Bridging the gaping hole: Central bank economists’ role in the rise of macro-finance post-crisis

Abstract

How has mainstream academic economic discourse evolved to regain its epistemic authority after the financial crisis of 2008 revealed serious blind spots in economic modeling that shattered the profession’s claim to predict and control macroeconomic variables? To answer this question, we combine content with bibliometric analyses of nearly 70000 papers on macroeconomics and finance published in academic journals from 1990 to 2019. These analyses reveal how a structural rapprochement between macroeconomics and finance created the new subfield macro-finance. We show that contributions by central bank economists, driven by the newly acquired macroprudential mandate of central banks, were key in its establishment. Acting within the space of regulatory science, they were connecting macroeconomic and financial knowledge to satisfy their employer’s administrative needs all the while contributing to bridge the gaping hole in economics discourse, thereby taking on an important stabilizing role for the epistemic authority of economics.

‚One can safely argue that there is a hole in our knowledge of macro financial interactions; one might also argue more controversially that economists have filled this hole with rocks as opposed to diamonds; but it is harder to argue that the hole is empty‘ (Reis 2018, p.140)

# Introduction

How did the great financial crisis influence the way the economics profession conceptualizes finance and its potentially disruptive impact on the macro-economy? Asking this question 15 years after the transatlantic financial crisis erupted in the summer of 2007 means to ask the question of the reflexive capacity of economics, which failed miserably in its proclaimed capacity to predict pending calamities and guide policy-making (Fligstein et al 2017).[[1]](#footnote-2) In how far has economics, which is the primary policy-guiding social science in the West, adapted to respond to this challenge to its legitimacy and fill this gap in its knowledge? In other words, how has economics as an abstract discourse evolved to incorporate the challenge of financial instability in its modelling and which agents within this intellectual field have driven this transformation in scholarship, if any? Asking these questions means to situate the evolution of economics in its real-world context and to analyse the intricate relationship between policy-making and abstract discourse, i.e., between administrative interventions in the economy and theory.

The 2007-2008 financial crisis and the following recession provoked a lot of soul-searching in the profession, with prominent economists attacking the profession for ignoring the risks of financial markets in their macroeconomic modelling (Krugman 2009, Kocherlakota 2010, Blanchard 2017, as cited in Claessen and Kose 2018: 1).[[2]](#footnote-3) Furthermore, economic scholars, in particular those involved with the policy-making of central banks, noted the limited usefulness of economics models for policy-making in times of financial crisis (Pagano 2014), which they linked to a long standing separation of macroeconomics and finance in academic discourse (Claessen and Kose 2018). As Claessen and Kose state, the crisis revealed a fundamental gap in the knowledge on “macrofinancial linkages”, defined as “two-way interactions between the real economy and the financial sector" (ibid: V).

Critical reflections by mainstream scholars have pointed out that this lack of knowledge was due to the prevalence of the Efficient Market Hypothesis and rational expectations theory in the academic mainstream since the late 1970s (Gennaioli and Shleifer 2018, for a general exposition of the theory s. Polillo 2015), which had led the profession to ignore these linkages, buried under the assumption that financial markets were sufficiently stable to play no role for macroeconomic modelling (Claessen and Kose 2018: 64).[[3]](#footnote-4) This configuration of scholarship on the macroeconomy and finance meant that when the financial sector caused unexpected macroeconomic damages during the financial crisis of 2007-2008, macroeconomic frames left policy makers largely hapless (Fligstein et al.2017, Golub et al.2015, Abolafia 2020). While the real economy was entering a dizzying tailspin in fall 2008, macroeconomic models of central banks were still predicting an impending quick recovery (Genaioli and Shleifer 2018), unable to anticipate the unfolding crisis events and their effects.

How has the economics profession reacted to this blind spot, challenging its claimed capacity of predicting and controlling macroeconomic variables? And which lessons can be learned from this reaction about the general evolution of economics and its relationship to real world events? To answer these questions empirically, we undertake a quantitative content analysis as well as a bibliometric analysis based on a dataset containing more than 69000 papers published on macroeconomics and finance in academic journals from 1990 to 2019. Based on this analysis, we show a rapprochement between finance and macroeconomics post-crisis due to the establishment of a new subfield of economics, which conceptualizes the cyclical fragilities of the financial system and its potential impact on the macroeconomy. We furthermore show that economists in central banks played a crucial role in the establishment of this new subfield, while central banks operated as the primary initial outlets for many of these works. In this way, central bank economists became an important force in bringing about change in the economic discourse, a much-overlooked impact of the “scientization” of central banks (Marcussen 2009, 2013, Mirowski 2013, Jacobs and King 2016, Dietsch et al. 2018, but s. Claveau and Dion 2018).

Our finding, which contrasts with prior findings about the performative power of abstract academic theories on real world economies (MacKenzie and Millo 2003, MacKenzie 2006) contributes to the sociology of economics, a branch of the sociology of science which has made recent inroads into economic sociology (Van Gunten 2015, Van Gunten et al 2016). Broadly speaking, this strand of literature argues that the evolution of economics needs to be understood in the “dialectical interaction between the real world (the economy) and the profession (economics), which claims tutelary power over it.“ (Fourcade 2006, 185f). One central place where this dialectical interaction plays out is in the use of economics as an abstract scientific discourse to guide the administrative craft of intervening within the economy (cf. Langley 2014, Fourcade 2009). Whereas prior work emphasized the impact of new economic theories on the administrative craft, we show that if a contradiction between economic events as experienced in the administrative craft and the predictions of the economics profession arises, this dialectical tension can evoke changes in the abstract academic discourse itself.

In this sense, our study allows us to specify the pathways that explain the evolution of the academic economics discourse post-crisis. By bringing together the political imperatives historical events impose upon policymakers with the locus of expertise that is tasked to address them (central bank economists), we show how practical imperatives of policymakers contributed to transform the macroeconomic discourse after the cataclysmic event of the financial crisis. These developments, we argue, led to a new interlinkage between priorly unrelated fields of economics, namely finance and macroeconomics, providing a venue for cross-fertilization and further innovations. These developments not only exemplify the recently detected empirical turn of economics in the twenty-first century that was driven by applied economists (Backhouse and Cherrier 2017), but they also carry important theoretical implications for the debate regarding the persistent epistemic authority of economics. Through their interventions in academic discourse, central bank economists ensure that it evolves in line with the imperatives of economics as a policy guiding science, thereby contributing to its persistent “tutelary power”.

To make these points, the paper proceeds as follows: In section 1, we review the literature on the evolution of economics and provide a short summary of the evolution of the role of finance in economics before and after the financial crisis of 2008. Here, we develop our dialectical view of economics, which evolves in the sometimes-tense relationship between an abstract academic discourse and a pragmatic administrative craft of making the economy susceptible to state intervention which can give rise to tensions that evoke change in either field. In this context, we introduce central bank economists as important actors in the evolution of economic discourse. Section 2 presents our data and discusses the combination of methods used to analyse it. Section 3 presents our findings, documenting the establishment of the subfield of macro-finance in the mainstream economic discourse, detailing the characteristics of the authors responsible for its propagation, which to an unusual degree resides in the contributions by central bank economists. Section 4 concludes by discussing the implications of our findings for the analysis of the economic discourse in general and pointing to the need to give a much more prominent role to applied economists and their task environment when analysing its evolution.

# Literature review

The sociology of economics is a relatively recent subfield of the sociology of knowledge, which has taken a strong development since the late 1990s (Fourcade-Gourinchas 2003), when Callon first posited the performativity hypothesis (Callon 1998). Based on insights in science and technology studies, this thesis posited that rather than describing the economy, economics takes part in its performation by shaping and formatting it (Callon 1998, p. 2). Later qualified as a process of co-performation (Callon 2007), this research investigated which socio-technical “agencements”, built on economic theories were needed to make certain economic theories succeed in the economy. In this vein, social constructivist work on the role of economics has shown that abstract economic models, such as the Black-Scholes formula can legitimize and fuel the evolution of entire financial markets (MacKenzie and Millo 2003), with these models shaping the price patterns observed in financial markets in line with their theories. This initial impulse to the sociology of economics shaped the field by leading the focus on how abstract academic theories impact the economy at large (Langley 2014, 9), and this despite Callon’s insistence on a study of “economists in the wild” and their contribution to the way the economy operates (1998, 2007, pp. 336f).

This study of post-crisis change in economics discourse is based on such a dialectical view of economics as a science and economics as an (administrative) practice. Following Fourcade (2006, 185), we analyse how economics claims the epistemic authority to decipher economic processes and guide administrative practices, thus ensuring the profession ‘s “tutelary power” over the economy. However, we emphasize the fact that this kind of influence is not merely operating from academic theory towards practice but can as well operate in the alternative direction. This understanding can in large part be derived from those works in the sociology of economics which have analysed the sometimes-tense relationship between abstract academic discourse and administrative economic practices (cf. Fourcade 2009, Langley 2014, on central banking cf. Blinder 1998), as the former seeks to exert its “tutelary power” (Fourcade 2006, 185f) over the latter.

The productive tension between economics as administrative craft and as academic discipline has been pointed out by Fourcade (2009), who in her seminal work on the evolution of the discipline of economics since about 1750, shows how government action seeking to govern the economy and scientific innovation in economics are heavily intertwined (2009, p. 116). As economists, placed within or outside of governments[[4]](#footnote-5) are asked to solve problems for the state, the solutions they propose in turn enter the realm of economics as a science, granting a kernel of truth to the old economists joke that economics is the science that proves in theory what works in practice (cf. Blinder 1998: 47). In other words, economics as a profession has often advanced through solving practical problems posed by governments or market actors (Fourcade 2009: 261), subsequently integrating these insights into academic discourse. Thus, in contrast to the predominant self-understanding of economics as an abstract science, detached from economic practice, this line maintains that much of economics’ intellectual development has been driven by economic practices of applied economists.[[5]](#footnote-6)

This line of research provides strong empirical foundations against a linear understanding of the import of knowledge from economic theory into the realm of economic practice. However, neither does it advocate a view that simply inverts this relationship from economics as practice to economics as science (Hirschman and Berman 2014). Instead, it conceptualizes the evolution of economics in the context of the “co-production” of both economic model worlds *and* techniques for the intervention in the economy (Jasanoff 2004), a process which often occurs in the realm of “regulatory science” (Jasanoff 1990, 2011), a space where applied economists in administrative agencies interact with academic experts and draw upon economic knowledge to craft regulatory interventions.[[6]](#footnote-7) In this vein, the literature has documented that the economy as an object of intervention has been invented and reinvented (Mitchell 1998, 2005) by economic experts in administrative practice and in economics as a science (Breslau 1997a, b, 2003), thereby providing legitimacy to public interventions. It is this sometimes-tense relationship between abstract discourses and applied (administrative) intervention that can evoke changes in either of these two realms.

However, most sociologists still typically understand the link between these two realms of economics as a one-way street in which academic developments unilaterally drive shifts in policy (Abbott 2005, Chwieroth 2010, Mudge and Vauchez 2012), transferring and applying established economic frames to local policy problems (Reay 2012). Abbott (2005) is the most explicit about this link, when he notes that applied economists rely on the prestige of abstract economics, without making much use of it, a claim reinforced by the empirical findings of Reay (2012). He then theorizes that economics is imported via avatars into bureaucratic fields (s. also Mudge and Vauchez 2012), where their installation slowly shifts policy paradigms (Chwieroth 2010, Kentikelennis and Babb 2019). Such shifts are conceptualized as driven by changes in the understanding of what the appropriate role of the state in the economy is, norms which are conveyed and indoctrinated in university classrooms and subsequently enacted in policy circles (regarding the capacity of the neoliberal school to inculcate and promote these values, s. Henriksen et al 2022).

In contrast, Whitley (1984) conceptualizes in opposing direction the influence of innovations by economists working in policy-making institutions on academia. His main point is that academic and applied economists, despite different task environments, relate to each other in the larger intellectual field of economic knowledge production, where crucially also the latter can influence the former. In this vein, recent works show the importance of applied economists within international bodies for the evolution of the macroeconomic discourse on austerity (Ban and Patenaude 2019, Ban 2015, Clift 2018). Similarly, Thiemann et al. (2021) highlight the impact of applied central bank economists on the discourse about systemic risk after the crisis. This influence is built on, but notably extends beyond the creation of knowledge infrastructures, such as databases (Hirschman 2021), which applied economists not only build to inform policymaking, but also use to advance academic debates (Thiemann et al 2021, Thiemann 2022).

We follow the latter approach to understand these mutual influences of applied and abstract economics. In this context we argue that one needs to appreciate the dynamics of the global economics profession (Fourcade 2006), embedded as it is in the wider field of “intellectual production” of economic knowledge. To date, the literature points to the “mathematization” and the ensuing globalization of the economics profession, today united in a US-centred manner (Fourcade 2006, 2009). It also points to the shifts in the academic field, which saw the synchronous ascendance of business schools and the theme of efficient financial markets, which they invested in (Fourcade and Khurana 2013). Yet, the literature on the sociology of economics still largely ignores the effects of what Marcussen (2006) dubbed the “scientization of central banks”, which is the growing employment of PhD economists in central banks as well as their use to legitimize central bank actions and its potential impact on the wider economic discourse.

Hired to engage in research that could be useful for and/or legitimize applied policymaking, these researchers had both a remarkable impact upon the field of macroeconomics from the 1980s onwards (Claveau and Dion 2018) and on central bank practice, influencing the way interest rates were set based on predictions of their DSGE models. Operating in the space of regulatory science situated between regulatory practice and academic theory, these economists not only transfer and apply economics to regulatory questions (as in the case of DSGE models), but as we will seek to show also transform regulatory questions into issues of abstract economic theory.

# The evolution of the economics profession and the scientization of central banks

Economics has since the 1960s globalized in a US centred manner (Fourcade 2006). The field is united through mathematics, which has become the central language of economics since the 1960s (Reay 2012, Brine and Poovey 2017). This globalized profession defines which styles of economic reasoning are legitimate and which are not, with prestige in the system concentrated in journals and departments that are mainly US based (Fourcade 2006). As Fourcade et al. (2015) show, this concentration of economic prestige has gone hand in hand with a particularly self-referential discourse leading up to the financial crisis, which largely ignored contributions in other fields of the social sciences.

Economics’ mathematical predilection favoured the rise of finance as an ever-more important subfield in the economic discourse in the three decades before the crisis (Polillo 2020, 2015) which coincided with the growing prestige of business schools and their professors.[[7]](#footnote-8) This rise of financial economics and business schools was the outcome of a reconfiguration in the field of economics (Fourcade and Khurana 2013), intrinsically linked to the rise of the Efficient Market Hypothesis in the 1970s (Fourcade and Khurana 2013, Polillo 2020, Whitley 1986). Sponsored by pension funds to legitimize the expansion of capital market activities (Whitley 1986), this new discourse was discarding all the elements that linked the macro-economy and finance, instead testing the strong assumption that financial markets incorporated all available information and hence efficiently allocated scarce capital (Polillo 2020, Summers 1983). Clothing itself in mathematical language and benefitting from data provided by pension funds and other financial actors, financial economics established itself as a reputable subfield in economics (Fourcade and Khurana 2013), whose contributions were rising in the mainstream journals before the crisis (Fourcade et al.2015).

One unintended consequence of this rise of financial economics lay in its impact on macroeconomic reasoning. Due to a confluence of different theorems, in particular the Modigliani-Miller theorem on capital market financing as well as the efficient-market hypothesis, the problem that financial markets might pose to the macroeconomy largely disappeared from macroeconomic reasoning (Aglietta 2018). Instead, the assumption of efficient capital market pricing meant that financial markets were not seen as a source of instability for the macroeconomy, allowing them to be safely ignored in the latest type of macroeconomic models, called Real Business Cycle Models, as well as in their New Keynesian successors (Kydtland and Prescott 1977, Helgadóttir 2023). This is to say, a divorce of these two streams of investigation, one into macroeconomic dynamics and one into financial markets occurred at this critical juncture in the late 1970s and early 1980s. Explaining this separation, Claessen and Kose (2018) write:

“The literature has exhibited an ***oscillating pattern between integration and separation of financial and real economy issues***. Early studies often considered developments in the real economy and financial sector jointly, but they resorted to mostly **qualitative approaches**. Later studies, however, emphasised the separation of the real sector from the financial sector and subscribed to the idea that the financial sector was no more than a ‘veil’ to the real economy. … An influential branch of the macroeconomic literature (following the real business cycle (RBC) approach) mostly focused on models that **do not account for financial imperfections and their potential role in shaping macrofinancial linkages**.” (Claessen and Kose 2018: 64, emphasis ours)

It was hence the highly influential Real Business Cycle Models by Kydlandt and Prescott (Kydtland and Prescott 1977), which were driving the transformation of macroeconomics into a model world in which finance could be safely ignored (for a trenchant critique, s. Romer 2016). These models ended a long Keynesian tradition, where to the contrary finance did play an extensive role (Tobin 1981, Greenwald and Stiglitz 1993). Since these new models were populated by single rational agents in dynamic stochastic general equilibrium (Helgadóttir 2023: 272) they had no place for the possibly disturbing impact of financial markets on the macroeconomy (s. Brine and Poovey 2017: 288f). Until the late 1970s economists, such as Keynes, Gurley and Shaw (1955) or Tobin (1981), had emphasized the impact financial booms and busts can have on the macroeconomy. In contrast, the new rational choice models of the macroeconomy assumed financial markets to be sufficiently stable, so that risks of instability could safely be neglected (Claessens and Kose 2018, Brine and Poovey 2017: 354ff).

This divorce manifested itself in the establishment of financial economics as a professional subdiscipline populated by business school professors on the one hand (Khurana 2010, Fourcade and Khurana 2013, Fourcade et al.2015) and new classical and new Keynesian macroeconomics professors in university departments on the other hand. It was to be decisive for the incapacity of the economics profession at large to both observe the build-up of systemic risks in the financial system pre-crisis as well as the devastating macroeconomic consequences of their materialization. Despite the existence of some works on shocks to financial institutions affecting macroeconomic dynamics (Bernanke 1983, Bernanke and Gertler 1990)[[8]](#footnote-9), the general take on the link between finance and the macroeconomy was a positive one, linking financial deepening to economic growth (Levine 1997). These intellectual field dynamics were aggravated by the fact that they extended beyond the purely academic realm to the field of applied economists, including those working for central banks (Claveau and Dion 2018, Marcussen 2009b). This community was growing both in size and influence from the 1980s onwards, as central banks were realizing the symbolic and political capital that could be gained by rigorous economic analysis, bestowing legitimacy for monetary policy decisions domestically and increasing the epistemic authority in increasingly international discussions on monetary policy (Fourcade 2009: 260, Johnson 2016).

In the context of this “scientization of central banks” (Marcussen 2006, 2009a, 2013), the increasing engagement of central banks with economics meant that they started to act not only as consumers, but also as producers of knowledge.[[9]](#footnote-10) In this vein, Claveau and Dion (2018) show the role of central bank economists in establishing monetary economics since the 1980s as a clearly defined and high-impact disciplinary project, tracing their long lasting and important impact in journals such as the Journal of Money, Credit and Banking. Central banks and their economists were key actors in the establishment of this field, establishing dynamic Stochastic General Equilibrium models as the unequivocal gold standard for macroeconomic modeling. Drawing directly on Real Business Cycle Models in academic economics (Helgadóttir 2023), central bankers were applying and refining these models in their daily practice, with the ECB’s DSGE model being hailed by prominent academic economists as a breakthrough in modelling techniques (Mudge and Vauchez 2018, p. 261f). In an ironic twist, the scientization of central banking, leading to the refinement and the use of DSGE models by central banks was effectively blindsiding policymakers to the impending developments in financial markets (Golub et al.2015), since these models did not account for the possibility of large-scale problems emanating from financial markets (Stiglitz 2018).

# The Post-crisis situation

Post-crisis, these gaps and misconceptions of financial markets in the leading literature on macroeconomic models as well as on financial economics led to an increasing questioning of economic expertise, both in the general public and in central banks (for the Fed, s. Abolafia 2020), in particular of simple DSGE models (Trichet 2010, as cited in Plassard 2020: 2). This critique coincided with a political request by the G20 in 2009 to install a macroprudential regulatory framework (G-20 2009), which would give increased importance to economic expertise in the realm of financial regulation. In this situation, central banks were asked to develop a framework to detect the build up of systemic risks in order to facilitate early counteractivities with the aim to create a more resilient financial system (Thiemann 2019), a task which risked repoliticizing their activities (Goodhart 2015).

In what followed, a process of research on financial instability unfolded (Malovana et al. 2020), including the construction of early warning systems, which was very much dominated by the need for applied economists, often operating in financial stability and/or statistics departments[[10]](#footnote-11) to act upon this demand, seeking corroboration for their mandate in economics (Thiemann et al. 2021, Thiemann 2022). This situation posed a dialectical tension between economics as an administrative craft and economics as a social science. While the latter had largely ignored the dangers which could arise for the macroeconomy from financial markets until that moment in time,[[11]](#footnote-12) the former was mandated to act on exactly these issues. To resolve this tension, central bank economists engaged in a massive research program (Thiemann et al. 2021), which as we will seek to show below also had a transformative impact on the academic discourse on finance and the macro-economy, bridging the two priorly unrelated fields. Occupying central positions in the co-authorship networks which link these two fields, these authors effectively became a driving force in a process of innovation which affects both of these fields in turn.

# Methods and Data

To better understand the larger impact of this work of applied central bank economists after the financial crisis on the academic discourse regarding finance and the macroeconomy, we investigate whether a subfield has emerged that links finance and the macroeconomy, problematizing the impact of the former on the latter. To do so, we adopt an analytical framework which combines quantitative analysis of a large corpus of economic papers written in macroeconomic and finance journals from 1990 to 2019, using text mining and bibliometric analyses with a prosopographic analysis of author CVs.[[12]](#footnote-13) We hence follow prior studies of subfield emergence in macroeconomics (Claveau and Gingras 2016) which have used citation data and dynamic bibliographic coupling analysis to then complement it with a topic model of article abstracts and in-depth CV data to get at the trajectories of central authors in the new subfield. Below we explain the corpus construction and the analytical techniques used.

<<Insert Figure 0 about here>>

For our analyses we draw on two data sources: We mainly use 69251 bibliographic records from Web of Science and complement these with CV data obtained by web scrapping.[[13]](#footnote-14) We process this data by implementing a combination of Python and R code. The data basis for our analysis are the results of a search in the Web of Science database, whereby we extracted all the papers from the top 20 journals in macroeconomics and finance according to the ranking by the SSCI index in November 2019. We chose this list of the top 20 journals for each field to cast our net wide. As these two lists somewhat overlap, we end up with 37 journals (for a list of the journals, s. Table A9). Based on this search we obtain 69251 individual records.[[14]](#footnote-15) In a first step, we filter these records to retain only entries that provide enough information to conduct the subsequent bibliographic analyses and the topic modelling. Since a substantial proportion of the documents in this corpus either lacks an abstract (AB field) or a list of cited references (CR field), we derive two different sub-corpora built specifically for the bibliographic network analyses (containing information in the CR field), on the one hand, and for the topic modeling (containing information in the AB field), on the other hand. This gives us 61115 records on which we base the subsequent topic modeling and 66765 records that will be included in the analysis of bibliometric networks.

# Topic Modeling

The topic model that we construct in order to track the changes in the composition of the economic discourse between 1990 and 2019 is based on the article abstracts from the „AB“-field in the Web of Science records. We tokenize each abstract, remove a set of stopwords and stem the data with Natural Language Toolkit (NLTK) to obtain a document-term-matrix which contains the number of occurrences of each token in each article abstract of our corpus. Subsequently, the document-term-matrix is analysed using topic modeling as implemented in the Latent Dirichlet Allocation (LDA) to identify the strength of each topic in each abstract. Based on these results we can then both detect the impact of each topic on the economic discourse over time and the interrelation of different topics. Furthermore, we can subsequently conduct a cross-analysis using the results of the bibliometric network analyses described below to gain an insight into how different topics move through the bibliographic network over time.

# Bibliometric Analyses

The second central component of our data analysis consists of a bibliometric analysis to identify changes in the economic discourse on a structural level. In a first step, we conduct a dynamic bibliographic coupling analysis of time windows of 6 years, followed by a comparative bibliographic coupling analysis for two time periods, namely the period until the financial crisis (1990-2007) and the period afterwards (2008-2019), identifying the formation of thematic clusters based on keywords. Bibliographic coupling operates by linking paper to each other which cite common sources, thereby identifying common fields of focus. To implement a fine-grained temporal analysis, we group the articles into overlapping time windows with a duration of 6 years and construct a bibliographic coupling network for each time-window, allowing us to trace the evolution of academic discourse on a yearly basis. By moving the time frame by one year we obtain 25 time-windows between 1990 and 2019. The nodes in each of the 25 networks represent the documents published in the 6-year time span of the respective time-window, while the weight of the edges corresponds to the number of references that two articles share. We then identify partitions of articles, i.e. communities with strong internal compared to few external connections, in the bibliographic coupling network of each time-window by drawing on the Louvain Method[[15]](#footnote-16). Finally, we compare the composition of communities in subsequent and thus partially overlapping time-windows to detect sequences of interrelated partitions.

Following the approach introduced by Claveau and Gingras (2016) we compare the composition of each partition in one time-window to each partition in the subsequent time-window. In order to do this for two partitions A in time-window T1 and partition B in time-window T2 we determine the percentage of heritable documents of partition A in time-window T1, that is documents that art part of partition A and are also in time-window T2. If partition B in time-window T2 gets more than 65% of these documents, this partition is considered a child of partition T1 in A. If the percentage of heritable nodes that a partition B in time-window T2 receives from a partition A in time-window T1 is between 25% and 65%, the relation is treated either as a split or a merger. A value below 25% is indicative of no relation between the partitions of two adjacent time-windows. A sequence is consequently a series of partitions in subsequent time-windows that are children of each other by virtue of being composed to at least 65% of the same documents according to the Louvain community detection.

We then combine the results of our topic modeling with analysis of sequences in the bibliographic coupling networks to show which topics dominate which sequences. In addition, we engage in citation and co-authorship network analysis as well as co-citation analysis to identify both the most cited papers and the most prominent authors in the sequences.

# CV data

In a last step, we use the author information in our database and a web-scraping algorithm to download the CVs of the 40943 authors of the overall sample. We are able to scrape the CVs of 20643 authors, of which 3827 authors are flagged as having a central bank or an International Organization in their CV. Checking the validity of the algorithm detection by hand coding a random sample of 600 authors, we find the algorithm to correctly flag central bank affiliation in 68% of the cases (compared to a rate of 32% of false positives) and to miss an actual central bank affiliation in 6% of the cases. We decided to accept those authors, who were flagged as having no affiliation and not to hand code these, but to hand code all the 3827 authors flagged as having such an affiliation. In addition, we code an additional 7124 authors, whose CV the algorithm was not able to find but whose papers have received at least one citation from papers in the corpus. Lastly, we cross-checked the accuracy of our data using the Web of Science Records, detecting central bank affiliated authors with the help of the first author column as well as the address provided in the column address (Table A14).

# Summary of our research strategy

As we investigate the changes in the discourse on macroeconomics and finance post-crisis, topic modeling allows us to see if there is a topic on financial crises in the corpus and if so, how it evolves over time. Meanwhile, dynamic bibliographic coupling affords us the possibility to trace the formation of subfields in the economic discourse over time, in order to investigate whether a sub-field on financial crises has formed and if so, when and from which origins. With respect to the question whether the field of finance and the field of macroeconomics have moved closer together over time, we use the measurement of inter-cluster density between bibliographic coupling clusters, i.e. we trace the number of common reference points in terms of articles that two clusters share. Here, an increase in the inter-cluster density points to an intellectual “rapprochement”, the nature of which we can investigate by looking at the references which contribute the most to the linkages between fields. Lastly, tracing the authorship affiliation in these sequences allows us to show which institutions were key to those interventions that ultimately restructured the field.

# Findings

In the following we present our findings, moving from topic modeling results to the dynamic bibliographic coupling. After discussing the overall evolution of the academic field, we investigate the content of a newly formed sequence, which from 2011 onwards explicitly treats the topic of financial instability, to then compare the distribution of central bank authors with that of other sequences. In a last step, we investigate the inter-cluster density between clusters on the macroeconomy and on finance, documenting the peculiar role the cluster on financial crises plays in linking the two.

# Topic modeling

Applying topic modeling to the entire data set, we settled on 40 topics after a round of iterations, as 40 was the highest number of topics which did not result in “garbage” topics. This model reveals two topics with a focus on financial crises which we named *Financial Crises Dynamics Topic* (topic 9) and *Mortgage Credit Dynamics Topic* (topic 34).

<<Insert Table 1 about here>>

As signalled by the tokens of these two topics, both deal with credit risks and the dynamics they can engender. The first topic on financial crises dynamics approaches the topic with a macro-lens that focuses on the banking system, liquidity risks and emergency liquidity facilities by central banks. It centres around the following three issues: systemic risks in banking systems, the credit supply of banking systems after financial crises and the increasing competition banks face from shadow banks. The topic dominates papers which were published mainly from 2009 onwards (84 of the first 100 papers most connected to the topic are published after that date) and is predominant in articles published in Finance Journals as well as the Journal of Money, Credit and Banking.

The second, more micro-economic topic, focusses on the measurement (through credit ratings) and evolution of mortgage markets, individual defaults and credit risks. This topic is very much related to the particularities of the US housing market and its financial crisis dynamics of 2007-2008. Being more micro-focused and more linked to the institutional peculiarities of the US market, the topic is dominated not only by journals on Finance and the Journal of Money, Credit and Banking, but also journals such as Real Estate Economics and the Journal of Accounting. The topic also reaches its peak influence a bit earlier, with 25 of the top 100 papers being published before 2009.

Below we depict the evolution of the percentages of these two topics in our corpus to show that these two topics, starting from very low levels at the beginning of the 1990s, are persistently growing over time to both reach their point of maximum influence in 2016. In comparison, the topic on Financial Crises Dynamics reaches an even stronger presence post-financial crisis than the topic on Mortgage Credit Dynamics.

<<Insert Figure 1 about here>>

In a next step, we select papers which score a particularly high value for at least one of these two topics and analyse their distribution over time and the affiliations of their authors. Based on a cut-off value of 20%, a number of 3888 papers in the entire corpus is strongly associated with our two focus topics. Figure 2 displays the percentage of papers that are dominated by one of the two topics per year, showing the growth of papers that are highly affiliated with the topic Financial Crises Dynamics and Mortgage Credit Dynamics from 2009 onwards, clearly pointing to the importance of the financial crisis as a triggering event for such kind of research.

<<Insert Figure 2 about here>>

When analysing author affiliation of the papers that are strongly influenced by these two topics, we find a very strong presence of authors with a central bank background. In fact, the topic Financial Crises Dynamics is the topic with the highest presence of authors having a central bank background (42%), just ahead of the topic on monetary policy topic which is followed by the topic on Mortgage Credit Dynamics. The latter still shows a percentage of central bank authors that is more than three times higher than the average of the corpus as a whole. These results underscore the strong engagement of central bank authors with these topics.

<<Insert Table 2 about here>>

# Dynamic Bibliographic coupling Sequence analysis

The results of the topic modeling show the rising problematization of financial system properties in general and its crisis-proneness in particular. To gain a more fine-grained understanding of the evolution of the relationship between this topic on financial crises and other themes in the dominant economic discourse, we now engage in a structural analysis to detect bibliographic clusters in our corpus. Based on our dynamic sequencing analysis, we can identify 48 sequences that last on average for about 5 6-year time windows (see figure 3 below). We then determine the most important keywords in each sequence to classify its content (Table A17-A18). Finally, we analyse the composition of these sequences in terms of authorship and their changing interrelationship over time.

<<Insert Figure 3 about here>>

While several sequences are either associated with macroeconomics or finance,[[16]](#footnote-17) only a single sequence (sequence 42) deals predominantly with financial crises.[[17]](#footnote-18) This sequence appears in the time window 2011-2016 as a split from the sequence on financial market governance (sequence 8)[[18]](#footnote-19). In line with the keywords of the financial crises sequence, the topic on Financial Crises Dynamics and the topic on Mortgage Credit Dynamics dominate the papers in the sequence (s. figure 4 below).[[19]](#footnote-20)

<<Insert Figure 4 about here>>

This focus is further confirmed by a study of the 10 most cited papers in sequence 42, which all concentrate on financial crises. The first group of papers places them in a wider historical context which sees credit cycles at play (Schularick and Taylor 2013, Reinhart and Rogoff 2011), while the second seeks to explain the dynamics of the Great Financial Crisis (Gorton and Metrick 2012, Berger and Bouwman 2013). Other works, linked to the practical application of economic knowledge, explore measurements of risks in the banking system to predict future crises (Gilchrist and Zakrasiek 2012, Adrian and Brunnermeier 2016, Acemoglu et al.2012, 2015). The last two papers seek to embed financial crises into broader macroeconomic dynamics, linking it to global capital flows (Forbes and Warnock 2012) and thus integrating them into a macroeconomic DSGE model (Brunnermeier and Sannikov 2014).[[20]](#footnote-21)

A few things stand out about these top 10 cited papers of the financial crisis sequence and the sequence in general. Most importantly the sequence is not confined to specialist journals of finance. Instead, six of the ten top papers were published in the American Economic Review, a generalist journal showing the appeal of these papers to a broader audience after the financial crisis. Similarly, the overall general distribution of papers in journals indicates that papers in this sequence have been published in a wide array of generalist and impactful journals. As the distribution of papers across journals (see figure 5) shows, the sequence has not only a strong presence in specialist journals, such as the Journal of Money, Credit and Banking, but also contains a high percentage of articles published in generalist journals, such as the American Economic Review and the Review of Financial Studies (for a distribution of papers across journals in sequence 42 s. Table A9).

<<Insert Figure 5 about here>>

A second point regarding the sequence is the prominence of central bank authors: Based on a manual inspection of the most important papers, we find that six of the top ten papers[[21]](#footnote-22) and more than half of the top 100[[22]](#footnote-23) papers in this sequence have at least one co-author with some form of central bank affiliation. We find the same strong prevalence of authors linked to technocratic institutions, when looking at the papers that are most cited by papers in sequence 42.[[23]](#footnote-24) This strong presence of central bank authors among the top papers can be confirmed for the sequence on financial crises as a whole by using the author address information provided by Web of Science to identify the institutional affiliations of authors. Here, we find more than 25% of papers in sequence 42 having at least one central bank affiliated author. In a comparative perspective, the financial crises sequence is thereby similar to the macroeconomic sequences on monetary policy, inflation and unemployment (sequence 18, 22, 26, 32 and 37). In contrast to the high presence of central bank affiliated authors there, the sequences on finance (sequence 7, 8, 19, 41, 43, 44) which are marked by a relative low involvement of authors with institutional links. (s. Figure 6).[[24]](#footnote-25)

<<Insert Figure 6 about here>>

The strong presence of central bank authors in both the sequence on financial crises and the sequences on macroeconomics indicates a shared concern around the tasks of modern central banks among at least part of the author population in the newly forming subfield. This formed the foundation, as we argue below, for the financial crises sequence to become a central connecting sequence between the sequences on finance and the sequences on macroeconomics.

# Interlinkages between the sequences in the bibliographic coupling network

When analysing the linkages between sequences in the dynamic bibliographic coupling network, we observe in general strong links among the macroeconomic sequences (18, 22, 26, 32, 37) and among the financial sequences (7, 8, 13, 19, 41, 43, 44), but few edges connecting these two groups of sequences.[[25]](#footnote-26) This structural hole between the two groups of sequences is filled by the financial crisis sequence (42) which connects these formerly separated fields of knowledge, a finding which is vindicated by an analysis of the respective citation networks. In this vein, papers in the financial crisis sequence prominently cite papers from the macroeconomic sequence and are cited by papers from the macroeconomic sequence (Table A5).[[26]](#footnote-27)

An analysis of the evolution of the inter-cluster density established between the different sequences across time windows confirms this stronger interlinkage between papers in sequences on finance and those in sequences on macroeconomics. To illustrate this increased connection, we display below the results for the time window 2003-2008 and the time window 2013-2018 (Table 3).[[27]](#footnote-28) In the first time window, the linkage between the three finance sequences and the macroeconomic sequence on monetary inflation and unemployment is weak, with an overall average inter-cluster density of 0.0117. In contrast, in 2013-2018, the inter-cluster density between the three finance sequences is more than 60% stronger with an increased average inter-cluster density of 0.0191. This increase can largely be accounted for by the Financial Crisis Sequence, whose inter-cluster density with the macroeconomic sequence in turn is more than 40% higher than the overall new average.

<<Insert Table 3 about here>>

This comparatively high inter-cluster density between the sequences on financial crises (42) and on macroeconomics (37) is undergirded by the fact that they have the highest percentage of shared authors of all sequences, with 23% of the authors in the macroeconomics sequence (37) having published at least one paper in the financial crisis sequence (42), a finding which is even more pronounced for central bank authors. Here, 34% of central bank authors which have published in the macroeconomic sequence 37 have also been publishing in sequence 42 on financial crises. This finding strongly suggests that the linkage between the sequence on financial crises and macroeconomics is strongly supported by (central bank) authors active contributions in both sequences and by the strong presence of central bank authors in general.[[28]](#footnote-29) The centrality of central bank affiliated authors in this literature is further confirmed when analysing the co-authorship network formed by the 8009 authors publishing in sequence 42 and sequence. In the largest subcomponent of that network, the 21,7% of authors with a central bank affiliation have on average 50% more edges than the average author and their eigenvector centrality measure[[29]](#footnote-30) is more than twice as high (s. table A19).

Our analysis below seeks to further analyse these overall shifts in the discourse on macroeconomics and finance from pre- to post-crisis by comparing the two respective bibliographic coupling networks (1990-2007 vs. 2008-2019). Here, once more, the bridging function of the papers on financial crises, connecting the discourse on finance and the macro-economy can be confirmed, which is establishing a new perception of the macroeconomic dangers inherent in financial markets. We furthermore show the crucial role of central bank authors in creating this bridge.

# Bibliographic Coupling Network Analysis for the Period 1990-2007 and 2008-2019

The dynamic bibliographic coupling analysis above shows the emergence of a sequence on financial crisis in 2011 that acts as a bridge between the formerly separated sequences on finance and macroeconomics. To capture the cumulative extent of this larger shift linking finance and macro-economics over time, we conduct an additional static bibliographic coupling network analysis, comparing the periods before (1990-2007) and after (2008-2019) the financial crisis. For each period, we identify the largest component of the bibliographical coupling network and, using the Louvain algorithm, its internal clusters. We then proceeded to establish the relevant clusters for our analysis using the dominant keywords per cluster, a reading of the abstracts of the most important papers as well as the membership of papers in the sequences identified in the dynamic sequencing analysis described above.

Using this approach, we identify 4 clusters of relevance for the first period (1990-2007), three of which are on finance and one on macroeconomics.Two of the clusters on finance are covering the efficient-market hypothesis and financial market governance respectively, which have little to no relationship to macroeconomics.[[30]](#footnote-31) This limited quantitative engagement of finance with macroeconomics based on qualitative approaches which declared that one could safely neglect one in terms of the other would change for the period 2008-2019, in which we see a much stronger relationship.

<<Insert Table 4 about here>>

In the bibliographic coupling network from 2008-2019, there are altogether three clusters of relevance, one on financial governance and macro-finance, which now also includes a strong component of papers from the sequence on financial crisis (42), one on financial market behaviour, which brings together work on efficient markets and financial market volatility and one on macroeconomics, which now also includes a component of papers from the sequence 42 on financial crises. The cluster on financial governance and macro-finance, as well as the pure cluster on financial market behaviour have a much stronger bibliographic coupling relation with macroeconomics than the clusters on finance before the crisis, with the average density being almost twice as high for both clusters (Table 4).[[31]](#footnote-32)

To explain the factors driving this difference in connection between the clusters over time, we investigate the contribution, which the presence and connecting role of papers on financial crises have made during these two periods. Drawing on all the papers identified in the topic modeling, which have a high membership for the topic on financial crises dynamics in both time periods, we first identify a much greater presence of papers on financial crises in both the clusters on macroeconomics and on finance from 2008 onwards (Table 5).

<<Insert Table 5 about here>>

In a second step, we then investigate the contribution, which these papers on financial crises made to create links between these clusters on macroeconomics and finance. Here, we find that in both periods these papers created on average a higher number of links than the average paper in these clusters, their contribution in the 2008-2019 period being particularly strong (Table A7 and A8).[[32]](#footnote-33)

Figure 7 below graphically depicts these increasing linkages between finance and macroeconomic clusters over time and figure 8 depicts the central role of papers strongly shaped by topics on financial crises within each cluster to create these linkages.[[33]](#footnote-34)

<<Insert Figure 7 about here>>

As Figure 7 illustrates, the two clusters on finance in the 2008-2019 period have a much stronger connection to the cluster on macroeconomics (blue) than the clusters on finance to macroeconomics (green) in the 1990-2007 period. Figure 8 depicts the contribution from papers on financial crisis to this increasing connection, with the link between the cluster on financial governance and macro-finance and macroeconomics being primarily driven by the papers on financial crises (figure 8, right hand side), clarifying the central focus of this linkage. In contrast, this connection created through financial crises papers between financial governance and macroeconomics, channelled is much weaker pre-crisis (s. figure 8, left hand side).

<<Insert Figure 8 about here>>

These changes in the connectivity of clusters go hand in hand with a rising contribution by central bank authors to these clusters, with their presence in these relevant clusters almost doubling from 1990-2007 to 2008-2019.[[34]](#footnote-35) Their central role in these clusters, and in particular their central role for the papers on financial crises within them (s. table 2) is suggesting central bank economists as important actors in the increasing linkage of these clusters, bridging the hole between them.

# Conclusion: The role of central bank economists in the reintegration of financial instability into the macroeconomic discourse

This paper set out to investigate the impact the financial crisis has had upon the scientific discourse on macroeconomics and finance by analysing the complete corpus of papers published in the top journals of economics and finance from 1990 to 2019. To do so, it combined dynamic bibliometric analyses of publication patterns with a topic modelling analysis to trace the evolution of themes and paradigms. Using this approach we identified two topics, one on financial crises dynamics and one on mortgage credit dynamics, that document the rising importance of the theme of financial crises and their macroeconomic consequences. Both topics became particularly important after 2007, with about two-thirds of the papers published from 2008 onwards strongly affiliated with them. These results show the responsiveness of the economics profession to the financial crisis of 2007-2008.

Using bibliographic sequencing analysis, we were then able to identify the emergence of a sequence on financial crises dynamics and their impact on the macroeconomy from the time window 2011-2016 onwards (sequence 42). This sequence of papers focuses on financial crisis, systemic risk and links these to monetary policy. It emerges from the sequence focusing on financial governance, which from 2010 onwards split into several clusters, yet also imported important new elements. Most notable in the analysis of this corpus is that authors from central banks are strongly present, only matched by the sequence of papers that build macroeconomic models for central banks to set their monetary policy. This finding shows that central bank economists have become a driving force in the evolution of the academic economic discourse since the financial crisis which sought to reflect and integrate the experience of the financial crisis in abstract economic reasoning (s. figure 9 below).

 <<Insert Figure 9 about here>>

In a next step, we then showed that this cluster of papers is an important element in forging a linkage between the discourses on macroeconomics and finance that did not exist before the financial crisis. In this vein, the paper documents the rise to prominence of a view that sees finance as operating in credit cycles which poses a potentially destabilizing macroeconomic factor post-crisis. This new view, which bridges these two discourses, has been carried forward by an alliance of central bank and academic economists, pushing publications that communicated this new view into the top journals of the profession. These papers examine “macro-financial linkages” (Claessen and Kodres 2018, Cochrane 2017), through which fragile financial systems can bring about severe recession, just as it happened during the Great Financial Crisis of 2008. They are in part the outcome of a reflection of central bank economists charged with surveilling financial vulnerabilities and their potential impact upon the macro-economy (cf. Adrian et al.2013, 2016), a task added to the duties of central banks post-financial crisis. As institutional actors, central banks facilitated this bridging across domains by bringing together economists working on macroeconomics with those working on finance, often mandating them to work on the topic jointly (s. Thiemann 2022).

This research then not only validates a notion of the dialectical relationship of economics and the economy, as proposed by scholars such as Fourcade (2006, 2009), which expresses itself in the craft of administering the economy and which can have a formative impact upon the abstract science of the economy. It provides more empirical insights into mechanisms that drive this process of influence from theory to practice and from practice to theory. In this respect, the study is first pointing to the capacity of applied economists, situated between scientifically informed practice and abstract scientific discourse in the space of regulatory science, to bridge different subfields in order to address their issue area of interest. These issue area of interest are not primarily driven by academic incentives, but primarily by the interests of their employer, central banks. Doing so, they take up a bridging role, holding important authorship positions simultaneously in the fields of finance and of macroeconomics, evoking innovations in both of them in turn.

In a longer-term perspective, these research findings point to two different dynamics that characterize the work of applied economists in the realm of regulatory science, where they mediate between abstract academic discourses and administrative craft (s. figure 10 below). It was first an abstract discourse on finance and the macroeconomy in the academic field which came to dominate the wider intellectual field of economics and the craft of administering it in the 1980s, ousting the practical knowledge of the cyclical dangers of finance to the macroeconomy.[[35]](#footnote-36) Central bank economists applied New Keynesian DSGE models to their task of economic predictions, fitting the model to their data and thereby refining the academic modelling techniques in turn (Mudge and Vauchez 2018). Incorporating academic models in their work in this way, the craft of governing the economy was blindsided and ignored financial market developments at its own peril, being thrown off guard by events it did not anticipate.

<<Insert Figure 10 about here>>

Subsequently, it was the requirements of the repositioning of this craft which shaped the evolution of the abstract scientific discourse, seeking to re-insert the knowledge regarding the dangers of finance for the macroeconomy into economic discourse. In this sense, the financial crisis, acting like a quasi-natural experiment evoked works on the links between the macroeconomy and the financial system, which focused on the potentially destabilising dynamics within the financial sector and their impact on the macroeconomy. This question posed itself not merely as an academic exercise, albeit making it an appealing topic to academics, which found increasing outlets for such work. It was also raised in the context of an administrative issue, namely the monitoring and supervision of the financial system with the view to prevent system-wide disruptions which could threaten the macroeconomy. This task fell primarily to central banks, which tasked their personnel to engage in analytic studies of these relationships, based on new datasets which were built explicitly for that purpose (Thiemann 2022). Bereft of ready-made models to think about these linkages between the macroeconomy and finance, central bank economists became an important force of innovation to introduce these linkages into the reflections both on macroeconomic dynamics and finance. Their work in turn contributed to creating a new interlinkage between macroeconomics and finance in the academic discourse, where before there was a gaping “hole” (Reis 2018, 140).

In this way, the financial crisis interrupted a self-referential academic discourse, largely centring around professional interests and notions of academic elegance in mathematical modelling (Helgadóttir 2023) and opened a venue towards a discourse, which is more other-referential and more attuned to the developments in the wider intellectual field and the realm of economic administration (Thiemann 2022). Our analysis points to a central role of central bank economists as mediators of this dynamic, both in the field of macroeconomics and finance. As applied economists in central banks post-crisis were tasked to develop tools to manage financial stability (such as early warning systems regarding the build-up of systemic risks), they engaged in a large-scale research program, allying with academic economists to generate stylized facts about the relationship between finance and the macroeconomy which could justify their interventions (Thiemann 2022, for the general concept of stylized facts, s. Hirschman 2016, 2021). They were seeking to link these findings to the research of their colleagues on macroeconomics and the tools invented there to manage the macroeconomy. This led to a sizeable influence of this group on the scientific discourse on macro-finance, which in turn was shaped by the interests and pre-occupations of central banks.

What is the importance of this finding? This finding is of crucial importance for the economics profession’s ability to continue to claim a tutelary power over the economy (Fourcade 2006) in face of events which seem to contradict its main tenets: as a social system, the academic economic discourse combines self- with other-referentiality (Luhmann 1995). Like any other social system, it can show tendencies to follow an internal path-dependent logic of certain assumptions, methodological decisions and modeling techniques (Cherrier 2022), which exclude certain phenomena from view. Consequently, it might encounter a serious deviation of events from what is to be expected within its modus of observation and thus a crisis of the epistemic authority of economics as a policy guiding science ensues. Applied economists and their work then allows to recalibrate the academic discourse, by increasing the other-reference with respect to real world events. By allowing to make sense of the economic events which occurred, their work provides economics as a discourse a certain plastic flexibility to adjust itself to those events and the new administrative practices they bring forth. It is in this sense, we submit, that applied economists act as an important adjustment force for the scientific economic discourse, which by changing it from their position within the space of regulatory science maintains its legitimacy as policy-guiding science.

In this way, applied economists are a very important source for the power of economic discourse to maintain its claim of tutelary power over the economy, much more important than prior conceptualization of the relationship between abstract scientific discourse and applied policy making have assumed. What the career interests of these applied economists are and how they shape and bias central bank economists’ research remains an important venue for research, as the structural position of these economists within these institutions inevitably shape their blind spots (for a critical take, s. Gabor 2020). [[36]](#footnote-37) Future research can further inquire in how far the two research programs, the one on macroeconomics and monetary policy pushing DSGE models and the one on financial instability, have become interlinked (for a sceptical view, s. Helgadóttir and Ban 2021). Has there been a settlement in the field of economics after the polarization, which led to the emergence of the new field (Van Gunten 2015)? In how far have works on financial instability become an “obligatory passage point” (Latour 1999) for models of monetary policy? Did these efforts lead to a fusion of these two programs of governance in practice or do central bankers continue to implement their monetary policy without considering financial stability, ignoring finance at their own peril?

Beyond the theme of financial stability and macro-finance, this finding on the increased role of applied economists in policy-making institutions for the abstract economic discourse opens many new venues for research. The crucial question is when and under which conditions we are likely to see such increased influence of applied economists. Here, cataclysmic real-world events which call into question existing paradigms, such as the financial crisis, seem to be a necessary condition. These events increase the other-reference of academic discourse, that is their openness to “real world events”. This, combined with the research advantages applied economists do possess due to their preferential access to data sets and the organizational imperative to study these issues explains at least partially their newfound importance. These advantages are not shared by academic economists which face a different incentive set and can suffer from a certain inertia linked to publication records and established research traditions. Whereas academic economists can potentially avoid the study of such events, applied economists are exposed to direct pressure from superiors to produce knowledge on these issues (Whitley, 1984). In addition, the structural resources at the behest of applied economists play an important role. In our case, central bank economists’ research efforts were not only facilitated by the increased urgency of the new financial stability mandate of central banks, but also by the increased resources central banks could provide in the context of their increased revenue originating from Quantitative Easing.

Both these incentives as well as resources apply to other research areas as well, where academic discourse and policymaking have entered into a dialectical relationship in the realm of what has been called “regulatory science” (Jasanoff 2011). One might point here to the massive research budgets in regulatory agencies such as the FDA (Jasanoff 1990), which hire health economists to engage in cost-benefit analysis, to applied economists engaging in market design for electricity markets, e.g. in the European Commission (Reverdy and Breslau 2019, s. also Rilinger 2022) as well as applied economists working for securities market regulators. Seeking to justify new regulation (of e.g. drug prizing, electricity markets or securities markets) after scandals such as those involving the production of insulin, energy market’s volatile pricing practices as well as unexpected financial market volatilities, these economists have the incentives and wherewithal to engage in this kind of research. One might also point to the work of economists at Federal the competition commissions amidst recent attempts to break up and limit tech giants, such as Google or Meta in the United States or the EU. While the Chicago school understanding of competition, as applied in competition law has seen little justification for undertaking such a break-up (Davies 2010), where recent regulatory initiatives have drawn upon alternative economic theories to justify such interventions (e.g. Lau 2020).

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1. The public disappointment and outrage over this failure of economics was best encapsulated by the question of the Queen of England in November 2008, asking why nobody saw this coming, to which the British economists could only give a tautological answer, pointing to a collective lack of imagination (Bryan et al 2012). [↑](#footnote-ref-2)
2. A particular focus of these internal discussions was the missing financial sector in the dominant Dynamic Stochastic General Equilibrium (DSGE) models (critical, Stiglitz 2018, for a less negative view s. Reis 2018). [↑](#footnote-ref-3)
3. This ignorance is linked to the micro-level foundations of macroeconomic models, which assume rational agents with complete foresight. We would like to thank one of the reviewers for this suggestion. [↑](#footnote-ref-4)
4. Fourcade links the position of these economists to the historical evolution of the predominant place of economic expertise in national contexts and its links to economic governance. One might like to add that these placements are also cyclical with respect to economic paradigms, with the rise of Keynesian economics seeing the entry of economists in government agencies in large swaths (Hall 1989). [↑](#footnote-ref-5)
5. In this vein, e.g. the technique of linear programming, used to calculate macroeconomic models entered into the toolkit of economics after its large scale application during the second world war in the US. Similarly, game theory can be traced to efforts during and after the War to assess the dangers from enemies, such as the Soviet Union in a science called “cybernetics” (s. Mirowski 2002). [↑](#footnote-ref-6)
6. As Jasanoff (1990, 2011) points out, in this space it is not the same epistemic standards which apply, as the imperative for regulatory action sometimes can outweigh the imperative of absolute scientific certainty.. Yet, at the same time, the space of regulatory science also draws upon peer review and other methods of expert consultation for ensuring scientific quality. [↑](#footnote-ref-7)
7. Fourcade et al. (2015: 105) also show that the contribution by business school professors rose pre-crisis (also cf. Fourcade and Khurana 2013), while the contribution of economists in government declined (cf. Mudge 2018). [↑](#footnote-ref-8)
8. This first wave of research focused on the direct impact on banks’ balance sheet on the macroeconomy. It however did neither take a systemic view on financial system developments, which would evaluate the cyclical dynamics of the entire system, nor the interlinkages between different market segments which could affect the macroeconomy as a whole (Claessens and Kose 2018). [↑](#footnote-ref-9)
9. For a recent survey regarding the knowledge production of central banks, s. Malovana et al 2020) [↑](#footnote-ref-10)
10. Whereas economists working in research departments often write papers for academic journals without any direct impact on central bank action (s. Mudge and Vauchez 2016, 2018), this is different for those working in financial stability or statistics departments. Their research agendas are more constrained by practical tasks of the department, since they have to contribute directly to the institution’s policy decisions (s. Thiemann 2022). In this vein, they act as “boundarywalkers” between the realm of economics as a craft and economics as an abstract economic discourse (ibid). [↑](#footnote-ref-11)
11. Heterodox economists, such as Post Keynesians extensively investigated these questions, but their work found little attention in policy circles. [↑](#footnote-ref-12)
12. A quantitative, in contrast to a qualitative analysis, allows us to deal with the large corpus of data. Qualitative reading of selective texts is applied to confirm the validity and to interpret the quantitative results. [↑](#footnote-ref-13)
13. We additionally draw on the RePEc database to determine if and when an article has previously been published as a working paper in order to estimate the publication delay of the articles in our corpus. [↑](#footnote-ref-14)
14. We observe a continuous and gradual increase of publications per year over time. The great advantage of our analytical techniques used is that due to their focus on relative percentages, they are mostly insensitive to this kind of continuous growth. Whenever necessary, we seek to control for the secular growth trends, e.g. in the case of citations, where we contrast general growth trends with the growth for our particular case (s. the inter-cluster density analysis below). [↑](#footnote-ref-15)
15. We use the python package T. Aynaud. 2020. python-louvain 1.6: Louvain algorithm for community detection. https://github.com/taynaud/python-louvain that is in turn an implementation of Vincent D Blondel, Jean-Loup Guillaume, Renaud Lambiotte, Renaud Lefebvre. 2008: Fast unfolding of communities in large networks, Journal of Statistical Mechanics: Theory and Experiment 10, P10008. [↑](#footnote-ref-16)
16. There is a clear line of consecutive sequences focusing on macroeconomics and monetary policy (sequence 6, 11, 18, 22, 29 and 37) and several sequences on finance. Then there are two long, highly interrelated sequences on the efficient market hypothesis (sequence 7) and on financial governance (sequence 8) that split up in 2010-2015 and 2011-2016 respectively, giving rise to several new sequences, one of which is sequence 42. There are also sequences on endogenous growth theory, game theory, econometrics, economics of education, economics of globalization and China, which we do not elaborate upon, as they do not enter in contact with macro and financial topics. [↑](#footnote-ref-17)
17. The 10 top keywords of sequence 42 are financial crisis, G21 (= banks and other depository institutions), liquidity, systemic risk, monetary policy, financial crises, financial stability, banking, adverse selection, asymmetric information (Table A17). [↑](#footnote-ref-18)
18. The fact that this sequence emerges only from 2011-2016 onwards can be linked to the fact that it takes several years for papers to move through the peer review process. According to the RePeC database 44% of the papers in sequence 42 have been published as working papers. More than 97% of these working papers have been published after 2007, indicating that the Great Financial Crisis triggered most of the work in sequence 42. [↑](#footnote-ref-19)
19. Nota bene: These topics dominate no other sequence. [↑](#footnote-ref-20)
20. This focus on credit cycles and their impact on the macroeconomy is further confirmed when looking at the papers most central in the citation network formed by papers in sequence 42. Here, the highly mathematical paper on credit cycles by Kiyotaki and Moore (1997) comes first, followed by several papers by Raghuram Rajan which describe the effects of close lending relationships by banks, the impact competition can have on these relationships and the dynamics linking finance and economic growth (cf. Rajan and Zingales 1998). Other papers by Shleifer and Vishny (1992) and Brunnermeier and Pedersen (2009) explore the downside risks of the credit cycle that in turn can be linked to the risk of fire sales. [↑](#footnote-ref-21)
21. Two papers have authors which are working at the Federal Reserve at the time of writing. When expanding that list to people who have been working at a central bank before they wrote the paper, this number goes up to six of the top ten papers. [↑](#footnote-ref-22)
22. While 23 of the top 100 papers have at least one co-author working for a CB at the time of publication, another 23 papers have at least one co-author which had previously worked at a central bank and 11 papers are co-authored by person with a central bank advisory role. Thus, taken together, 57 out of the top 100 papers have at least one co-author with some form of central bank affiliation. [↑](#footnote-ref-23)
23. E.g. Kiyotaki, co-author of the second most cited paper of the sequence on credit cycles (Kiyotaki and Moore 1997) is holding a visiting position at the Fed at the time of publishing the paper. [↑](#footnote-ref-24)
24. This stark difference with the other sequences on the topic of finance in terms of institutional affiliation is further revealed by a direct comparison with the top authors on the Efficient Market Hypothesis (sequence 7) with those in the financial crisis sequence. In the financial crises sequence, 60% of the top 500 authors had an institutional link to central banks and/or international organizations throughout their career, whereas only 10% of the authors of the top 500 papers in the Efficient Market Hypothesis sequence (sequence 7) had such a link. For them, the link to private sector employment, in particular in the financial sector, had a much larger importance. As stipulated by the sociology of finance (Whitley 1986, MacKenzie 2006, Fourcade and Khurana 2013), economists working on the efficient-market hypothesis, which dominate the overall top publications have a strong link to private finance. In contrast, those working on financial instability have a strong link to central banks and international organizations. [↑](#footnote-ref-25)
25. In this vein, from 1997-2002 to 2009-2014, for 13 years, the sequences on the efficient market hypothesis and the sequence on financial governance (sequence 7 and 8) are the most strongly connected sequences in the whole sample. For an overview on citation patterns see Table A2-A5. [↑](#footnote-ref-26)
26. This strong linkage between the sequences on macroeconomics and financial crises post-crisis is furthermore supported by the overlap of papers which form part of both the macroeconomic sequence and the financial crises topic over the different time windows. More than 18% of papers that were assigned to the financial crisis sequence at least once were also assigned to the sequence on macroeconomics, the highest value of any finance sequence in terms of papers being cross listed in a sequence on macroeconomics. [↑](#footnote-ref-27)
27. This selection assumes that papers on the Great Financial Crisis were only published from 2009 onwards. [↑](#footnote-ref-28)
28. In this vein, the results reported in Table A16 show that papers by central bank authors, in particular of those publishing in both sequences generate a much higher number of edges between these two sequences than the average paper. [↑](#footnote-ref-29)
29. Eigenvector centrality measures not only the connectedness of authors, but also the number of edges the authors they are connected to hold, meaning that central bank authors are well connected to authors which are well connected. [↑](#footnote-ref-30)
30. The cluster covering volatility and option pricing’s relationship to macroeconomics, in contrast, is twice as strong (Table 4). These linkages are primarily created through papers which reference the Real Business Cycle Theory, such as papers by Robert Lucas (1975) and Kydtland and Prescott (1977), which account for the majority of bibliographic coupling edges created between these clusters (for the list of top ten papers creating these linkages, s. Table A10-A12). [↑](#footnote-ref-31)
31. As we will show below, this result is primarily driven by the increasing percentage of papers on financial crises and not by a general trend of rising citations, as a closer analysis of the two sub-networks reveals. While research suggests that the general number of citations is rising since 2005 due to the increasing use of the internet (Evans and Reimer 2009), which might explain part of this increasing inter-cluster density, it should be noted that the main density of the overall main component for these two networks only rises by 50%. In contrast, the density between the clusters on finance and the one on the macroeconomy almost doubles. [↑](#footnote-ref-32)
32. During this second period, papers on financial crises in the clusters on finance create on average 54% (financial governance) and 31% (finance) more bibliographic coupling links with papers in the macroeconomic cluster than the average paper in their respective cluster. This central role of crisis papers is even more pronounced for crises papers in the macroeconomics cluster, with these papers having three times more links with papers on financial governance than the average paper in macroeconomics (Table A8). [↑](#footnote-ref-33)
33. Each figure shows 1990-2007 on the left and 2008-2019 on the right side. To improve the readability of the graphs without distorting the results the figures display only 20% of the nodes and 3% of the edges of each network. [↑](#footnote-ref-34)
34. The percentage rises from 23% to 40% for the macroeconomic cluster; from 10% to 17% for the financial governance cluster and from 7% to 13% for the financial market cluster. [↑](#footnote-ref-35)
35. For an analysis, which points to the administrative and organizational redesign within central banks, which favoured the imposition of this abstract economic knowledge and the loss of this practical knowledge within central banks, s. Wansleben (2021). [↑](#footnote-ref-36)
36. This question seems particular apt for the work on macro-finance and the role central banks themselves might play in fostering financial instability. Are central bank economists able to reflect on this issue? Recent work on central bank research on QE suggests that the issue of self-reflexivity and blame avoidance has shaped central banks work on the effects of QE (Fabo et al. 2020). [↑](#footnote-ref-37)