Six Decades of Economic Research at the Bank of England

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Abstract[2]

This paper discusses the transformation of the content, role, and status of economic research at the Bank of England (BoE) in the past 60 years. We show how three factors (policy functions and missions of the Bank, its organisational structure, and the attitude of its executives towards economics) shaped the evolution of in-house BoE economic research during three distinctive periods (1960-1991; 1992-2007; 2007 - 2020). Our account relies on a broad set of sources and methods (BoE publications, archives, interviews with current and former BoE economists, citation analysis, prosopography, and topic modelling).

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1. Introduction

In 2012, Andrew Haldane, who was to become Bank of England Chief economist two years later, wrote a *VoxEu* column entitled "What have the economists ever done for us?" (Haldane, 2012). He placed economists "among the guilty parties" for the 2008 financial crisis. New Keynesian dynamic stochastic general equilibrium (DSGE) models, lacking banking and financial sectors, were at fault; so was the type of monetary framework economists advocated on the basis of such models – i.e., inflation targeting. With these arguments, Haldane was summarizing the most common criticisms economists faced in the aftermath of the crisis (Turner, 2014).

An underlying assumption of these criticisms is that a single type of model developed within academia reigned over central banks' analyses and decisions. Yet, little is known about which economic research is actually produced and used by central banks. Our sense is that this is a blind spot in the thriving literature on central banking. Contributions by economic historians (Forder, 2005; Goodhart, 2011; Bordo and Orphanides, 2013; Monnet, 2018), historians of central banks (Singleton, 2010; Capie, 2011; Feiertag and Margairaz, 2016; Conti-Brown, 2016; Kynaston, 2017; Conti-Brown and Lastra, 2018; James, 2020), political economy scholars and economic sociologists (Krippner, 2012; Lebaron, 2012; Johnson, 2016; Gabor and Ban, 2016; Fligstein et al. 2017; Braun 2018; Dietsch et al. 2018; Walter and Wansleben, 2019; Ban and Patenaude, 2019; Van't Klooster and Fontan, 2020; Thiemann *et al.*, 2020; Abolafia, 2020) usually focus on the origins and consequences of policy decisions, as well as on the policy-makers behind them. They unpack their training, networks, goals, cognitive and ideological biases, and they relate these factors to the governance and policy regimes of central banks. When dealing with economics as a science, with economic analysis, or economic research, those studies document how economics is leveraged in reputational and power games and used to legitimize central banks' expanding role and governance regimes. For instance, Marcussen (2009) emphasizes the growing epistemic primacy of academic standards in central banks, and Mudge and Vauchez (2016; 2018) argue that these standards have contributed to the transnational embeddedness of the European Central Bank (ECB). They view the archetypal DSGE model devised in 2005 by Frank Smets from the ECB and by Raf Wouters from the National Bank of Belgium as "one of the ECB's most acclaimed scientific exports" (Mudge and Vauchez, 2018, 250). Very few of these contributions include a re-evaluation of what economists themselves claim economic research is for: describing, explaining and predicting the economy.[3]

This paper thus focuses on the Bank of England (BoE or "the Bank" hereafter) to document the evolution of the content, status, and role of in-house economic research over 60

[3] Exceptions include Downward and Mearman (2008), who theorize decision making at the Bank of England as a process of limited triangulation; Rancan (2019), Acosta and Rubin (2019), Backhouse and Cherrier (2018), Acosta and Cherrier (2019), who replace the history of macroeconometric modelling in the US in the context of the transformation of economic analysis at the Fed; and Mehrling (2010) who ties changes in academic views of money and banking to the idea that central banks should be dealers of last resort.

years. Our account relies on multiple types of sources (including BoE publications, documents from the Bank of England Archives, 20 semi-structured interviews with BoE former and current staff and policymakers) and methods (including prosopography, network analysis, citation analysis, and topic modelling).[4] We highlight the influence of three factors. First, we study shifts in *policy missions and functions* of the Bank and explain how they are intertwined with the missions and functions of other institutions (HM Treasury, the Financial Services Authority, the government). Second, we explore the evolution of the *organisational structure* aiming at producing economic research within the Bank and communicating its outputs across the Bank (notably to policymakers) and outside the Bank (to other policymaking institutions, to academia, and to the general public). The organisational structure encompasses: (i) the creation, organisation, and evolution of administrative units with research missions;[5] (ii) the creation and evolution of different formats for circulating economic ideas produced within the Bank (such as working papers, official documentation, bulletins, etc.); (iii) the hiring policies and career paths for economists in the staff. Third, we document the *attitudes towards economics* of BoE executives (Governors and their Deputies, Executive Directors, Chief economists, Heads of Division) and policymakers (Governors and, from 1997, members of the Monetary Policy Committee, MPC hereafter). We describe how their academic background, their own research, and their opinions played a role in orienting research at the Bank.

Our historical account illustrates that the evolution of economic research at the BoE is characterised by a persistent tension. On the one hand, the BoE ambitioned to meet the highest academic standards of research for reputational purposes, as well as to attract skilled researchers. On the other hand, economic research needed to be useful for the policy-making process. This tension was resolved through different arrangements: we identify three distinct periods with respect to the organization of research, the research topics, and their relation to policy decisions and routines (1960-1992; 1992-2008; 2008 - 2020).

Our findings do not contradict the idea of a general "scientization" process of central banks (Marcussen, 2009). However, if state-of-the-art academic standards matter at the BoE, the race for academic publications is a very recent phenomenon, mostly limited to the period after 2014. Most importantly, we do not find evidence of a linear trend towards ever-greater integration of BoE research with academia. Research at the Bank in the late 1980s hardly influenced policy decisions, but it was on the academic frontier, particularly in econometrics.

[4] Our quantitative analysis uses three databases: (1) Web of Science, which allows us to access academic publications of economists affiliated to central banks, and thus to the references cited by these publications; (2) a database, which we have built, of all the documents published on the BoE website, which contains the metadata (authors, date of publication, *etc.*) and the raw text of each document; a prosopographic database of the most prolific BoE economists, which we have built by collecting information on 369 economists. Details on our quantitative analysis are in a Technical Appendix (available here).

[5] Over the period under investigation, the BoE organisational chart has evolved numerous times. However, as a rough approximation, it consists of three layers: the Governor and the Deputy Governor(s); Directorates, chaired by Executive Directors, reporting to the Governor and Deputy Governor(s); Divisions, chaired by Heads of Division, reporting to an Executive Director. See Figure 7 and 8 in the Appendix for more details.

In the 1990s and early 2000s, research on the implementation of monetary policy and the development of macroeconometric models became central to the policymaking process, but was less driven by academic standards and a race for publication. Research followed other directions after the 2007 Global Financial Crisis, including experimentation with interdisciplinary research and financial research on micro- and macro- prudential policies.

"Research" and "economic research" are terms that the Bank's staff and executives have used for decades with varying scope and content. These changing meanings can sometimes be inferred from the dichotomies they are embedded in. In the 1960s and 1970s, the Bank's staff and executives contrasted science and art, analytical and practical, research and experience, suggesting that they were struggling between two types of practices within the Bank. By the late 1980s, "research" was more clearly identified with academic standards (and often referred to as "academic research"), i.e. writing papers aimed at and legitimized through the peer-review publication process of academic journals. A tension still existed, but it was more about reclaiming an identity for an alternative type of research, one that would prove useful to policymakers in particular. Such "policy-oriented research" was legitimized by its use in policymaking routines (reports and forecasts feeding policy briefings and meetings and supporting day-to-day implementation of the policy decisions). While professional standards from academia were also relevant in validating and legitimizing policy-oriented research, the latter was ultimately assessed through the lens of executives' attitudes and norms. Staff economists therefore had to find a balance between the academic standards learned during their training (more often a PhD training) and the necessities of performing policy-oriented research.[6]

The article is organised chronologically. Section 1 describes the slow development of economic research at the Bank from the early 1960s to 1991. Section 2 covers 15 years (1992-2007). It presents the evolution of research in the context of a march towards independence, under the supervision of Mervyn King. We illustrate how King favoured policy-oriented research, although one conducted by staff with strong academic background. Section 3 discusses policymakers' reliance on in-house research (or lack thereof) in the adoption and implementation of Quantitative Easing during the Great Financial Crisis and its aftermath. This section documents the newfound visibility of research on financial and prudential issues (2007-2014). As a conclusion, we provide an insight, through the lens of the historical trends highlighted by our research, on the recent changes under Governor Mark Carney (2014-2020).

[6] Research is only one kind of 'economic knowledge' produced at the BoE. As explained by Tucker et al. (2020), the Bank also produces other types of knowledge, for instance through the Agents' Economic Reports that the twelve regional agencies write on the basis of local business opinion surveys and discuss with the MPC.

2. Making space for research (1960-1991)

BoE executives had traditionally considered economic research as useless, sometimes even subversive.[7] In the 1960s and 1970s, the constantly changing legal context for credit regulation and the raging debate over monetarism created a need for expertise in monetary economics and for the internal provision of in-house forecasts and policy simulation. In the 1980s, John Flemming, as head of the Economics Division, pushed for the development of in-house econometric research meeting academic standards. Such research had, however, limited resonance with Bank executives and with monetary policy decisions—the latter being, for this whole period, in the hands of the Treasury and the government, while the BoE's only responsibility was to execute the Treasury's decisions.

2.1 Slow beginnings

Like most central banks, the BoE is an institution that was neither built by economists, nor for economists.[8] What was needed to manage the Bank's operations, early 20th century executives thought, was practical knowledge of the financial and banking sectors. For decades, BoE executives even "appeared positively averse to economics" (BoE, 1976, 436; see also Kynaston, 2017, chap. 14). A small Economic Section was established in 1921 with the purpose of assembling statistics. The same purpose presided over the establishment of an Economic Intelligence Department in 1964. It was tasked with collecting the statistics on the balance of payments, providing analytical insights on their evolution and circulating them through the *Quarterly Bulletin* and the *Annual Report* (BoE, 1976, 441). By 1966, its staff had reached 180 employees.[9] However, when asked by the Radcliffe Committee to gather more data and statistics in 1958, the then Governor Lord Cobbold had famously answered that the BoE was "a bank, not a study group" (Radcliffe Committee, 1960, 52).[10]

It was only in 1970, with the establishment of a new Economic Section within the Economic Intelligence Department—renamed Economics Division in 1976—that economic research began to take hold at the Bank. The Economic Section was tasked with conducting "studies which have a bearing on the choice of official policies and operational strategy and to undertake longer-term research on the working of the monetary system and other topics of concern to the Bank."[11] It was also tasked with developing "mathematical techniques" and

[7] For example, a 1925 internal memo about the possible recruitment of an economist warned that the candidate "must have a gift of applying economics to practical affairs …[and] if he had also followed [Mr Keynes] in his progressive decline and fall … he would be worse than useless" (Hennessy, 1992, 314).

[8] See Singleton (2010) and Siklos (2006) for transnational histories of central banking in the 20th century.

[9] By comparison, the staff in the Overseas, the Accountant's, and Cashier's departments were 550, 1400, and 1400 respectively (BoE, 1966, 23).

[10] See Kynaston (2017, chap. 3) for further historical background on this period.

[11] "Economic Intelligence Department and Economic Section", January 1974, EID8/7, BoE Archives.

with nurturing computational skills to foster those studies. In 1973, a further step fostering in-house economic research was taken when the Economic Section acquired a macroeconometric model of the UK from the London Business School (LBS).[12] The Bank had hitherto had access to the Treasury's macroeconometric model, but BoE executives and staff thought that developing their own model would allow them to have a more independent analysis of the UK economy. The model was acquired and not built from scratch at the Bank because the Economic Section lacked the required manpower to do so. Even maintaining and improving the model proved challenging in the 1970s.[13]

The Bank underwent a major reorganisation in 1980, in the midst of the end of foreign exchange controls and the departure of senior executives (Capie, 2010). Aimed at "clarifying lines of authority and responsibility," the reorganisation led to the formal creation of three areas, Policy and Markets (with three Divisions, Home Finance, Economics, and Overseas), Financial Structure and Supervision, and Operations and Services (BoE, 1980, 19-23). However, the Economics Division remained essentially unaltered and provided a stable and expanding internal institutional space, where the shape and goals of economic research at the Bank were negotiated and implemented. The production of economic research grew gradually and became more recognized by the Bank; this was due to the development of new missions, carried by a few individuals with a more research-oriented outlook than the then prevailing Bank culture. In these years, the question was not yet whether such work should align with academic standards, but, rather, to what extent analytical work not directly deriving from some market experience was useful in the conduct of the Bank's missions.

2.2 New missions for economists

Monetary economics was definitely a new field of expertise for the BoE, which was developed within the Economic Section from the late 1960s. Christopher Dow, hired in 1973 as the Executive Director for Economics, wrote a few years later:

> *The tradition of the Bank (as of the City) has been to decide, not to deliberate; to buy or sell, not to ponder; to work by word of mouth, not on paper. There had been no place before the Governor's room where issues of policy got discussed; and no training within the Bank in writing papers on policy in a reasoned and fairly dispassionate way ...*

[12] The Bank purchased the set of equations forming its theoretical structure, the data, and the computer programs used to solve and estimate the model. See Ball et al. (1975) for a detailed description of the original LBS model.

[13] Goodhart to Dicks-Mireaux, "Mrs Oldershaw and the LBS/Bank model," 26 June 1975, 10A216/5; Townend to Dicks-Mireaux, "Current price national income forecasting and the Bank model," 10 April 1973, 10A216/3, BoE Archives.

(Dow, [1980] 2013, 151).[14]

In 1968, the Bank hired, for the role of "Special Advisor," a "monetary specialist," London School of Economics (LSE)'s monetary economist Charles Goodhart.[15] He was tasked with monitoring, assessing and forecasting the development of monetary aggregates, offering policy advice, and working as an interface between the Bank, scholars in monetary theory from academia and monetary analysts from other public institutions (Goodhart, 1984, 2). He worked with the Monetary Policy Group (within the Economic Section), whose role was to analyse both current developments of the UK economy and to conduct "longer-term studies", "frequently published" in the BoE *Quarterly Bulletin*. A novelty was that these studies were "from time to time" published in academic journals (BoE, 1976, 444).[16]

Part of Goodhart's role was to make the raging debates over the proper objectives and instruments for monetary economics understandable inside the Bank and to help its executives in agreeing on a common position.[17] These debates were fuelled both by the economic context and by academic research. The 1971 introduction of the Competition and Credit Control removed quantitative ceilings on lending, which led to a sharp acceleration in credit. This, together with the introduction of new deposits regulation ("the Corset" in 1973) and the floating of the pound (since 1972), resulted in erratic movements in monetary aggregates. Meanwhile, a range of studies by US-based monetarists suggested that the demand for money equation was a more stable function of prices, income and interest rates, hence a more *predictable* one, than had hitherto been thought. In the UK, this analysis was challenged by the "New Cambridge Theory" of Wynne Godley. These debates were closely monitored through notes by Goodhart and his assistants, for instance Dorothy Smith. He also sought to offer empirical evidence on the national situation. With Andrew Crockett, David Gowland, and David Williams, he showed that the UK demand for money was indeed stable and negatively correlated with the interest rate (Goodhart and Crockett, 1970; Williams et al., 1976).

Dow was sceptical of their conclusion (Goodhart, 2006; Dow, 2013, Introduction), but his memoirs show that economists and executives at the time were all struggling to carve out a position towards "practical monetarism" (James, 2020, chap. 4). The monetary target was

[14] Kynaston (2017, 425) likewise highlights an "almost atavistic loyalty to practice over theory, to market touch over everything" during the 1960s. Dow's memoirs during his stay at the BoE were edited and published posthumously in 2013. We therefore report in brackets the date in which each quote or reference was originally written.

[15] A program whereby an academic economist would come for a 2-year stint as a BoE advisor was set up at the turn of the 1960s. Goodhart came to the Bank throughout this program, then recruited on a permanent basis (Charles Goodhart, Interview).

[16] "Studies may be made into for example, the case for, and the likely consequences of, a change in interest rates or a change in the controls over the banks and discount houses" (BoE, 1976, 444).

[17] See for example his article with Andrew Crockett, "The Importance of Money" (1970), published in the BoE *Quarterly Bulletin*. Capie (2010, 452) considers it a "watershed" that "marked the beginning of some monetary economists' influence in the Bank".

set at M3, and, although a self-christened Keynesian, Dow welcomed the move as a way to bring discipline to how much the government could use deficits (Hacche and Taylor in Dow, 2013, 14-15). Preparing an important speech by then Governor William Richardson on the Bank's "monetary philosophy," he wrote to Goodhart that "the requirement is ... to defend something like a monetarist prescription, on grounds that are not monetarists."[18] Discussions on the proper methods of monetary control and the use of interest rates stimulated the production of a stream of research writings, so much so that a *Discussion Papers Series* was established in October 1978. The goal was to allow "wider circulation to research work undertaken in the Bank" (as mentioned by the introductory note to Discussion Paper no. 1; Threadgold, 1978, ii).[19] "[I]n the longer run the Bank must have the capability to discuss policy issues … by writing papers about them", Dow ([1977] 2013, 89-90) explained.

A staunch believer that monetary policy should be informed by in-house and external research, Dow also managed to staff up the Economics Division, whose executives and staff attended academic conferences such as meetings of the Econometric Society, and he worked hand in hand with Division head Leslie Dicks-Mireaux to establish a Panel of Economic Consultants. The first meeting, held in 1977, was meant to be "a relatively innocuous discussion of monetary targets." A conclusion of the meeting was that "the adoption of monetary targets by the Bank does not imply wholesale conversion to monetarism ... it is possible to believe in the importance of money & not be a convinced monetarist."[20] During the next decade, the Panel met to discuss various topics ranging from the nature of contemporary recessions (1978, 1981) to investment, low profits, the determinants of the exchange rate (1980) or pensions (1983). It also housed a substantial number of sessions on methods of monetary control (1980, 1979, 1982, 1983), monetarism (1980), or macroeconometrics and forecasting (1980, 1982).

Another mission that Dow, Goodhart, and other high-ranked Bank officials were adamant to foster was forecasting—predicting the evolution of GDP, prices, etc.—and simulation—assessing the effect of policy changes on these variables. When the Economics and Fiscal Policy Group of the Economics Division was established in 1976, it was instructed to "provide a wide range of reports on the real economy" but also, and most importantly, it was "responsible for the Bank's economic forecasts," a mission again emphasized during the 1980 restructuration (BoE, 1980, 21). By then "forecasting rounds" using the Bank's macroeconometric model had already become a defining routine of the Economics Division.[21] Dow, who had previously launched the *Economic Outlook* while working at the OECD, thought that forecasting contributed to shape available policy options. He dismissed the mere extrapolation of a set of statistics on firms or the economy as a guide for monetary policy, but he also understood that relying on econometrics was hampered by the lack of a "demand for

[18] Dow to Goodhart, "Speech on 'monetary philosophy'," 23 December 1975, 6A151/1, BoA Archives.

[19] This research was considered too "exploratory" and "technical" to be published in the *Quarterly Bulletin* (cf. Threadgold, 1978, ii).

[20] "Panel of Academic Consultants, First meeting 5th October 1977: Monetary targets", 31 October 1977, EID19/4, BoE Archives.

[21] Goodhart (2006, 80) recalls: "The Economics Division was mainly organised around the model, with a Model Development Group, and a number of sectoral groups." See also Goodhart (1984; 1997).

money equation" (Dow, [1977] 2013, 93). Indeed, a major shortcoming of the 300-equation 1976 version of the BoE model was the lack of a proper specification of the monetary and financial side of the economy. Economists involved in the forecasting group were tasked with improving linkages between the model's real and financial sectors, but they felt under-staffed and lacking in econometric expertise.[22]

Furthermore, BoE macroeconometric modellers only slowly endorsed their own "research" identity. Although they were reading academic papers, attending events where modelling and estimation techniques were discussed with academic economists and engineers, and writing papers, they maintained that their own "estimation techniques ... require a good deal of experience and is more like an art than a science in its present state." They also discussed whether their "forecast" model was also a "research" model, or whether a distinct smaller "research" model should be developed.[23] Though they were using words like "science" and "art," "research" and "experience," "analytical" and "practical" without clear definitions, the recurring use of overlapping dichotomies in those years suggests a tension between two ways of 'doing economics,' sometimes perceived as antagonistic, sometimes as complementary—in any case, perceived as different. It does not seem that they considered one as home-grown and the other as imported, from academia or from another sphere. Yet Goodhart's credentials, as well as increasing interactions with academics and early attempts to publish in academic journals, made them aware of the relevance of importing and exporting the Bank's research.

An important support for the push to provide greater analytical foundations for the conduct of monetary policy came from Governor Richardson himself. His beliefs were more conservative or monetarist-aligned than Dow's, but the latter's memoirs suggest the pair got along well. In particular, Richardson seems to have supported Dow's push to develop the Bank's analytical and forecasting abilities, probably thinking it could increase the Bank's independence towards the Treasury and the Chancellor—who had the final say over monetary policy during the 1970s and 1980s. Indeed, Bank forecasts were then seen as a way to "influence" HMT's own forecasts[24] and provided helpful information for the Governor's periodic meetings with the Chancellor. However, even if Richardson "hanker[ed] continually after greater independence for the Bank" (Dow [1978] 2013, 102) there were many obstacles on the way. Notably, as many interviewees underlined, the Bank was barred from publishing

[22] Allen, "Meeting on research strategy," 15 May 1973; Wyss, "Priorities for model development, 18 October 1974, 10A216/3, Bank Archives. The monetary/financial sector of the model was still considered "unsatisfactory in the extreme" in 1976 (Stevenson to Goodhart and Price, "Money and the Bank's model," 23 February 1976, 10A216/7). In 1978, they asked to set up "an authoritative source of econometric advice to be tapped ... possible candidates for such a consultancy role are Angus Deaton and David Hendry" (Walker to Dicks-Mireaux, "Expert Econometric Advice," 24 June 1978, 6A151/3). The Bank's model was first made public in 1979, and by then it included more than 700 variables (Latter 1979). Economics Division economists also spent much energy trying to develop a smaller model to help with 5 years projections (Coghlan, 1979).

[23] Memo to Dick-Mireaux, undated (probably 1973), 10A216/3; Threadgold to Dorrington, "A research version of the short-term model," 21 June 1978, 10A216/12, Bank Archives.

[24] Ash to Dow *et al.*, "Draft minutes of the Model Development Group meeting of Dec 11, 1975," 29 December 1975, 10A216/5, Bank Archives.

its own forecasts to avoid any public disagreement with the Treasury's.[25] This restriction, added to in-house econometricians' unease to communicate about the sophistication of their macroeconometric model, made the Bank's research initially invisible (staff economist 7, Interview). Public challenge to the Treasury's forecasts came instead from LBS and from the National Institute of Economic and Social Research (NIESR). Early comparative assessments of UK macroeconometric models (for instance Laury et al., 1978) did not even include the Bank's model.

The 1980 reorganisation of the Bank, however, created what seemed like "a field day for economists [...] [and] greate[r] emphasis on intellectual advice" (Dow, [1980] 2013, 151). The missions of the Chief cashier, hitherto the most important position at the Bank and one that illustrated the primacy of operational concerns and skills, were substantially narrowed. According to Dow (2013, 150), Richardson also wanted a "Bank's answer to Terry Burns [Chief Economic Adviser to the Treasury and Head of the Government Economic Service from 1980 to 1991]." He therefore hired John Flemming, who proved pivotal in the further development of economic research at the Bank in the 1980s.

2.3 The years of high econometrics

Flemming was appointed BoE Chief advisor (Policy and Markets, under Dow) in 1980, then he became Head of the Economics Division in 1984. He was the first in this role who had such a strong academic stature and background.[26] According to a former staff member, he had a clear goal, to "boost econometrics and economic analysis at the Bank" (staff economist 7, Interview) and push it beyond the routine work around model-based forecasting. As Goodhart recalls:

> *The core of life as an economist in the Bank lay in the assessment and forecasting of economic data. John [Flemming] was not, however, oriented towards empirical work. He was, on the other hand, much concerned with the proper specification of models. His main contributions on the modelling/forecasting side lay in the introduction of model-consistent (weak form rational) expectations, wealth effects on consumption, and improved analysis of the transmission effects of monetary policy on expenditures. He established a Research Steering Committee, and kept a close eye on almost all*

[25] In addition, as Capie (2010, 706) notes, the "Select Committee on Nationalised Industries suggested that a single forecasting model should be used".

[26] His academic work before joining the BoE ranged from welfare and taxation theory (Feldstein and Flemming, 1971) to the study of capital market imperfections (Flemming, 1978). See Goodhart (2006) for further comments on Flemming work. Flemming was a PhD graduate from Nuffield College Oxford, where he established a close relationship with fellow PhD students who also became influential in developing new interfaces between policy and academia: Martin Feldstein (who later became President of the National Bureau of Economic Research, and served in this role for almost 40 years), John Helliwell (who later became the most preeminent economist at the Bank of Canada), and Richard Portes (who later founded the Center for Economic Policy Research).

> *research projects. All Economics Division recall the quick, incisive, detailed and thought-provoking manner in which he handled the research exercises.*
>
> Goodhart (2006, 81)

Flemming's attention on the analytical underpinning of forecasting models, and of economic expertise more generally, translated into a shift in hiring policy. Before the mid-1990s, BoE job ads (published in *The Economist* and other periodicals) did not require graduate studies to work at the Economics Division; however, they did require either some experience with forecasting or good knowledge of econometrics.[27] The number of PhD economists recruited rose slowly (Figure 1), and MA and PhD economists alike were exclusively recruited from UK universities—mostly LSE, Cambridge, Oxford, Warwick (Figure 3.2).[28]

In order to attract senior economists (those with a well-established academic career), the Economics Division also offered temporary positions and external consultancy roles, before moving to permanent hires (Stephen Hall, Interview). This flexible hiring policy allowed the recruitment of high-profile econometricians, who had often participated in macroeconometric model-building elsewhere, such as, for instance, Brian Henry and Stephen Hall. The two came from NIESR in 1987 with the explicit purpose of improving the BoE model. They had pioneered the introduction of forward-looking expectations in macroeconometric models. They joined David Miles, Bahram Pesaran, David Barr and long-term consultant Kerry Patterson. As a result of their work, the BoE model came to integrate (or refine) several factors and mechanisms—like oil prices, current account balance, inflation differentials and interest rates. Modelling exchange rate had also become crucial given the high volatility of the pound, but it remained a difficult task. Increasing attention was also devoted to co-integration and error correction mechanisms, in the spirit of Engle and Granger (1987). Patterson et al. (1987) also published the first extensive presentation of the model and its uses at the Bank.

As a consequence of this hiring strategy, the research output of BoE economists underwent a quantitative as well as a qualitative shift throughout the 1980s. 54 new *Discussion Papers* were issued under Flemming and an additional *Technical Series* was established to "give wider circulation to econometric research work predominantly in connection with revising and updating the various Bank models and to invite comment upon it" (Davis 1982, i). Both working papers and articles published in peer-review journals (those referenced in the Web of Science database) grew from less than 5 per year to approximately 20 at the turn of the 1990s, when Flemming left for the European Bank of Reconstruction and

[27] Until the end of the 1960s, it was not uncommon for Economics Division staff to hold English literature or History degrees. Basic training in economics, in a literary style, was provided by the Bank to all newcomers. Additional "specialist" training, including an introduction to econometrics, was organised jointly with the Royal Economic Society (Latter to Carlisle, "Seminars and lectures," 23 June 1970, EID8/21). However, by the mid-1970s, the most common degree in the Economics Division was economics, followed by mathematics (BoE, 1976, 442). Opportunities for postgraduate education in economics were anyway a relative novelty in the UK in the early 1980s: very few universities had developed such programs (see Backhouse, 1996).

[28] In these years, 35% of new recruits (in our sample of BoE economists) were LSE graduates. Overall (1960-2019), 18.5% of BoE economists in our database graduated from LSE (Figure 3.1).

Development (Figure 4). This level of publication was only attained again a decade later, at the turn of the 2000s, after a substantial decrease throughout the 1990s.[29]

The qualitative shift is documented in Tables 1 and 2, which identify over- or under-citation by academic publications from the BoE with respect to academic publications originating from other central banks.[30] This comparative exercise highlights three salient facts for the 1979-1990 period. First, the national preference: an overwhelming share of citations goes to British economists, notably those who worked or had worked for the Bank (Patterson, Hall, Salmon, Pesaran). Second, a focus on econometrics: most cited papers to British and non-British economists alike are to authors of landmark econometric pieces. The list of most-cited articles includes some by Engle, Granger, Johansen or Hansen (that were also cited in the research of other central banks, but over-cited at the BoE) and several pieces by David Hendry—a trait that set aside the BoE from other central banks. This is also consistent with economists' reminiscence about the formative influence of Flemming's scientific vision. Third, the relative neglect of rational expectation theory: as previously mentioned, the integration of rational expectations in the BoE macroeconometric model was a hallmark of this period. Yet, the endeavour seems to have been envisioned mostly through technical lenses, as citations to landmark "new classical" articles by Lucas (1972; 1975), Sargent and Wallace (1975), or Kydland and Prescott (1982) were far less frequent in the BoE publication than elsewhere. While some of these trends—e.g., the national preference—gradually disappeared, the under-citation of Kydland and Prescott (1982), for instance, remained in the following decades.

The picture painted here is thus one in which the 1980s were the "years of high econometrics" at the Bank. BoE macroeconometrics, which had hitherto been considered rather backward and invisible by other economists, got closer to international academic standards and other central banks such as the Federal Reserve (Singleton, 2010). The main goal of the 1980s research was thus largely to improve forecasting and simulation rounds (since such rounds initially took up to six weeks; Stephen Hall, Interview).[31] However, the technical push was not driven by BoE executives (Flemming excepted), and the results of the forecasting rounds were not systematically embedded in the decision-making processes (which, anyway, were mostly taking place outside of the Bank). Although waning, the focus was still on operations, thus on the Markets Division.[32] In fact, the new institutional space created for research in the 1970s was filled with individual visions of high stature academics (e.g. Goodhart, Flemming), so that research at BoE in the 1980s moved closer to the UK academic frontier. Paradoxically, it was the lack of institutional strategy towards a more systematic use of economic research in the decision-making process that allowed in-house economists to pursue their own research agenda, devoid of strict practical considerations and

[29] Former members of the Bank's staff during Flemming's tenure consistently pointed out in our interviews that he would directly answer many of the questions that the Governor and others made, thus freeing up time from the Economic Division's staff which would otherwise have gone to answering these questions.

[30] Over- or under-citation is measured by Chi2 residuals. See the Technical Appendix for the methodology.

[31] As staff economist 7 recalls, the goal of Flemming and the staff was to demonstrate that they "did serious economic modelling and … had very advanced methods of model solution."

[32] Former MPC member 4 explains that "until [the UK went out of the ERM], the way monetary policy operated was through the lens of market reactions to shocks in the world and through market operations of various kinds."

constraints. All this radically changed from the early 1990s onward, with the march towards independence and the resulting need for more research input in policymaking.

3. "The thinkers are the doers": The King era (1992-2007)

The role and content of economic research at the Bank evolved substantially in the 1990s, along with the Bank's new missions. BoE executives, as well as policymakers sitting at the Monetary Policy Committee table, had a more organised and frequent dialogue with in-house economists, especially those from the Monetary Analysis Directorate—which became institutionalized within the *Inflation Report*. This section argues that the changing role of economic research at the BoE was driven, during this period, by executives and policymakers (notably Mervyn King) and shows how it impacted the recruitment of researchers and the production of models.

3.1 Economic analysis takes centre stage

In September 1992, the British pound underwent a large devaluation, which drove *de facto* the UK out of the European Exchange Rate Mechanism. The consequences of Black Wednesday were twofold. First, the UK was left without a clear monetary regime, i.e. monetary policy had no clear objectives and targets (Cobham, 2002, chap. 5; Kynaston, 2017, 576-581). Second, it was widely perceived by different audiences (the general public, but also government officials and economists) as a significant failure of the way the Treasury handled monetary policy (Evans, 2003, 209; Elgie and Thompson, 1998, 76-77; James, 2020, 23).

This context opened up intellectual and political spaces for the BoE executives to gain autonomy through the implementation of a new monetary regime with operational independence from the Treasury. In October 1992, Chancellor Norman Lamont announced that the government would set an inflation target and that the Bank "would be responsible for monitoring the Government's progress" towards the target through the publication of an *Inflation Report* (Lamont in Elgie and Thompson, 1998, 77). Monthly BoE-Treasury meetings would be planned in advance and would lead to the publication of a report explaining the decisions taken. This new monetary regime and its transparency increased both the public visibility and the scrutiny of BoE research.

This new institutional setting (as well as the rising probability for the Bank to become independent) stimulated internal discussions about the role and place of in-house economic research. In a December 1993 memo to the Deputy Governor, King (then Chief economist) already argued:

> *We need to think carefully about the core purposes which would be appropriate to an independent central bank … It would make sense to undertake a major reorganisation … In my view a central bank has two wings. The first is concerned with monetary*

> *policy and the second with stability of the financial system ... Both wings would contain the analytical and operational groups relevant to their respective responsibility.*[33]

This view, shared by many of the Bank's executives and staff, was implemented in 1995. The Bank was reorganised around two wings, Monetary Stability (with two Directorates, Monetary Analysis and Market Operations) and Financial Stability (with two Directorates, Banking Supervision and Financial Structure).[34] The distribution of roles between the Financial Stability and Monetary Stability wings was predicated on the assumption that an independent BoE would retain its missions regarding financial stability and banking supervision, though the staff was already worried about a possible removal of these responsibilities.[35] Indeed, the Bank was unexpectedly relieved from its supervision duties in 1997.[36] They were transferred to the newly created Financial Services Authority (FSA), which began its operations in 2001 (Kynaston, 2017, 635-639). While Governor Eddie George considered resigning, King viewed the narrowing of the Bank's mission as an opportunity to strengthen its independence and focus on monetary policy.[37]

Not only did Financial Stability become increasingly isolated from policymaking routines (*cf. infra*, 3.2), but the two wings exhibited different combinations of "operational" and "analytical" skills that the management was adamant to combine into the new organisational structure. In describing the Bank's approach, Pendarell E. Kent (Executive Director for Financial Stability) noted that "we do not do much conceptual thinking, which would frankly need more resource." This does not mean that analytical work was shunned in the financial stability wing, only that the research culture was different, less focused on models and more on describing institutions. In 1996, the BoE was the first major central bank to launch a biannual *Financial Stability Review* (Osterloo et al., 2007). The analytical and operational culture of financial supervision, which Kent described as "à la carte," contrasted sharply with the detailed programmatic memo on "The Analytical Functions" of the

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[33] King to the Governors, "The new Bank," 1 December 1993, 9A226/1, "Ashridge" Folder, BoE Archives.

[34] After 1998, the Financial Structure Directorate was renamed in "Financial Stability"—we have kept hereafter "Financial Stability" to designate this Directorate, for sake of simplicity.

[35] "If the bank gets independence our non-monetary policy roles will be questioned or perhaps removed," Pendarell H. Kent wrote in a memo to the Deputy Governor (29 November 1993, 9A226/1).

[36] The BoE became the first bank supervisor and regulator in the UK in 1979. Before that, banking control was overseen by the BoE in an informal way (Moran, 2003).

[37] Peston, R. "Governor Thought of Quitting over Bank Proposals." *The Financial Times*, 22 May 1997. More than the loss per se, George was upset by the lack of consideration for the Bank's opinion on the matter and the surprising timing of the news (James, 2020, 419-420). According to former MPC member 4, "King wanted to transform the BoE into a monetary institute." These conflicting positions were echoed in the wider central banking community in the 1990s: some central bankers believed that their true expertise lied in their provision of liquidity to the financial system, while others favored an exclusive focus on inflation targets (Goodhart and Schoenmaker, 1995).

Monetary Analysis Directorate that King circulated in early 1994.[38] The latter Directorate rapidly became the intellectual powerhouse of the Bank and the most important research support for policymaking routines.

From the outset, Monetary Analysis was geared towards supporting the Bank's new responsibilities', notably the publication of the *Inflation Report*. This quarterly publication outlined the Bank's views of the ongoing developments of the UK economy and their anticipated evolutions. It featured both analytical comments and quantitative projections on growth and inflation The forecasts were elaborated by Monetary Analysis staff, particularly by the Conjunctural Assessment and Projections Division (in charge of the central forecasting model), while the Inflation Report Division was tasked with writing the *Inflation Report*. These initial forecasts were discussed during a sequence of meetings between the staff and the Governor, the Deputy Governor, and the Executive Directors, which set the final forecasts to be published (George, 1997, 101). The *Inflation Report* was explicitly conceived by Governor George and King as a means for the BoE to claim expertise over the Treasury on forecasting and economic analysis.[39] George (1997, 100) recognized that the *Inflation Report* would engage publicly the "Bank's professional reputation." King explained likewise that "it is vital not only that we are, but that we are seen to be, on top of this subject [the transmission mechanism]. If we are not, we would rightly be considered as amateurs in a professional world."[40]

The public scrutiny over BoE economic research increased when the Bank was granted operational independence in 1997. Independence implied the establishment of a Monetary Policy Committee (MPC), whose mission was to take operational decisions (notably setting interest rates) to reach the inflation target set by the Government. The MPC comprised the Governor, the two Deputy Governors, two Executive Directors and four external members. Monetary Analysis economists were further integrated into the new routines of the MPC, for instance through briefings with MPC members ahead of policy meetings (Bean and Jenkinson, 2001). The new organisation meant that external MPC members were now in a position to debate and challenge the research presented during these meetings (James, 2020, 436). Some external MPC members—especially those with a well-established background in economics such as Goodhart, Willem Buiter, Stephen Nickell, Danny Blanchflower or Sushil Wadhwani—challenged monetary policy objectives, instruments, and in-house economic analysis. Furthermore, they also obtained, in 2000, their own dedicated staff to conduct independent economic research (what became known as the "External MPC Unit").[41] Overall, the interactions between Bank economists and executives

[38] See note 33 for archival references.

[39] Note that, in the times when public forecasts were exclusively provided by the Treasury, the Bank was already use to expressing (discreetly, cautiously, and conditionally to Treasury's approval) its views on the economic situation and its prospects via the "Economic Commentary" published in the *Quarterly Bulletin* (Windram and Footman, 2010).

[40] King to the Deputy Governor, "The Analytical Functions," 5 January 1993, 9A226/1, BoE Archives.

[41] The discussion over external MPC members' access to research started in October of 1999 and seems to have been settled by the end of the year, with King accepting to provide dedicated staff. See "Bank to meet demand

became institutionalized, in the sense that they were more systematic (regular meetings) and organised around producing a precise output (the *Inflation Report*).

These changes in institutional arrangements and internal organisation shifted the intellectual focus of economic research. As interest in econometric modelling declined, the main focus of the BoE research publications in the 1990s became the explicit discussion of the design and operation of monetary policy (see Figure 5).[42] The most emblematic contribution was Briault et al. (1995) who defended the BoE framework in the context of rising independence of central banks around the world.[43] This main line of research in the second part of the 1990s echoed the institutional transformations of the Bank and its need for securing its legitimacy.[44] Monetary policy frameworks remained important in BoE research in the early 2000s, coupled with the rise of works on new Keynesian DSGE models. This line of work became highly cited in BoE economists' academic publications, a pattern that's in line with the preferences of the MPC itself.[45]

3.2 The influence of King's views

The consensus among the former BoE members we interviewed is that the role and place of economic research at the Bank was thoroughly shaped by King's vision, one he instilled as Chief economist and Executive Director (1991-1998), then as Deputy Governor (1998-2003), and finally as Governor (2003-2013). His vision was already clearly articulated in the "Analytical Functions" memo aforementioned. King listed no less than ten activities that should be pursued: providing an analysis of the inflation target range, understanding the

of the MPC outsiders", *The Financial Times*, 24 November 1999; "MPs berate Bank over handling of research row", *The Financial Times*, 10 December 1999.

[42] By 'monetary policy framework', we mean central banks' missions and targets, as well as the issues of credibility, transparency, and accountability. See the Technical Appendix for the methodology of topic analysis.

[43] Their main argument was that the lack of independence of the Bank was compensated, for improving the credibility of monetary policy, by its high accountability.

[44] An example of this line of research is the 1999 Central Bankers Symposium on "Key Issues in the Choice of Monetary Policy Frameworks", later published by the Centre for Central Banking Studies, (Mahadeva and Sterne, 2000). The CCBS was founded in 1990 by the Bank to promote central banking technical training and assistance.

[45] Clarida et al. (1999) and Gali (1999) were the most cited references by BoE economists' publications in the early 2000s (see Table 1). Bean (2007), then BoE Chief economist, offered a description of the meaning of the "New Keynesian synthesis" for monetary policy. Paul Fisher, former Executive Director of the Markets Directorate and MPC member (2009-2014) recalls that "if you look at the whole MPC period, there was really anybody who came in with a completely different economic philosophy. Everybody was fairly conventional, in that sort of New Keynesian synthesis, on what was going on ... Everybody had broadly the same model on how the economy worked."

transmission mechanism, analysing the structure of money markets, assessing the current state of the economy, collecting statistics, presenting the internal forecast of inflation inside and outside the Bank, assessing development overseas, communicating BoE policies to the outside world, and contributing to debates on a European Monetary Union.

King's views of each assignment were influenced by his background. Like his predecessor Flemming, he had a well-established academic career before entering the BoE.[46] As a taxation economist, he had participated in the Meade Commission in 1978, and published in and edited several of the most prestigious academic journals in economics. His theoretical and econometric work covered income and capital taxation, and their effects on the wealth distribution, family welfare, housing, and financial markets. Though not a macroeconomist, he nevertheless held specific views on what kind of macroeconomic models should be developed and for what purpose. These views clashed with the macroeconometric work that was being conducted at the Economics Division.[47]

First, King considered that research at the Bank should aim at serving policymakers and that policymaking needed simple models telling "stories"—i.e. narratives about the functioning of the economy that should be easily understandable (for instance, by clearly identifying driving factors of economic dynamics, or channels of monetary policy) and easy to communicate (particularly to non-specialist audiences). Stories have indeed become central to the BoE modelling culture. Discussing the 2010s, a staff member explains that "ultimately the MPC wants to communicate to the wider world in terms of stories that the wider world can understand." (Staff economist 5, Interview) A former MPC member also argues that "presenting the forecast and explaining policy … is partly about presenting stories … they must be as simple as they can be, for what we are trying to do, while setting up discussion of risks and uncertainty. And an econometric model is not going to give you any story whatsoever, but it does help you maintain internal consistency and integrity." (Former MPC member 4, Interview)

Agreeing with many other economists in the 1980s and 1990s (Backhouse and Cherrier, 2019), King was dismissive of large scale macroeconometric models hitherto developed by the Economics Division. Such models were perceived to be complicated and opaque 'black boxes', i.e. featuring too many mechanisms at play simultaneously and involving too much 'tinkering' in the estimation. In 1993, King made it clear that:

> *The value in constructing a forecast lies not in the end result but in the questions and answers which form the process by which the forecast is made. From this perspective, what is important is not the detailed modelling of the economy as a whole but the need*

[46] After graduating from Cambridge (BA Economics, 1969), King held several positions as Fellow and Lecturer in Cambridge, before becoming Professor at the LSE (1984), and entering the editorial board of the *American Economic Review* the following year. Over this period, he visited MIT and Harvard several times. He had just returned from a visit to Harvard and the NBER when he joined the Bank.

[47] Whether agreeing or not with King, many BoE economists we have interviewed concur on their description of King's view of macroeconometric modelling at the time. King's recent books offer a posteriori insight on his views on macro-modelling (King, 2016, 101-103, 111-112, 242-245; Kay and King, 2020, chap. 14 and 19).

> *to ask basic questions about the factors determining inflation. Experience has taught us that a large econometric model is a hindrance to understanding. It is being abandoned.*[48]

If narratives were to rely on models, these needed to be simpler, smaller and far less concerned with econometric procedures for fit. King also insisted on the need for models to be built on fundamental parameters and relations that were not affected by shifts in policy regimes, meaning that the models needed to feature rational expectations, optimizing behaviour, and market clearing (what one could call microfoundations *à la* Lucas; Hoover, 2012).[49] At the same time, the staff recognized that King constantly insisted that the economic world they operated was characterized by radical uncertainty. This did not affect the content of models, but their use. First, policymakers should rely on a variety of models rather than a single "all-encompassing" macroeconometric model: "What we need is a capability to put together and use interactively a range of very small models, each of which is designed to throw light on one particular issue," he wrote in 1993. Second, he argued that policymakers should be left with margins for judgment and they should not apply models 'mechanically.' King supported the publication of the forecast as a probability distribution—the "fan chart", launched in February 1996 (King, 1997; Britton et al., 1998).

Finally, besides the content of research, King also promoted a distinctive view about how research should be concretely organised around policy routines. He believed that no research department (i.e., a distinct administrative unit hosting full time researchers, like at the European Central Bank) should be created, because this kind of structure would inevitably lean towards academic topics and standards, which may not be the most relevant to policymakers. Charles Bean (Chief economist, 2000-2008) recalls that he and King shared

> *strong views that research should not be segregated from the rest of the Bank; it should be embedded. That's good for the researchers, it pushes them to work on good topics and not on the problems of the self-referential literature. You want researchers to be exposed to the big questions of the policy makers, and you want the materials to*

[48] King to the Deputy Governor, "The Analytical Functions," 5 January 1993, 9A226/1, BoE Archives. Charles Bean (Interview) recalls that "King ... was not a big fan of econometrics, and particularly of this kind of econometric big black box models… He was not against empirical and applied work, but rather against econometric models and endless regressions."

[49] This view might be explained by his training in microeconomics or his ties with US macroeconomics. It created at first several disagreements in the Bank and, ultimately, a staff turnover. An economist working at the BoE in the 1980s and the early 1990s recalls: "Although [King] came from the LSE in the UK, he really came from the American DSGE type of tradition of modelling ... he started to move the whole thing towards that sort of direction, which is when a number of us decided that we didn't need to be at the Bank anymore." (Staff economist 6, Interview).

do more conceptual stuff to be presented to the MPC. And it's good for those providing conjunctural analysis as it exposes them to up-to-date academic thinking.[50]

(Charles Bean, Interview)

From the 1990s onward, King's views of economic modelling and research, as they were perceived by staff and executives, contributed to reshape the status of economists at the Bank, as well as the organisation of the forecasting process.

3.3 New people, new jobs

"We require a high-powered team of economists who are familiar with the academic literature as well as the latest work in other central banks. Most of these people should have a PhD or equivalent qualification in economics," King hammered in his 1993 plan to shape the new Monetary Analysis wing of the Bank. Our prosopography of BoE economists and our analysis of BoE job ads published by *The Economist* both highlight a resulting shift in the recruitment strategy. The share of economists with a PhD rose slowly but steadily after 1995 (Figure 1).[51] Staff with international experience or overseas diplomas also became more frequent: the BoE progressively opened up to economists trained in continental Europe and in North America, although this international opening remained relatively modest until the 2010s (Figure 2). Of course, the standardization of PhD requirements and the internalization of recruitment also reflected a broader transformation of the profession in the UK (see Backhouse, 1996; Fourcade, 2009, chap. 3). However, the importance granted to the academic credentials of newly hired BoE economists is also remarkably consistent with BoE management's views about the role of economics in central banking: "[King] said we will not constrain ourselves to hire Britons and [that we will] open to the international market and to PhDs."[52] (Charles Bean, Interview)

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[50] Consciously or not, King avoided using the term 'research' in his 1993 plan, in a way that memos by other BoE executives did not. His integrative view is exemplified by the memo's opening statement: "The Monetary Stability Wing is rather different from most parts of the Bank in that, as far as monetary policy is concerned, the analysis is the operation. There should not be a distinction between the thinkers and the doers because the thinkers are the doers."

[51] The Bank's job ads published in *The Economist* did not mention PhD or graduate studies until the mid-1990s. An ad published in May 20, 1995, targeted "graduates with a good economics degree, preferably post-graduate, with several years' relevant experience in macroeconomic research and/or applied economic analysis" that could also "demonstrate a sound grasp of modern macroeconomic theory and applied econometric techniques." This evolution echoes King's distrust for empirical and econometrically sophisticated methods promoted during Flemming's time as Chief economist.

[52] Early discussions about reorganisation conceived Monetary Analysis as a further step, after the Economics Division, in economists' autonomy and self-governance with respect to hiring, promotion and career paths. In a preliminary memo, BoE economist Tony Yates wrote that: "forms of independences envisaged would clearly

If new staff was thus hired based on academic background and training, their role was not to produce academic research. Quite to the opposite, economists were primarily requested to perform policy routine tasks and to produce policy-oriented research. Time for academic research was both very low and highly constrained:

> *It was directed research… The managers as a group would decide what research topics would be pursued. It was, at least in those days, unlike the Fed, in which you choose the topics of your papers based on your own research agenda…I think that the Bank of England has always been perceived as giving a lower priority to research than is the case with the Federal Reserve. … I don't want to caricature. But, in general, the Bank has been perceived as a place in which people, in order to be highly productive researchers, will have to be prepared to do a lot of their research in their spare time.*
>
> (Edward Nelson, Interview)

BoE's reputation of being less welcoming to academic research than the Fed, the European Central Bank or the International Monetary Fund was a recurring theme in our interviews, and appears as an enduring one.[53] Figure 4 shows a dip in academic articles written by BoE economists that lasted throughout the 1990s. The tensions between academic standards and policy orientations that staff economists experienced in their work organisation were also vividly felt in their modelling practices.

3.4 New models

Building, maintaining, and running large scale models along the schedule of forecasting rounds remained one central occupation for a significant part of the economic staff; a task that persisted despites the Bank's executives, in particular King, antagonistic view of large-scale macroeconometric models. The macroeconomic model used to produce forecasts of GDP and inflation for the UK evolved significantly over the 1990s and early 2000s: the last avatar of the large-scale macroeconometric model inherited from the 1970s (the "Bank of England Quarterly model" ; Patterson et al., 1987) was replaced in 1994 by a new model, which took different denominations and forms—"Bank of England Medium Term Forecasting Model", "Medium Term Macroeconometric Model" or simply

change the role of ED [Economics Division] … [I]f the Bank places a premium on the highest-quality analysis … should it continue to recruit and promote on the basis that individuals Bank-wide utility? … I think not … ED should do its own hiring" (Yates to King, "The role of the Bank," 11 February, 91226/1, BoE Archives.)

[53] Staff economist 8 explains: "In 2014, prior to the formation of its own Research Hub and the introduction of its new Research Agenda, research at the BoE had been pretty low on the list of priorities for a number of years. They have had [people] … running the staff here who thought: 'if your objective is to get published in the AER or in the JEP, this is not the place to be'." On the Research Hub and the Research Agenda, *cf. infra*.

"Macroeconometric Model" (Whitley, 1997; BoE, 1999; 2000).[54] The central forecasting model was then substantially re-shaped twice: in 2003 (becoming "the BEQM", for Bank of England Quarterly Model; Harrison et al., 2005) and in 2009 (becoming "COMPASS", Central Organising Model for Projection Analysis and Scenario Simulation; Burgess et al., 2013).

Modelling became the cornerstone of the forecasting rounds, in that it provided insights about the evolution of the UK economy, and allowed to elaborate scenarios on the consequences of alternative policies. Besides producing "numbers", the central forecasting model was also intellectually crucial, insofar as it framed and organised the discussion across the BoE and within the MPC.[55] As King had argued (*cf. supra)*, the questions and answers raised during the forecasting process were more important than the output itself.

The model came to be intensely scrutinized. Criticisms of the BoE's central forecasting model often served as a Trojan horse for a general attack on its forecasting expertise. In the late 1990s, some external MPC members challenged the secrecy of model building via the press (*cf. supra*, 2.1). They publicly wondered whether this secrecy was a way for the Bank to keep control over policy decisions. The House of Lord Select Committee on Economic Affairs then recommended an external audit of the BoE forecasting model (House of Lords, 2001, Appendix 2, §10). A careful examination of the central forecasting model was additionally commissioned by the BoE itself (Pagan, 2003). BoE modellers also had to cope with academic criticisms (Arestis and Sawyer, 2002).

An early response to this intense scrutiny had been to emphasize that the forecasting in fact did not rely on a single macroeconometric model, but on a "suite of models" (cf. e.g. Whitley 1997), akin to what King had proposed when the 1994 reorganisation was being discussed. However, for many BoE economists, the "suite" had, until recently, been more of a rhetorical device than a reality:

> *the suite was a complete scam. It didn't exist … It was not true that there were many distinct macro models that you combine to have the forecasts. It was really a rhetorical device … to diffuse people's interest in the model.*
>
> (Charles Bean, Interview)

This perception was shared by staff: "the suite … was an ambition but never the truth about how the inflation forecast was really done." (Tony Yates, Interview)

A second response to the sometimes contradictory demands from BoE Executive, the public, and academics was to deploy successive generations of macroeconometric models,

[54] A small calibrated general equilibrium model, built to match King's views, was also developed in parallel (Holland and Scott, 1998), although this did not offset the need for a larger macroeconometric model used in forecasting.

[55] The model was of course not the only provider of organising principles for policy discussions: MPC members with their own expertise (or, later, their own research staff) would often think "outside the model." Moreover, several dimensions determining the dynamics of the UK economy (such as the evolution of the exchange rates, energy prices, etc.) were analysed independently from the central forecasting model.

each representing a distinct compromise between various demands. On the one hand, the modelling team was increasingly aware and willing to abide by academic theoretical and methodological standards—namely the new Keynesian DSGE models:

> *MTMM [the main BoE macroeconometric model in the 1990s] did not really have microfoundations. So the staff (academia was moving on, you had DSGE, standard framework for lots of academic work, new people hired…) was pushing in the direction of going there.*
>
> (Charles Bean, Interview)

On the other hand, modelling staff had to take into account the methodological constraints imposed by executives and policymakers, as well as the requisite of producing reliable forecasts. During the transition from MTMM to BEQM (the 2000s model), Chief economist Charles Bean recalls saying to the modelling team: "Look, I will let you go down this route provided it doesn't materially damage the fit of the model to the data." (Charles Bean, Interview)[56]

This tension was reflected in the structure of BEQM, the forecasting and simulation macroeconometric model that came in operation around 2004. It exhibited a theoretical, calibrated "core model" that drew upon academic standards ("state-of-the-art models"; Harrison et al., 2005, 12). It was described by the staff as aiming for "theoretical consistency" (*ibid.)* while reflecting "the MPC's vision of how the economy functions" (King in Harrison et al., 2005, 1). But BEQM's final forecasting were also driven by a "non-core model," actually a collection of estimated equations with additional variables and observed empirical correlations with little "theoretical underpinning" (Harrison et al., 2005*, 61*).[57] Such core/non-core structure embodied the compromise between staff's aspirations to a theoretical "state-of-the-art" new Keynesian DSGE model and executives and policymakers' willingness to supplement the model with their own insights and judgement.[58]

Forecasting and analysis obtained with BEQM turned out to be unsatisfactory for the modelling team, the policymakers, and the academics alike. A member of the BEQM modelling team recalls that the core/non-core structure made it more difficult to tell narratives to the Committee: "That [core/non-core structure] made it difficult to decompose

[56] Only in 2005 an actual suite of models was established and its ability to produce forecasts was tested; this work, led notably by Simon Price (Tony Yates, Interview), was based on 'forecast combination' methods (or 'model averaging'). See Kapetanios et al. (2005) and Kapetanios et al. (2007). However, the suite and model averaging methods were not officially integrated to the MPC forecasting rounds until later (*cf. infra*, 3.1).

[57] The "full model" produced forecasting of a variable by 'adding' the forecast produced by the core model, the forecast produced by the non-core model, plus an error term. This kind of "error-correction mechanism" was common in macroeconometric models of the previous decade (see e.g. Pagan, 2005, 192) and, in this case, was crucial in improving the empirical performance of BEQM.

[58] Moreover, the calibration of the core as well as the ad-hocness of the non-core greatly facilitated matching data.

the forecast and explain what was driving it." (Staff economist 4, Interview)[59] Bean also recalls:

> *the staff founded more problematic to tell stories with [the new model], because you had some stuff about the long run, the core, and when you were telling things about the data, you had a mix of [long-run and short-run] ... it was not suitable to the narratives and the storytelling which is the key part accompanying forecast.*
>
> (Charles Bean, Interview)

Reflecting on the same period, another MPC member felt that the modellers

> *built a model, attempting to address this problem [the trade off between theoretical adequacy and 'does it fit the data'] in a way that they did not initially disclose to us in an open way, but we bumped into it when we asked about policy experiments, etc. This was a management mistake ... top management did not spend enough time on how to make the trade off in a way that was both defensible and workable.*
>
> (Former MPC Member 4 , Interview)

VAR-architect Chris Sims proved especially critical of BEQM during a conference held at the Federal Reserve Board ("DSGE Modelling at Policy Making Institutions: Progress and Prospects", December 2-3 2005):[60] Sims maintained that "there is no indication … that the model is ever dealt with in [an] internally consistent way" (Sims, 2008, 6; see also Sims, 2010). The next paper presented at the conference was one in which the BEQM modelling team argued that DSGE models should not only be evaluated on the basis of their theoretical structure and data fit, but also on their ability to "communicate outputs" and "tell economic stories": BEQM "can tell a story about how much weight to put on a purist, textbook explanation, and how much to put on short run factors that, while ad hoc, have exhibited plausible correlations," they explained (Alvarez-Lois et al., 2008).

None of these criticisms however impacted the practical importance given to the operation of the model in the forecasting rounds and associated monetary policy discussions.

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[59] Besides, the modelling team rapidly became aware that some theoretical modelling choices were not consistent with those made by other new Keynesian DSGE models in other policymaking institutions, and which ultimately became standard in the new Keynesian DSGE literature. Staff economist 3, involved with the design of BEQM, pointed out in his interview that those years (2001-2004) were a turning point for this literature, as several central banks and policymaking institutions were parallely developing for the first time large Keynesian DSGE models for simulation and/or forecasting. Although BEQM modellers were in touch with modellers institutions (like Frank Smets), the BEQM model had already pre-set its development path quite early. Retrospectively, Staff economist 3 argues, the design of BEQM would probably had been different if the project had begun three or four years later, once the development of new Keynesian DSGE models had settled and become standard (Staff economist 3, Interview).

[60] BoE modelling staff was shaken by Sims's remarks. Tony Yates (interview) recalls that "Sims destroyed the model."

It was only after the financial crisis hit that the work done by the Monetary Analysis division lost its dominant position.

4. Research reorientation in times of crisis (2007-2014)

The first act of the Great Financial Crisis started during the summer of 2007, when the closure of two open-ended funds managed by BNP Paribas revealed severe malfunctioning in market segments associated with recent financial innovations. Most central bankers initially interpreted the event as benign risk revaluation in financial markets. Yet, the intensification of the financial turmoil pushed them to reconsider the markets' stabilizing capacities, and more specifically the role played by the changing business models of specific financial institutions. In the UK, the collapse of Northern Rock, a bank that relied excessively on short-term wholesale funding, led the BoE to set up a liquidity support facility in September 2007. A wary King would later deplore that "the massive support extended to the banking sector around the world, while necessary to avert economic disaster, has created possibly the *biggest moral hazard in history.*" (King, 2009b, 4, our emphasis; see also Kynaston, 2017, 658-666).

After the collapse of Lehman Brothers in September 2008, the BoE gradually lowered its interest rates toward zero, but this was not enough to dispel fears of a complete market meltdown and a prolonged economic recession. Hence, in March 2009, the BoE announced the implementation of a new instrument in its monetary policy toolkit: the asset-purchase facility, which allows the Bank to perform Quantitative Easing (QE hereafter).[61] The crisis also resulted in the 2012 redesign of the financial supervision system, with the BoE regaining financial supervision competencies. These crisis-induced policy and regulatory transformations contributed to re-shape the topics, status and role of economic research at the Bank.

4.1 Macromodelling and Quantitative Easing

QE represented a step aside from the new Keynesian DSGE framework and its focus on the interest rate as the main (or sole) instrument of monetary policy. The transmission channels whereby these respective policies affect the economy are different: interest rates primarily affect borrowing conditions on the interbank lending markets, while QE targets asset prices (with the hope of inducing some portfolio-rebalancing behaviour) and the balance sheets of

[61] Technically, the asset-purchase facility is a special investment vehicle that is set up outside the Bank and performs asset purchases on behalf of the Bank, while the fiscal responsibility for it falls on the Treasury.

financial institutions.[62] The BoE was neither the first nor the sole central bank to implement QE, but the usefulness of these other programmes was limited for the BoE because it needed to calibrate the amount, composition and maturity of its purchases to its own goals and to the specificities of the UK financial system (Lyonnet and Wener, 2012).

Since standard new Keynesian DSGE models, in 2008, did not feature portfolio adjustments, significant financial frictions or bank balance sheets, they could inform neither the decision to implement QE, nor its operational calibration. Investigating QE required going back to a "simpler and older economic literature, back at least to Tobin and Brainard in the 1960s and 1970s, and Patinkin." (Staff economist 11, Interview) The central banking community had since lost sight of the relevance of monetary aggregates for monetary policy, and the MPC was no exception—as recalled by a former MPC member:

> *look at what the textbooks told us about. In my day, monetary policy was always about expanding the money supply by ΔM. That was not how monetary policy was conducted, but it was what was taught in the classroom. In contrast, and it should not be a big surprise, most economists into the MPC did not really believe in the power of money. The only person who really did was Mervyn King.*
>
> (Paul Fisher, Interview)

The staff had produced a few studies on monetary policy when short-term nominal interest rate reaches zero (the 'zero lower bound'). Drawing on the Japanese experience of the early 2000s, Yates (2003) reviewed central banks' policy options, including asset purchases (QE). In fact, since the 1990's, QE has been part of the policy options when facing the zero lower bound (see e.g. Tucker, 2004). That such state of affairs would materialize in the UK was, however, deemed highly unlikely then. Consequently, no articulated plan for implementation of QE was developed.

Against this background, reminiscences of the process that led to the decision and implementation of QE in 2009, in particular the role of BoE staff economists, substantially diverge. A short-lived "QE team" bringing together researchers from the Monetary Analysis and Markets, was set up in December 2008 and discontinued in March 2009. It was initially tasked with writing papers on each policy option left when interest rates neared zero: QE, other purchasing programmes, negative interest rates, forward guidance, and helicopter money. Those papers never made it to the MPC, according to Staff economist 12, who recalls that the "QE team" assignment soon evolved: from providing a detailed breakdown of policy options and a comparative assessment of those options, the task became to analyse 'how much QE' was needed. Some workstreams paired the staff from Monetary Analysis with those of the Markets area, with the purpose of investigating legal aspects of QE, its operational details, as well as how to use auctions in the process.

[62] When a central bank purchases securities on secondary markets, it raises the prices of these securities and creates a 'wealth effect' that helps financial institutions to stabilize their balance sheets and further their lending activities.

Several ex-MPC members explained in interviews that the MPC discussions at the time indeed focused on the desirable volume of purchases and on implementation issues rather than on the policy choice itself. They emphasized that the time window to implement the policy was tight, and pointed out some communication issues:

> *the economists (apparently) set about designing what they thought a QE program might be. But they did not talk to the Markets area, and, as a result, there was nothing operationalized. It was not until we were into 2009, when Mervyn [King] was saying we will actually do this and prepared to put it to the MPC, that operational design was done in a rush, for both gilts and corporate bonds purchases ... It was a breakdown of communication. The economists had done some economic analysis but hadn't thought about how you might implement [it] in the market.*
>
> (Paul Fisher, Interview)

Explaining that they "essentially knocked up the QE plan ('That's how it will work, end of story') in about three days," a former MPC member agrees that while the transmission channel whereby QE operated was well understood,

> *the big issue was (and, I suspect, remains), how do lower corporate yields and other things like that feed into aggregate demand and activity. That's the genuine hard bit, especially as market conditions stabilized. That's the hard bit, the one no one might know the answer to.*
>
> (Former MPC member 4, Interview)

One reason for the divergence between the MPC and the in-house economists in the interpretation of the process leading to the QE might be that existing BoE research on QE relied on the Japanese experience (Yates, 2003; Benford et al., 2009). Yet, a MPC member (David Miles, Interview) underlined that the Japanese experimentation had not been successful and should not be taken as a template because the (international, market-based) UK financial system differed from the (domestic, bank-based) Japanese system. Moreover, "it was also the case that Japanese QE purchases built up very gradually while what was relevant in the UK was the impact of large purchases undertaken over a relatively short period." (David Miles, Interview). BoE policymakers thus decided to buy sovereign bonds from pension funds, insurance companies and investors overseas with the hope to trigger portfolio effects[63].

Overall, neither the BoE macroeconomic models nor the research conducted by the "QE team" was used to decide which policy to pursue, or how to implement it. This required a simple understanding of the balance sheets of the UK financial systems and different models of the transmission channels. There was also dissension about how to frame the public rationale for QE. King adopted a monetarist perspective through explaining that the

[63] The aim of these purchases was to incentivize institutional funds to start purchasing corporate bonds issued in sterling with their additional liquidity in order to sustain economic activity (Lyonnet and Wener, 2012; Fawley and Neely, 2013).

main goal of QE was to boost the money supply, to 'pump money' into the economy.[64] Other MPC members (according to Charles Bean, Interview) rather interpreted QE as a tool to bypass a dysfunctional banking system. Adam Posen (2009) and David Miles (2009) both offered non-monetarist justifications for QE. The Bank Independent Evaluation Office underlined that these divergent interpretations on QE persisted through time: "The Bank has advanced its understanding of QE since 2009 but there remain open debates about how exactly QE works." (IEO, 2021)

QE, in turn, stimulated new research initiatives, in particular to evaluate its effects: BoE members wrote 34 research papers on QE between 2010 and 2020 (IEO 2020). Researchers in the Monetary Analysis division first took existing models "from the shelf" and tweaked them to estimate QE effects, in an attempt to make them fit a coherent framework and narrative. According to Staff economist 4 (Interview), this was essentially a mobilization of the suite of models on a short notice. For instance, Bridges and Thomas (2012) took a sectorial money model (Dhar *et al*., 2000), which included a pension fund sector and a portfolio balance mechanism, and turned it into a macro model, so that they could estimate the impact of purchases on asset prices and GDP. BoE staff also relied on event studies to analyse how asset prices change after QE announcements, and repurposed consumption and investment models with wealth effect (Joyce and Tong, 2011). The distributional effects of QE were also a topic of in-house research, with an early 2012 report explaining that the rise in shares and bonds value primarily benefited the richest 10% of households (BoE, 2012), while a follow-up paper rather found that the overall effect on income and wealth distributions has been small (Bunn et al., 2018).

The need to adapt the analytical tools that BoE economists were using offered an opportunity to finally build and operate the "suite" of models King had been advertising for decades.[65] According to Staff economist 4 (Interview), this led to the development of a 'suite of models' for unconventional policies but also, more generally, for analysing how credit spreads and the banking system affect the economy (as in Cloyne et al. 2015). This was made necessary by the replacement of BEQM with a new model, named COMPASS (Burgess et al., 2013). The development of COMPASS was a response to the theoretical and empirical dissatisfaction with BEQM (*cf. supra*, 3.4), to the willingness to tell clearer "stories" to the MPC, and to improve the forecasting performance that had deteriorated in the wake of the

[64] King (2009a, 7) outlined his monetarist views on how QE works two months before its implementation: "purchases by the Bank of England of a range of financial assets [would] expand the amount of reserves held by commercial banks and to increase the availability of credit to companies. That should encourage the banking system to expand the supply of broad money." These justifications are found again in the first BoE publication on QE: "The aim of quantitative easing is to inject money into the economy in order to revive nominal spending." (Benford et al., 2009, 91)

[65] Although, as mentioned *supra* (2.4), preliminary attempts to build a suite of model for forecasting, (based on model averaging methods) was already underway since 2005.

crisis.[66] COMPASS was closer to a standard new Keynesian DSGE, more streamlined, and easier to operate. However, COMPASS did not include itself any detailed description of the working of the banking and financial sector; henceforth, COMPASS came with a "new forecasting platform" (or "suite of models"), including several satellite models where financial frictions were added so as to estimate the impact of credit shocks on the economy.

In sum, the implementation of QE had paradoxical effects on the research and the models developed in Monetary Analysis. On the one hand, the crucial decisions about the implementation of QE were taken without relying on the research inputs usually presented to the MPC during the *Inflation Report* process and other briefings. On the other hand, the flexible use of models at the BoE helped the research staff adapt their models and produce research on unconventional monetary policy. Whether the input from the modelling team had some influence on the policy decisions is however difficult to assess. Some elements of the QE evaluation indicate that this issue is still unclear: "When considering its QE work plan, we would encourage close interaction between the Bank's policy and research teams." (IEO, 2021)

4.2 Macroeconomic vs. financial research: The great rebalancing?

At the BoE, as in most macroeconomic institutions, the aftermath of the Great Financial Crisis saw a continued reassessment of the uses and limits of new Keynesian DSGE models.[67] These models "assumed that financial conditions were summarized in the interest rates. You can see it in the Woodford textbook [Woodford, 2003], in conventional new Keynesian macro." (Staff economist 11, Interview) Thus, they did not allow economists neither to anticipate the extent of the Great Financial Crisis, nor to promptly provide positive guidance to QE. In addition, a core limitation was that the functioning of the banking system was not modelled: "the Bank was serious about finance theory on the monetary side, but not about financial institutions and, more precisely, the consequences of a breakdown of financial intermediation." (Former MPC Member 4, Interview). This former MPC member equally emphasized the limitations of academic research in financial economics: "at the time, modern macro included finance theory in the style of, say, John Campbell or, rather differently, Gene Fama, but it did not include financial intermediation. That was unknown. That is just as important as more specific things like not having banks in a DSGE model".

This retrospective criticism is in line with those voiced in the report published by the FSA chairman Ader Turner in March 2009. Commissioned by the Chancellor of the Exchequer, the report reviewed the causes of the financial crisis and recommended a shift in

[66] An assessment of the MPC forecasting performance was penned by Fed economist David Stockton (2012). It pointed to evidence of serial persistence of errors. The Report suggested (among other actions) that the staff produce a public forecast, distinct from that of the MPC, a recommendation that was rejected (BoE, 2013a, 25).

[67] Post crisis soul-searching articles by macroeconomists are too numerous to be referenced here; see Vines and Wills (2018) for a synthesis.

the regulation and supervisory approach of UK authorities, in particular a greater attention to systemic risk and enhanced macro-prudential analysis. Among other causes, Turner faulted "the theory of efficient and rational markets," (Turner, 2009, 40), a belief that he argued constrained regulators' intervention. Turner (2009, 84) also criticised the BoE for "focus[ing] on monetary policy analysis as required by the inflation target, and while it did some excellent analytical work in preparation for the Financial Stability Review, that analysis did not result in policy responses." His diagnosis encapsulated several key features of the status of financial research at the Bank prior to the crisis. First, financial research had continued at the bank after the institution was deprived of responsibilities regarding financial stability in the late 1990s. Until 2005, the *Financial Stability Review* exhibited a low level of technicity, as exemplified by the unsystematic use of the financial soundness indicators promoted by the IMF (Osterloo et al., 2006, 345). From 2006 onward, however, BoE economists ramped up their financial expertise. The *Financial Stability Review* was turned into the *Financial Stability Report,* and was streamlined in a format similar to the *Inflation Report*. Hence, it was used to feed the views of the Financial Policy Committee.[68]

Yet, unlike the MPC, the Financial Policy Committee was merely an internal consulting organ without policymaking powers. It hosted presentations on the banking system and financial risks but, by institutional design, these discussions were kept separate from the monthly MPC process, where the bulk of the BoE policymaking occurred at that time. Moreover, the gap in research cultures highlighted in the previous section constituted an obstacle to cross-fertilization of financial and policy discussions. Reflecting on his experience as head of the macro-financial analysis division (within the Monetary Analysis directorate), a former BoE economist explained:

> *I came in a division with a tradition of geeky people talking about derivatives, with MPC members not understanding it. That was the challenge, bridging the gap between macro and finance … Many people on the MPC were less comfortable with financial stuff … When I first started working in relation with the MPC, I used to do a presentation and then somebody from the Markets area does a presentation; [it was] two different worlds; we did not understand each other. At the end, we decided to have just one presentation combining the 'economic insights with the market insights': what does the economic staff think, what do the Markets think?*
>
> (Staff economist 11, Interview)

Finally, BoE financial analysts were, according to some interviews, shackled by a lingering turf war with the FSA: according to a former MPC member, the BoE leadership was under

[68] The Financial Policy Committee is a BoE committee tasked with financial supervision. Note that this Committee was actually renamed many times (Financial Stability Committee, Financial Stability Board).

pressure from both the FSA and, more important, the Treasury to keep clear of FSA affairs (Former MPC Member 4, Interview).[69]

The failure of regulators and supervisors to rein in financial exuberance led the 2010 liberal-conservative government to rethink the pre-crisis financial supervision system (James, 2018). The most significant policy change was to dissolve the FSA and transfer micro- and macro- prudential competences back to the BoE. In a way these events are reminiscent of shifts in monetary policy arrangements in the 1990s. The 2012 Banking Act transformed the Financial Policy Committee into a policymaking institution. It was tasked with conducting macroprudential policy (i.e. stabilizing the financial system as a whole) and hosted five external members sitting alongside six BoE representatives.[70] The Act also introduced a Prudential Regulation Authority, reporting to the Governor. Its role was micro-prudential, that is, to supervise and regulate large financial institutions such as banks or insurance companies.

Mirroring some of the transformations that had taken place in the 1990s, this redesign of BoE policy missions fuelled a more frequent dialogue between BoE policymakers and the Financial Stability Directorate: MPC members became even more interested in the research produced by the Financial Stability Division—for instance, the inputs of a model (named RAMSI; Burrows et al., 2012) developed by Financial Stability for analysing systemic risk (Charles Bean, Interview). In line with this renewed interest, transfers of BoE staff between the Monetary Analysis and the Financial Stability Directorate, which already existed in the previous decades, became more frequent (Staff economist 10, Interview).

Overall, the financial crisis, the implementation of QE, and the recovery of financial supervision powers did not result in a sudden reorientation of BoE's research away from the criticized New Keynesian models. The latest New Keynesian model, COMPASS, remained the backbone of the inflation forecasting process, together with a growing number of other models (see Burgess et al., 2013). Moreover, this research was increasingly combined with the growing output of the Financial Stability wing. Figure 5 shows the growing proportion of research output dealing with financial markets and financial supervision after 2010. This growth was fuelled by specific subthemes, namely shadow banking (OTC and financial market liquidity) and financial modelling (term structure/yield curve models). Figure 6 highlights the uses of this research within the Bank. While the proportion of in-house papers from Monetary Analysis cited in BoE policymakers' speeches has fluctuated between 30% and 40% since 2000, the trend has been significantly different for research produced by Financial Stability. Mentions of this research in speeches went from inexistent at the beginning of the 2000s to growing substantially up to 30% between 2005 and 2010 (thus predating the crisis). After a second dip, citations reached 50% in 2012, when the Bank regained financial supervision powers.

[69] This former MPC member continued: "I once expressed concern to a Deputy Governor about how Mervyn [King] was pursuing a 'monetary institute type' model and I was told emphatically that this was what the Treasury wanted."

[70] These were the BoE Governor, the four Deputy Governors and the Executive Director for Financial Stability.

5. Epilogue: A new research agenda?

Under Mark Carney's Governorship (2013-2020), the role and place of economic research at the Bank seemingly changed again. Carney began with setting and advertising new research directions (the *One Bank Research Agenda*; BoE, 2013). The internal organisation of research evolved accordingly. An institutional space exclusively devoted to research (the Research Hub) was also created, although with limited resources (3 permanent researchers in 2014, 10 in 2020). This Hub is aimed at supporting BoE staff (15 to 25 researchers per year initially, now up to 30-40) through allowing successful research applicants from any Directorate to take a 'research leave' (generally six months) to undertake a specific research project.[71] Additionally, four programs have been developed to attract PhD students, young scholars, as well as senior researchers. Recent hires (Figures 1 and 2) testify to the growing importance of academic credentials and overseas degrees as preconditions to join the staff. The Bank communicates more actively and transparently on his research activities—examples are *The Bank Underground* blog (established in 2015) and independent evaluations of research activities (BoE, 2019).

These changes are very recent and still in the making, so they do not lend themselves to historical scrutiny yet. Our historical investigation however allows us to speculate on how these recent transformations fit in the long-run, historical trends about the role of research at the BoE. A first takeaway of our analysis is the extent to which BoE executives' views of what a proper economic model is and how it should be used in the policy process shape the Bank's research methods, theoretical stances, and topics. Carney's leadership relied on his own credentials as an economist, his previous experience as the Governor of the Bank of Canada, which is recognized as a very research-active institution. As a consequence, renewed importance was given to academic standards, one that has resulted in a sustained increase in publications in peer-reviewed journals (Figure 4). Chief economist Andy Haldane's appetence for interdisciplinary work has resulted in a growing diversity in research and modelling approaches (Haldane, 2012; see Plassard, 2020 on the development of agent-based models at the Bank). It is, however, unclear whether these new research directions will effectively become integrated in internal forecasting and decision-making processes.

A second conclusion is that policy mandates, as well as policymaking routines, and the transformation of the economic context, stimulated research on new topics and shaped modelling practices. In recent years, no such changes have occurred. However, since the Great Financial Crisis, the BoE has operated in a context of heightened negotiation and cooperation between central banks. In this context, promoting research that abides by the international standards of this community as well as the standards of academia can be seen as a way to increase the reputation of the Bank (Claveau and Dion, 2018).

In this paper, we have also documented how the internal organisation of a central bank both reflects and shapes research outputs. From this perspective, the most significant organisational change in recent years has been the creation of the Research Hub. The Hub

[71] A Research Steering Committee, comprising the Governor and executives from different Directorates, meets quarterly to assess research project proposals to be conducted in the Research Hub.

was tasked with promoting inter-directorate and interdisciplinary research within the Bank. How this could contribute to challenge the predominance of Monetary Analysis on research, already re-balanced by the rise of research conducted within Financial Stability, is something to follow closely.

In a nutshell, changes to the content, status and role of research in recent years can be interpreted in light of the historical back and forth between research inspired and legitimized by academic standards and research commissioned and legitimized by policy requirements. Shifts in mandates, in internal organisation and decision routines, and in policymakers and executives' views on economics have proved powerful drivers.

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Appendix: Figures and Tables

Figure 1: Recruitment of BoE economists with a PhD (1976-2019)

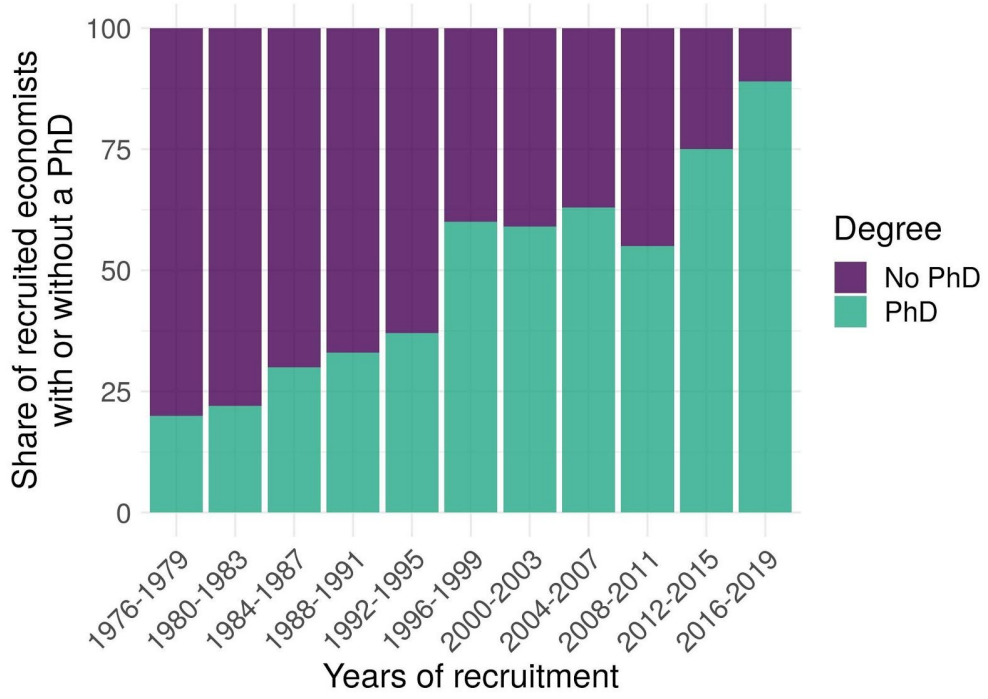

Figure 2: Geographical location of Master and PhD degrees of BoE economists (1980-2019)

Figure 3.1: Top 5 institutions for Master and PhD degrees of BoE Economists (1960-2019)

Note/ Y-axis reports absolute numbers, while tags report percentages. Total percentage is >100% since both master and PhD location are reported for some economists

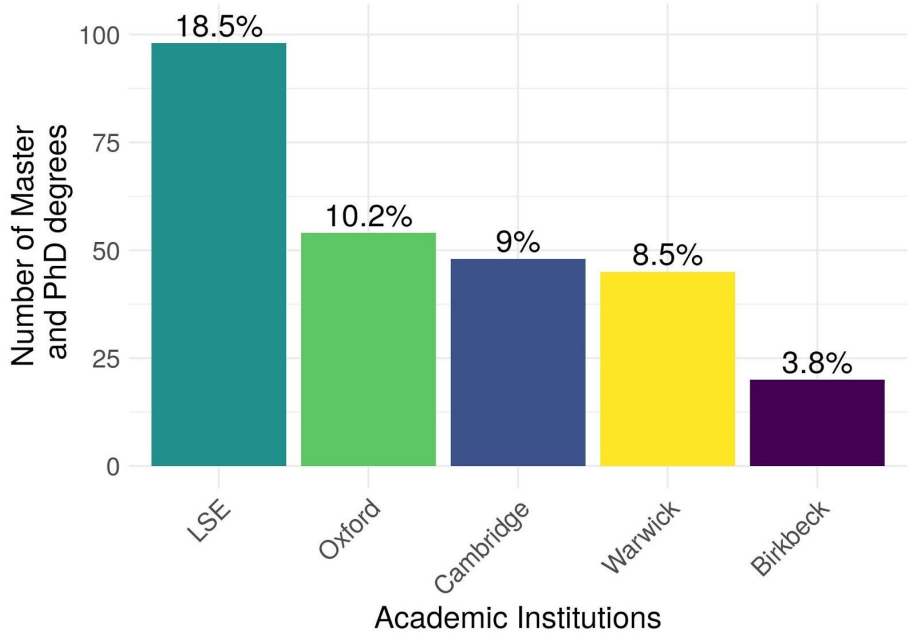

Figure 3.2 MA and PhD origins of economists recruited at each period (smoothed)

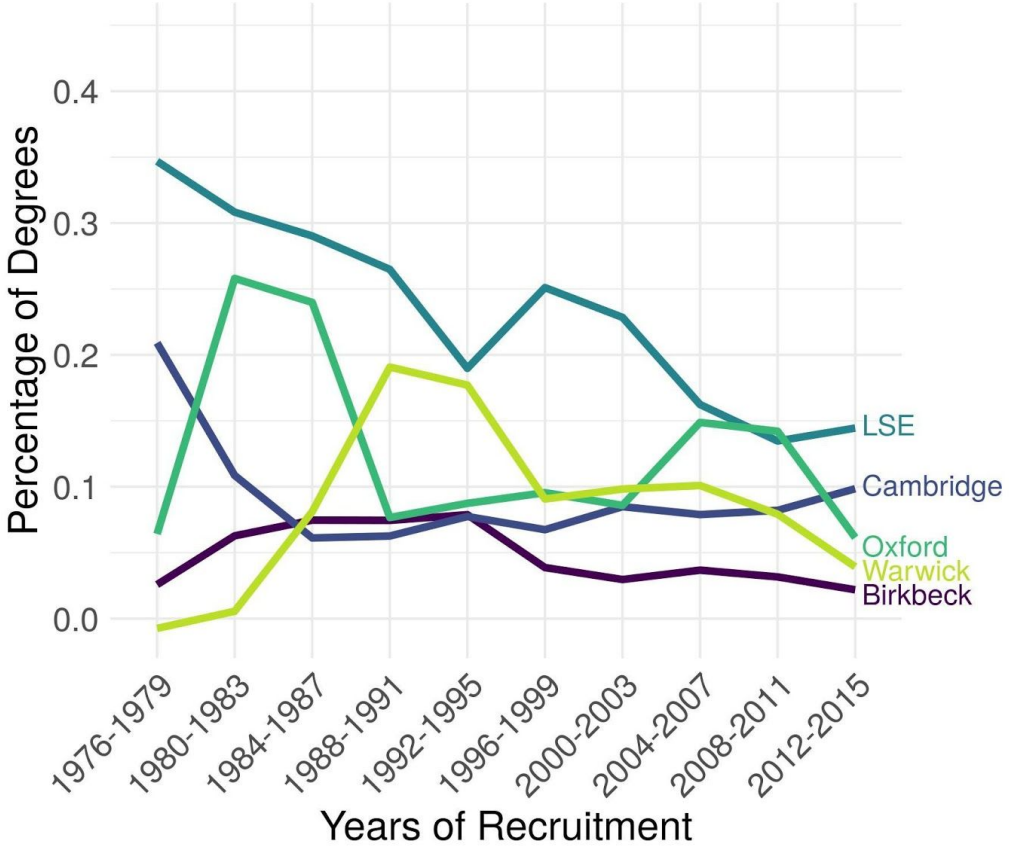

Figure 4: Evolution of the research output of the Bank of England
(curves are smoothed with local polynomial regression)

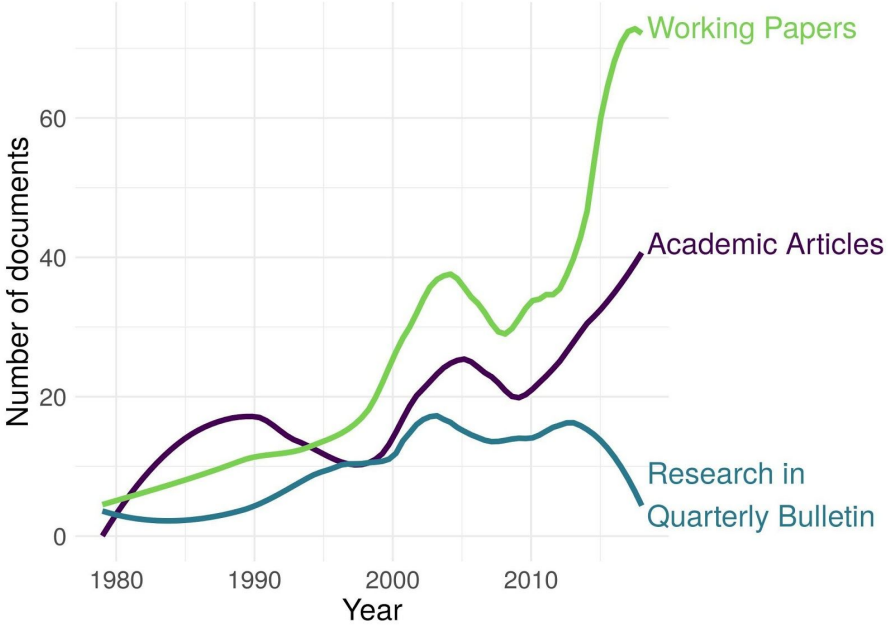

Figure 5: Size of the general topics in the research output of the Bank of England

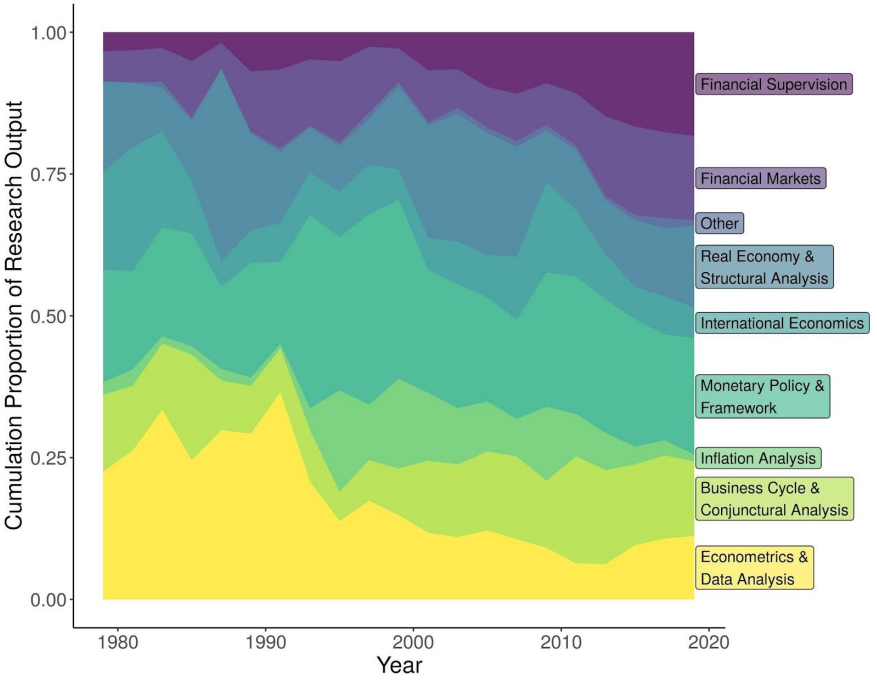

Figure 6: Proportion of in-house research being cited at least once in speeches
(curves are smoothed using local polynomial regression)

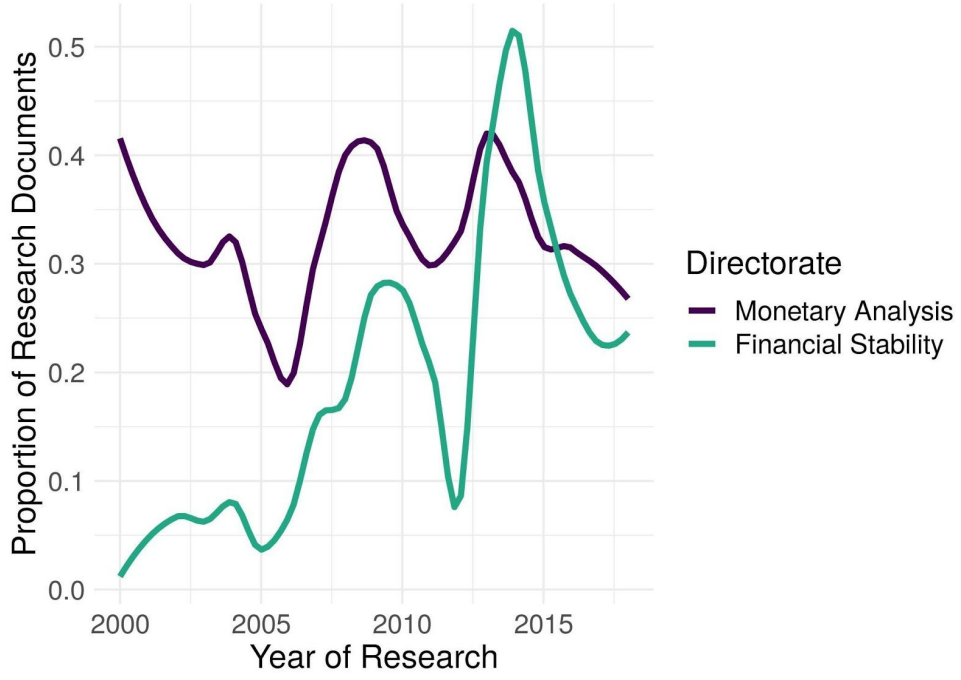

Figure 7: Stylized organisational structure of the Bank of England in the 1970s and 1980s.
Ellipses indicate omitted unnecessary details (i.e. roles or departements/divisions that are not mentioned in this article). The bidirectional arrow indicates an advising relationship.

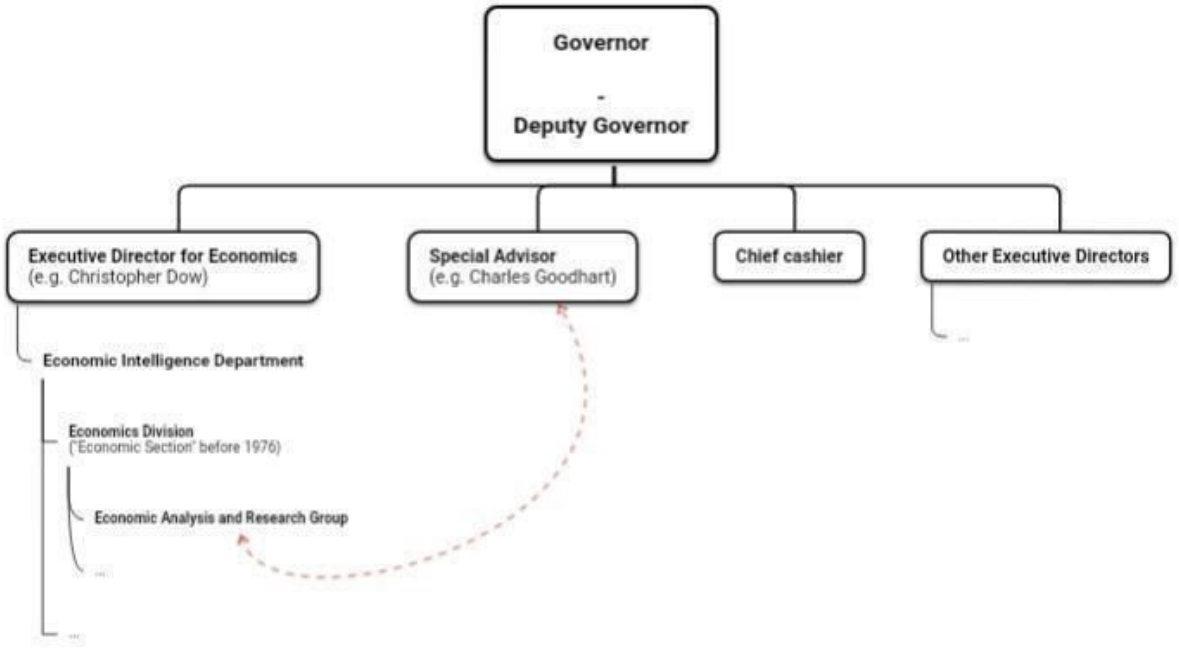

Figure 8: Stylized organisational structure of the Bank of England in the 1990s and 2000s. Ellipses indicate omitted unnecessary details (i.e. roles or departements/divisions that are not mentioned in this article).

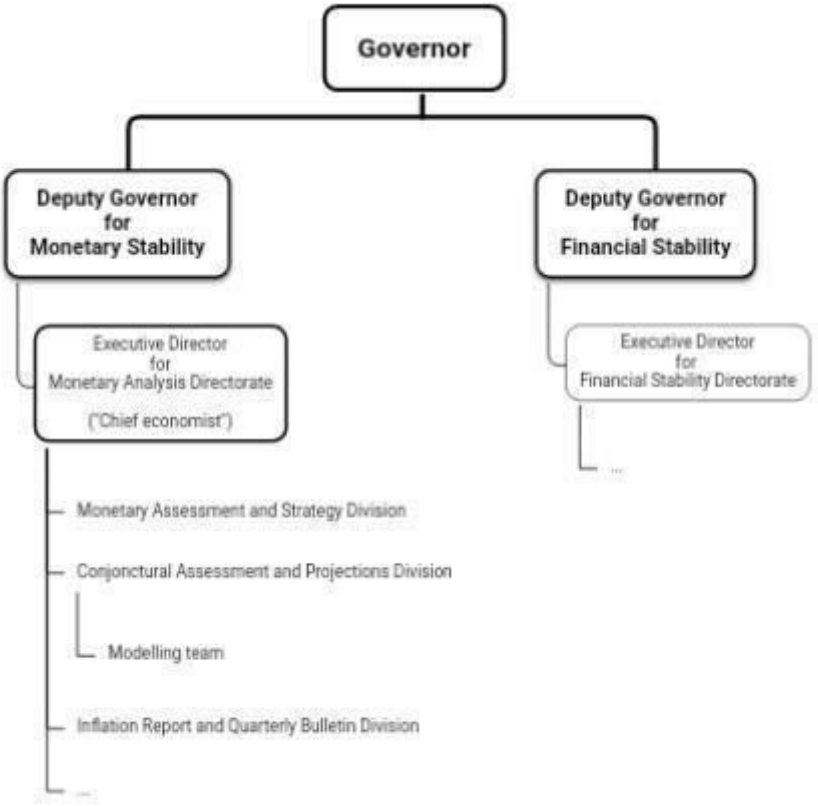

Table 1: Most-cited articles in research by BoE vs other central bank economists

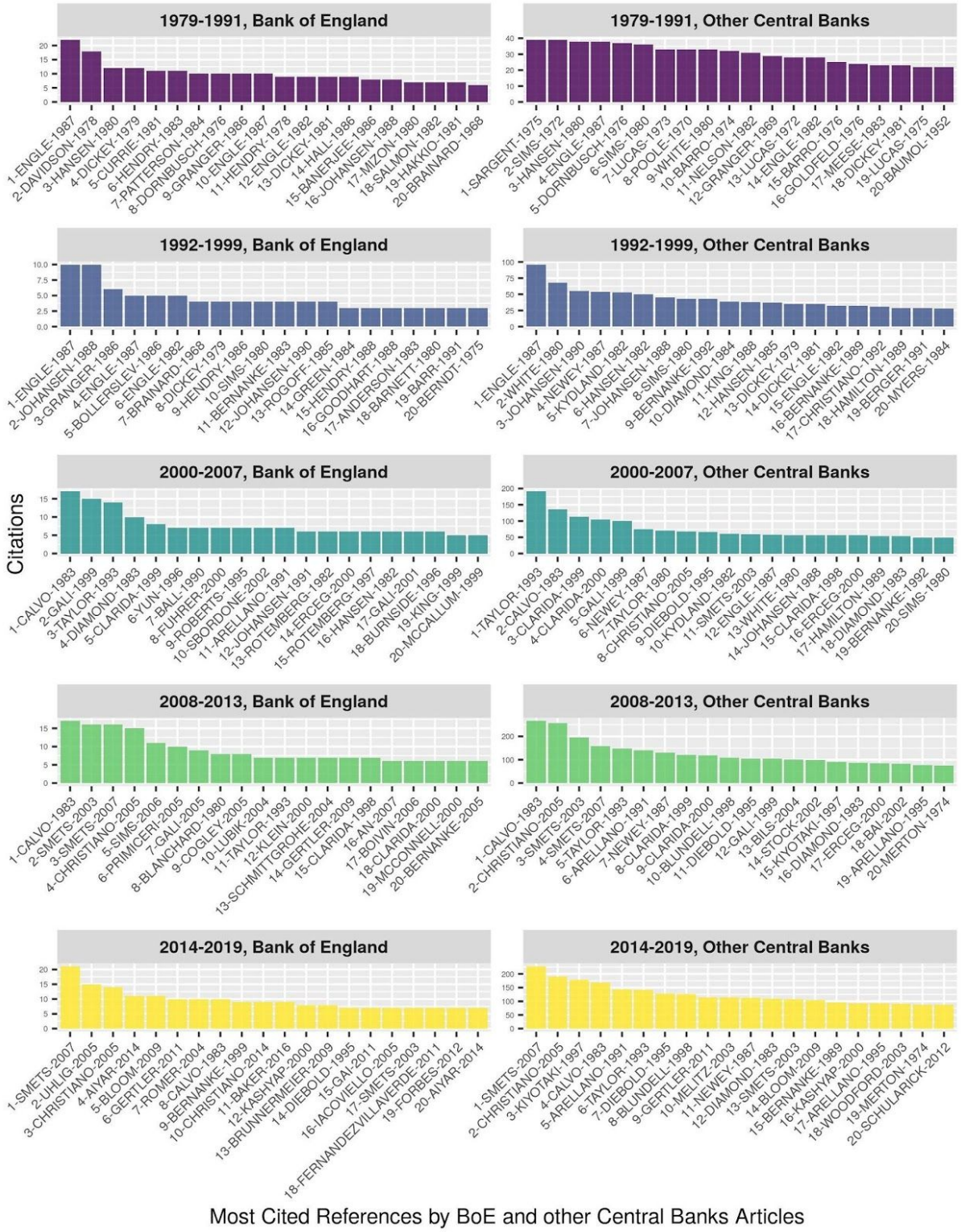

Table 2: Comparison between 20 most cited references in BoE vs other central bank articles

What is displayed are residuals of a Chi2 test. The number of references for each sub-period (for instance, 35 for the first sub-period) indicates the degree of conformity of BoE references with other central banks. The maximum number of references is 40 (if the 20 most cited references by the BoE are different that the 20 most cited references by other central banks). The smaller the number of references, the larger the conformity of the BoE with what is cited the most by other central banks.