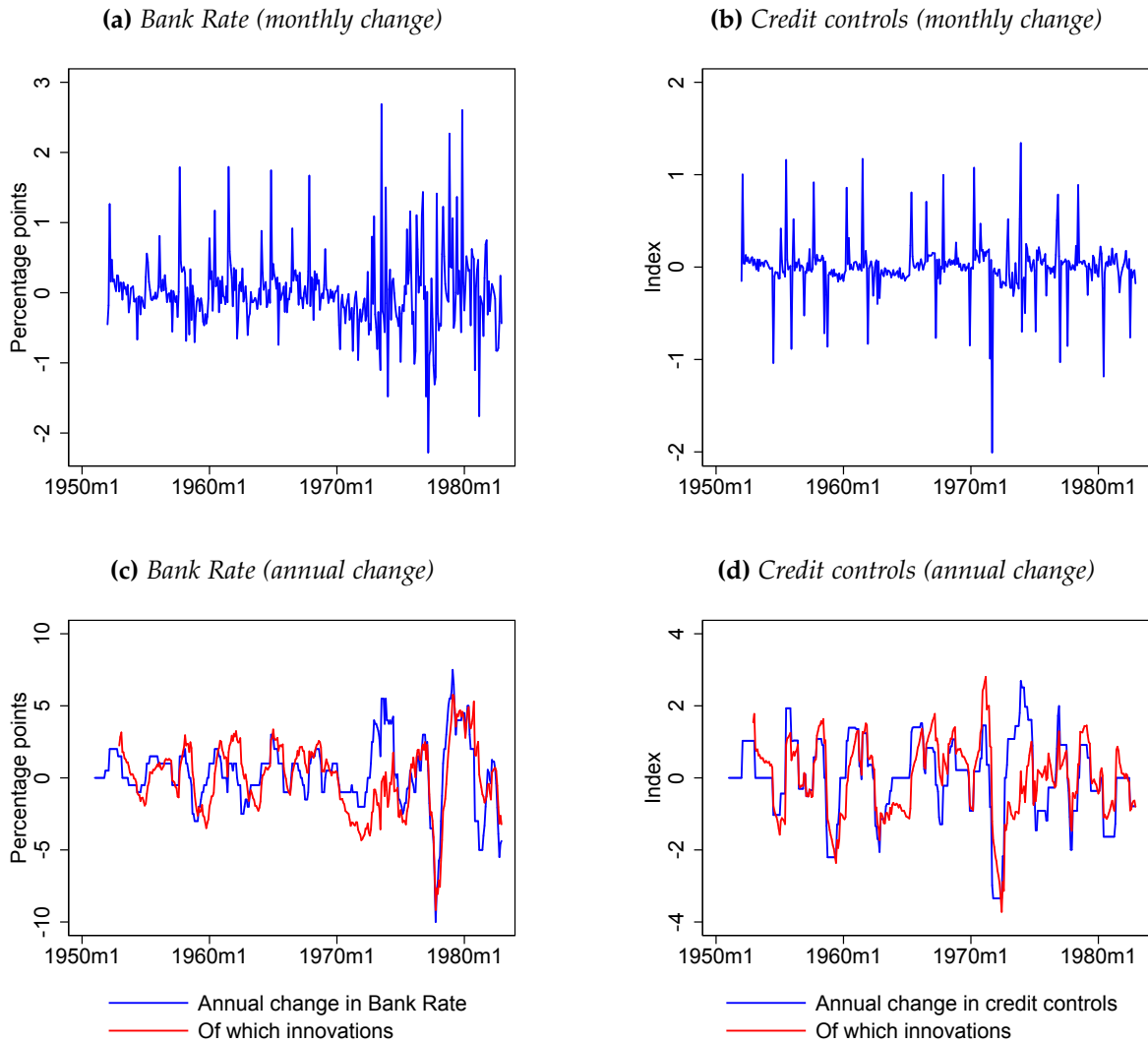
Notes: See text.

5.2. The causal impact of Bank Rate innovations

The left column of Figure 6 presents our FALP-estimated impulse responses of key macroeconomic variables following a 1 standard deviation (3.5 percentage point) increase in Bank Rate. We estimate that there was a large and statistically significant fall in bank lending in response. Manufacturing output fell persistently, with a mean response of around five per cent after two years, but returning to its original level within four years. The consumer price level took longer to adjust; prices were broadly unchanged for 20 months, and then began to decline persistently thereafter.

The results are broadly in line with the empirical literature on the effects of monetary policy. After adjusting for the standard deviation, the estimated responses for output and inflation are qualitatively similar but have somewhat larger peak impacts than the estimates by Cloyne and Hürtgen (2016) for Britain in the period 1975 to 2007. The shape of our IRFs for output and inflation are very similar to those in the U.S. literature such as in Bernanke, Boivin and Eliasz (2005) and Romer and Romer (2004), but the peak impacts are somewhat smaller in magnitude.

The robustness exercises presented in the Supplementary Appendix do not give us cause to doubt our qualitative results.

We interpret our results as running contrary to the Radcliffe Committee's doubts about the efficacy of conventional monetary policy: our findings indicate that, even in that distant era, monetary policy had a stable transmission mechanism to output and prices. Moreover, the causal impacts we identify are close in magnitude to the consensus impacts seen in the contemporary macro literature.

5.3. The causal impact of credit control innovations

The right column of Figure 6 presents estimated impulse responses to a 1 standard deviation innovation in the credit policy index. As this is an index, the size of this increase does not have a natural interpretation. In response, bank lending is estimated to have declined persistently and considerably, falling by around 8 per cent after a year. The peak impact occurred after one year, compared to three years in response to an innovation in Bank Rate. Manufacturing output is also estimated to have declined, falling by around 2 per cent after one year. There was no discernible impact on consumer prices.

While the result for lending appears to be robust, the charts in the Supplementary Appendix leave some room for doubt about the impact on output, particularly the exercise in which no weight is put on hire-purchase controls.

Figure 6: *Responses of key variables to monetary and credit policy innovations*

The panels present estimated impulse responses of each variable to a one standard deviation in Bank Rate (first column) and credit controls (second column). The red bold line shows the mean estimated response; the dark grey region shows the ±1 standard error confidence interval; the light grey region shows the ±2 standard error confidence interval.
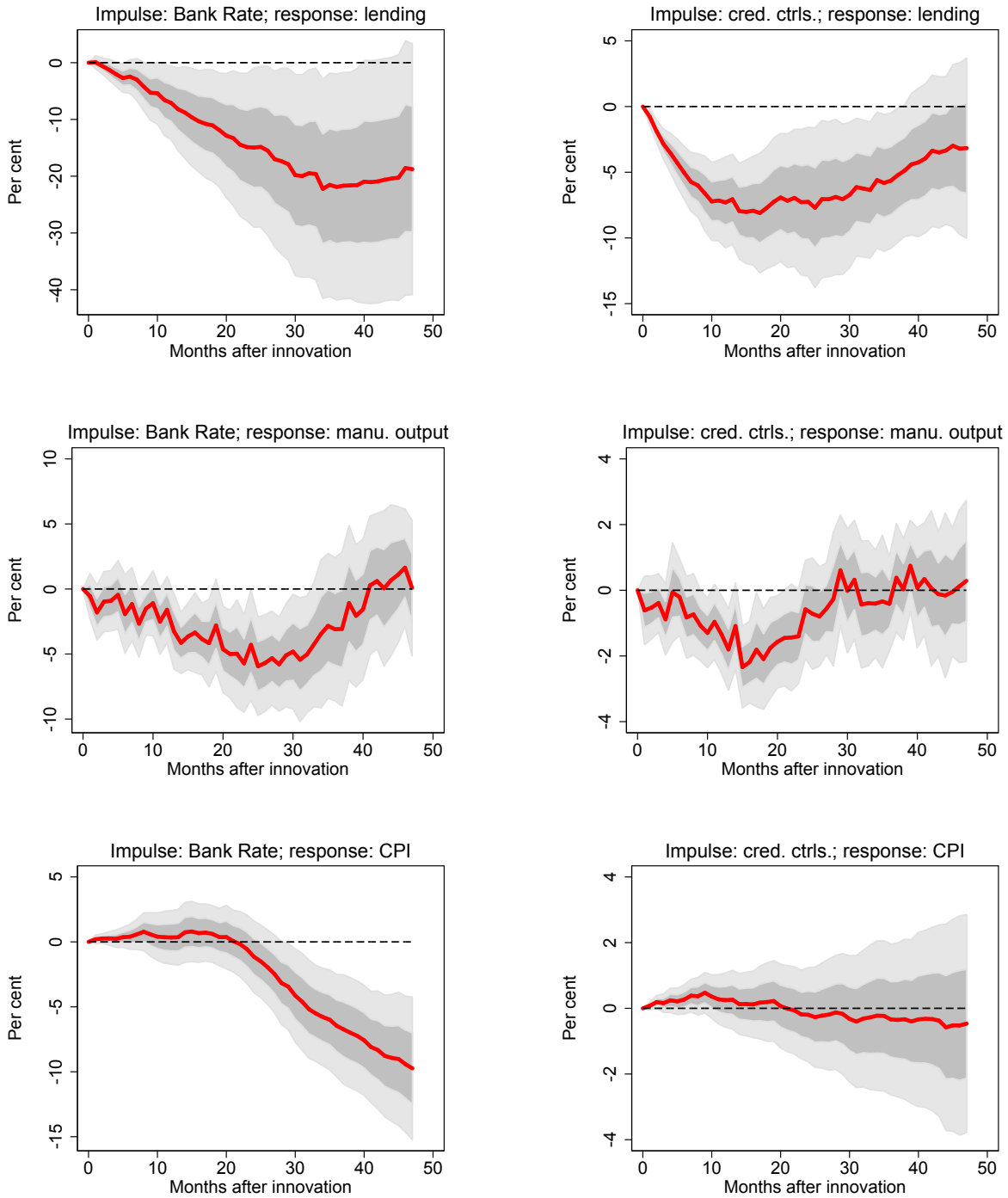
Notes: See text.

5.4. Discussion of response of consumer prices to credit policy innovations

Given the potential importance of our finding that tighter credit controls did not reduce prices both to macroprudential policymakers today and to our understanding of the history of this period, we have subjected this result to extra scrutiny. One potential explanation is that the oil price shocks happened to occur soon after credit controls were imposed. If the rise in consumer prices was driven by the oil shock and credit controls did not cause the oil shock, then the rise in consumer prices we find would not represent a causal relationship. In fact, we can rule out this explanation by controlling for movements in the oil price for the months *after* the policy change. When we did this, the response of consumer prices to credit controls was broadly unchanged.

Taken at face value, then, these results might not seem consistent with a household demand channel dominating aggregate supply channels in the transmission of credit policy. Of course, this might not be surprising when household and especially mortgage credit were much smaller relative to GDP than they are today, and firm credit played a relatively bigger role. To check further, we looked for evidence on the channels through which credit controls affected the economy.

We focussed our search on two periods: 1955–56, during and after the first instance of two credit controls being applied at the same time, and 1969–71, when our cumulated innovations series suggests that credit policy was at its tightest. Not coincidentally, they were both followed by official reports which, among other issues, examined their impact: the Radcliffe Report and the Committee of Inquiry on Small Firms (1971), otherwise known as the Bolton Report. These reports, along with evidence from surveys and newspapers, suggest that credit controls *did* affect the economy via a household demand channel, but also via a working capital channel, and via a business investment channel.

Evidence on the household demand channel is probably most systematic, because several papers (cited in footnote 7) have found clear evidence that consumption of the particular goods targeted by hire-purchase restrictions fell relative to consumption of other goods. Anecdotal evidence is broadly consistent with this. For example, the Retail Distributors Association evidence to the Radcliffe Report stated that "undoubtedly when initial payments [on purchases financed by hire purchase] are raised and the periods of repayment shortened there is an immediate fall in hire purchase sales".[50] In 1969, the *Times* reported a 38 per cent fall in hire purchase sales of vehicles between November and December 1968, concluding that the falls were "a clear indication that the Government's emergency November hire purchase restrictions are having their intended effect" (Smith 1969).

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[50]Committee on the Working of the Monetary System (1960), page 141.

Working capital problems were clearly affecting some firms in both 1955–56 and 1969–71. A letter to the *Financial Times* complained about the credit ceiling: "Can you imagine anything more absurdly futile? I asked my bank manager whether I was expected to pay my wages and various supplies with bits of straw and un-threshed grain while I waited to sell my corn many weeks if not months after the 31st December next?" (Hopton 1955). The *Daily Express* surveyed readers on the ceiling's impact. One replied: "I have a promise of larger orders in future and the prospect of substantial orders from another source abroad. But I cannot afford to finance them so I approached my bank manager. But the bank replied: 'No further credit can be granted in any circumstances'" (Daily Express 1955).

This anecdotal evidence is corroborated by survey evidence. For example, a survey by the Federation of British Industries (FBI) found that 11 per cent of respondents' trading was affected by a lack of external finance in the two years to 1957, while 26 per cent of the respondents to the Oxford Institute of Statistics survey reduced their stocks of raw materials in response to the credit squeeze. By 1969, the Confederation of British Industry (CBI, successor to the FBI) was regularly asking manufacturers whether credit or finance was limiting output. Over the period 1969–71, an average of 8.9 per cent responded that output had been limited this way. This compares to a survey average of 4.3 per cent and an all-time peak of 9.4 per cent in the three years to July 2011, including the most acute phase of the Global Financial Crisis.

There is also evidence on the business investment channel, though it is less systematic than for the other two channels. Three one-off surveys suggest that the 1955 credit squeeze had an impact on firms' capital expenditure. First, the FBI survey cited above showed that 9 per cent of firms responding had postponed investment on account of difficulty raising external finance in the two years ending 1955, rising to 16 per cent in the two years ending 1957.[51] Second, a survey by the Birmingham Chamber of Commerce found that 30 percent of members postponed investment between 1955 and 1957, and a quarter of these blamed credit restrictions.[52] Third, a survey of small- and medium-sized manufacturers by the Oxford Institute of Statistics reported that 23 per cent of respondents had revised their investment plans in response to the 1955 credit squeeze (Lydall 1957). Meanwhile an article in the *Financial Times* reported fears that farmers would reduce spending on tractors in response to hire purchase restrictions (Financial Times Industrial Correspondent 1956). Evidence for the investment channel in 1969–1971 is hard to find.

In our view, this array of evidence that credit controls affected working capital and business investment, as well as household demand, makes the finding of no significant response of consumer prices unsurprising.

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[51]Committee on the Working of the Monetary System (1960), page 119.
[52]Committee on the Working of the Monetary System (1960), page 88.

In sum, our results suggest that credit controls had strong effects on limiting lending, and they may have had some effect in dampening output, where they probably operated through both household demand and firm supply channels. However, it is far from clear that policymakers' trust in these instruments' ability to curb inflation was warranted.

6. Implications for Monetary and Macroprudential Policies Today

Even though credit policies may not have been used successfully around the time of the Radcliffe Report, policymakers today might be able to learn from the experience. Central banks are now grappling with the challenges of a new mission, one that may require them to use unusual and controversial macroprudential tools alongside interest rate policy. There is an active debate about the efficacy of macroprudential tools and the appropriate role for them alongside monetary policy in securing financial stability.[53]

Some of the macroprudential tools under consideration today are quite similar to the tools discussed in this paper. For example, liquidity regulations are similar to special and supplementary special deposits, while product tools such as loan-to-value regulations are similar to hire-purchase controls. And just as today, these tools were used alongside the policy rate, although today policymakers are seeking to achieve a different objective with macroprudential policy – namely, financial stability.

If macroprudential policies today work as credit controls did in the Radcliffe era, then the different macroeconomic impacts we estimate could be a useful guide for policymakers. First, we could conclude that lending can be controlled without sacrificing control of inflation, and with somewhat mild impacts on output. Given the different lengths of and lack of synchronization between business and credit cycles, this could be very valuable. Second, macroprudential policy may give policymakers more immediate control over bank lending, compared to standard monetary policy. Third, even if using macroprudential policy for credit control will probably have consequences for output, this consequence could still be *stabilising* if macroprudential policy is tightened in credit booms when output tends to be firmer and loosened in credit busts when output underperforms (Jordà, Schularick and Taylor 2013).

At this juncture, there is much uncertainty about how to measure systemic risk and hence the efficacy of macroprudential policy in achieving its central objective. Nevertheless, a number of authors have found that systemic banking crises are routinely preceded by deteriorations in non-financial private sector balance sheets (e.g., Borio and Lowe (2002); Schularick and Taylor (2012)). This evidence has been influential in policy circles: the

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[53]E.g., Stein (2013); Williams (2014); Korinek and Simsek (2016); Svensson (2017); Aikman, Giese, Kapadia and McLeay (2018).

Figure 7: *Impact of policies on a financial stability risk indicator*

The panels present estimated impulse responses of each variable to a one standard deviation in Bank Rate (first column) and credit controls (second column). The red bold line shows the mean estimated response; the dark grey region shows the ±1 standard error confidence interval; the light grey region shows the ±2 standard error confidence interval.
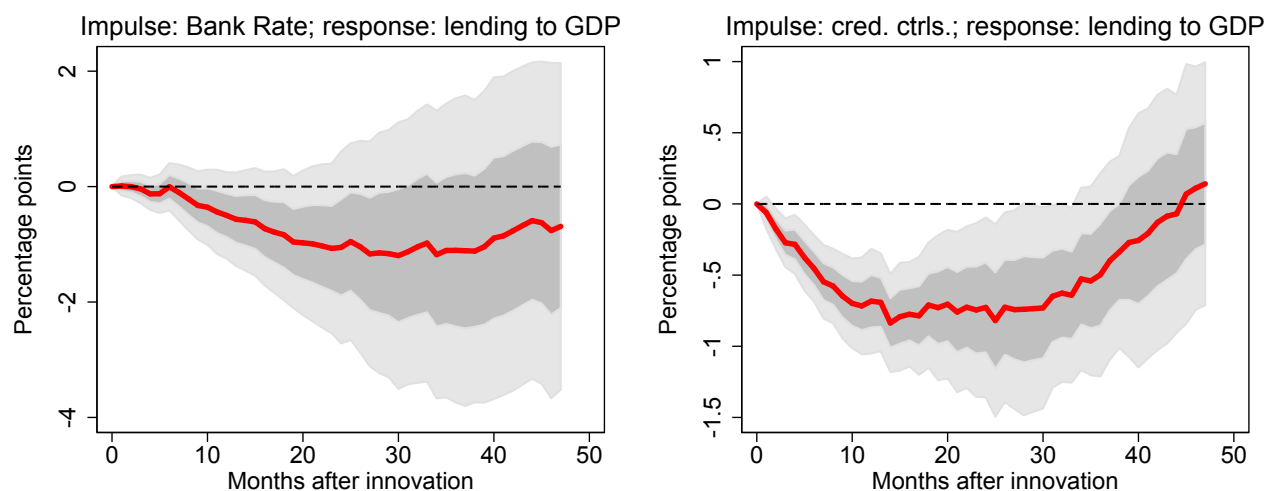
Notes: See text.

Riksbank decided to tighten monetary policy because of concerns about the rising ratio of credit to GDP.

Given all this, we investigate the effects of both monetary policy and credit policy on this popular systemic risk proxy as a final response variable of interest using our FALP estimation framework. We find that, whereas the ratio of bank lending to GDP is estimated to decline persistently, considerably and robustly following a credit policy tightening, the estimated response to a Bank Rate innovation is of marginal statistical significance (see Figure 7 and the Supplementary Appendix).

Although these results are subject to the Lucas Critique given credit policies were not used to limit systemic risk in the period we study, the findings suggest that credit policies may be better suited to curbing increases in the credit to GDP ratio than monetary policy. If smoothing fluctuations in the credit to GDP ratio is beneficial to financial stability, this points to directing macroprudential policy in the first instance at achieving financial stability aims, leaving monetary policy to control inflation.

Table 5: *Summary of our results*

Policy	Credit	Output	Inflation	Credit to GDP ratio
Bank Rate	↓↓	↓↓	↓↓	↓
Credit controls	↓↓	↓	—	↓↓

7. CONCLUSION

In this paper, we use a novel econometric technique and a new data set to study the effects of monetary and credit control policies on macroeconomic and financial outcomes in the United Kingdom between the 1950s and early 1980s.

We report two main results. First, we find that monetary and credit policies had qualitatively distinct effects on four headline macroeconomic and financial variables during this period. Table 5 summarises these differences. Increases in Bank Rate had robust negative effects on bank lending, manufacturing output, and consumer prices especially. By contrast, we find that credit controls – liquidity requirements on banks, credit growth limits, and constraints on the terms of consumer finance – had a strong negative impact on bank lending but a less robust impact on output and no discernible effect on inflation.

Overall, our estimates suggest that monetary and credit policies spanned different outcome spaces during this period. This result supports the notion that today's macroprudential tools, which are close cousins of the credit policies studied in this paper, might provide additional independent instruments to help central banks mitigate painful tradeoffs and better meet both their monetary and financial stability objectives.

Second, our impulse responses indicate that credit policies had moderating effects on a key modern-day indicator of financial system vulnerabilities, while the effects of monetary policy actions were less clear cut. Our results therefore provide some support to the view that macroprudential policy is better suited to achieving financial stability goals than monetary policy.

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Appendix 1: National Institute Forecast Evaluations

This appendix contains quotes from a series for forecast evaluation exercises in the *National Institute Economic Review*. In summary, the Institute seems to have taken forecasting seriously and its forecasts were comparable in quality to other leading forecasters.

Within two years the Institute assessed its forecast (Nield and Shirley 1961), finding that:

> "The Review, since it appears fairly frequently and has attempted always to take a view of the future, was probably a significant factor [in the similarity between different forecasts, including HM Treasury's]"

> "Our forecasts compare quite favourably with those made by others. But none was very good"

In 1969, NIESR commissioned an independent academic to evaluate its forecasts (Kennedy 1969), finding that:

> "The forecasts have done extremely well as qualitative indicators of the rate of economic expansion"

> "The main conclusion from this comparison is that there is no startling difference in the degree of accuracy achieved by the National Institute's forecasts, on the one hand, and the more formal, econometric model on the other"

> "One reason for investigating the value of the forecasts from the point of view of economic policy is that the forecasts are used as a basis for the policy recommendations presented in the National Institute Economic Review, and these wield some influence on public opinion"

> "A second, and more important point, [sic] is that the mean absolute forecast error for GDP is, at 1.4 per cent, rather large in policy terms"

The year 1976 was the first time that the Review focussed on forecast errors for inflation (Dean 1976), finding that:

> "The most serious error made in the various National Institute forecasts of personal incomes and prices has been the tendency to underestimate inflation. This error has been less serious for the consumer price index than for the other current prices variables studies. It was suggested above that this may be because the cost mark-up approach adopted for forecasting prices involves the use of lagged variables, some of which are already known at the time of the forecast"

> "Apart from other personal incomes and total personal disposable incomes the National Institute forecasts generally outperform the three naïve models tested"

Appendix 2: Monthly Dataset

Table A1 shows the 78 variables in our monthly data set. Variables were seasonally adjusted and transformed where appropriate. The second column below shows the transformation, with '1' indicating no transformation and '2' indicating that the log difference was taken.

Table A1: Variables used in estimating factors

Domestic demand and output			**Financial markets (cont.)**		
1	2	Index of production	40	1	Corporate bond spread
2	2	Mining and quarrying output	41	1	Call rate (low)
3	2	Manufacturing output	42	1	Call rate (high)
4	2	Food, drink and tobacco output	43	1	Bank deposit rate
5	2	Textiles output	44	1	Trade bill rate
6	2	Chemicals output	45	1	Bank bill rate
7	2	Metals output	46	1	Mortgage rate
8	2	Engineering output	47	2	Gold price
9	2	Other manufacturing output	48	2	Oil price
10	2	Gas, water and electricity output	49	2	Commodity prices
11	1	Number of days lost to industrial stoppages			
12	2	Retail sales values	**Money & credit and banking**		
13	2	Retail sales values - food	50	2	BoE notes in circulation
14	2	Retail sales values - clothing	51	2	Bank deposits at BoE
15	2	Retail sales values - durables	52	2	LCB deposits
16	2	Retail sales values - other	53	2	LCB retail deposits
17	2	Number of new vehicle registrations	54	2	LCB advances
18	2	Central government expenditure			
19	2	Central government revenue	**Prices**		
20	2	Number of dwellings completed	55	2	Producer input prices
			56	2	Producer output prices
Labour market			57	2	Consumer prices
21	2	Employment in the industrial sector	58	2	Consumer prices - food
22	2	Manufacturing employment	59	2	Consumer prices - alcohol
23	1	Vacancies	60	2	Consumer prices - clothing
24	1	Unemployment rate	61	2	Consumer prices - housing
			62	2	Import prices
Balance of payments			63	2	Export prices
25	2	Goods export value	64	2	Economy-wide average hourly wages
26	2	Goods import value	65	2	Manufacturing average hourly wages
27	2	FX reserves	66	2	Economy-wide average weekly wages
28	1	IMF lending to UK	67	2	Manufacturing average weekly wages
29	1	Other official lending to UK			
			Foreign variables		
Financial markets			68	2	US industrial production
30	2	£ per $	69	2	US consumer prices
31	2	FF per $	70	1	St Louis Fed discount rate
32	2	DM per $	71	1	US Treasury bill yield
33	2	£ per $ (black market)	72	1	US long-term bond yield
34	1	Dollar forward margin	73	2	German industrial production
35	2	Stock prices	74	2	German consumer prices
36	1	Dividend yield	75	1	German short-term interest rate
38	1	20 year gilt yield	77	2	French consumer prices
39	1	Consol yield	78	1	French short-term interest rate