Another strange non-death: The NAIRU and the ideational foundations of the Federal Reserve's new monetary policy framework

Tobias Arbogast[2], Hielke van Doorslaer[1], Mattias Vermeiren[1]

[1] Ghent University

[2] Max-Planck-Institute for the Study of Societies

Abstract

Monetary policy has long relied on the 'natural rate hypothesis', suggesting that after an economic shock the unemployment rate will automatically return to its supply-side 'natural' rate or NAIRU. Macroeconomic developments since the 2008 financial crisis have challenged this hypothesis, forcing the US Federal Reserve to conduct a strategic review of its monetary policy framework, published in 2020. We conducted an in-depth case study of the Fed through a content analysis of 120 speeches given by the Fed's top-level body (FOMC) from 2012 to 2022. We show that policy learning has occurred in that FOMC members have problematised the NAIRU either on (1) epistemological grounds, acknowledging the risk of relying on NAIRU estimates, or on (2) ontological grounds, highlighting the endogeneity of the NAIRU to monetary policy. While both interpretations lead to a more expansionary monetary policy stance, the differing motivations matter for future policymaking. In the case of (1) the rationale is mainly to a avoid downward de-anchoring of inflation expectations, whereas with (2) it is to deliberately chase hot labour markets and a high-pressure-economy. Our speech analysis shows that (1) has been far more dominant in the FOMC, indicating incremental rather than fundamental ideational change.

1. Introduction

In the fall of 2018, the Fed launched the first-ever comprehensive and public review of its monetary policy framework and published it in 2020. A core novelty of the Fed's revised policy framework was a more lenient attitude towards overshooting its inflation target. Only two years later, however, in March 2022 in the wake of the Covid-19 pandemic and the Russian invasion of Ukraine the Fed embarked on its sharpest tightening cycle since the end of the 1970s. Up to this point, a historically tight labor market had brought benefits to even the lowest-paid workers, partly reversing decades of rising wage inequality (Autor et al., 2023). The Fed's choice to hike interest rates at the cost of raising unemployment led some to accuse the Fed of engaging in class warfare (Barker, 2023; Downey 2022). Others were more positive about the move as they saw the Fed playing a role in fuelling inflation through its unprecedented monetary accommodation during the pandemic as well as for responding too slow to soaring prices (Furman, 2022; Summers, 2021). This study tries to make sense of these opposite views by shedding light on the ideational foundations of the Fed's new framework and the concomitant policy learning processes.

In its new framework, the Fed redefined how it interprets its dual mandate of fostering price stability and maximum employment. From now, the Fed would aim to achieve *on average* two percent inflation and hence engage in a flexible make-up strategy according to which below-target periods would be followed by above-target periods for some time. This newfound leniency towards higher inflation was also matched by a stronger commitment to the second goal of the Fed's dual mandate, namely maximum employment. In contrast to the 2012 review of the longer-run goals and monetary policy strategy (henceforth 2012 review), which had consolidated the Fed's inclination to focus on inflation as opposed to unemployment (Kaya, 2022), the Fed would now be 'lexicographically diminishing inflation concerns as compared to employment concerns' as a former Fed economist put it (Hess, 2021, p. 9).

Under its new framework the Fed would consider only *shortfalls* of employment from target instead of deviations in either direction and adopt a 'wait-and-see' approach: its monetary policy decisions would from now on lend more weight to *actual* inflation trends compared to model projections. Moreover, absent inflation the Fed committed to no longer raise interest rates to prevent unemployment from falling below its estimates of the 'natural rate' – the level deemed consistent with stable inflation. As Governor Brainard put it, 'monetary policy can take a patient approach rather than a pre-emptive approach' (Brainard, A/23/03/2021). For decades, this pre-emptive tightening strategy had institutionalized a preference to err on the side of excess unemployment rather than excess inflation. It was a central element of the Fed's pursuit of price stability and had, according to some authors, contributed to the weakened bargaining power of low-income workers (Hung and Thompson, 2016; Palley, 2018, Seydl and Spittler, 2016; Van Doorslaer and Vermeiren, 2021).

The strategic review should be of primary interest to scholars interested in the international political economy (IPE) of central banking as it embodied a significant – potentially even radical – change in policy. Yet, the Fed's new monetary policy framework has barely received attention in the recent IPE literature on central banking. This is surprising given that the abandonment of the pre-emptive tightening strategy might constitute a turning point in the Fed's ideational framework with potential consequences for the distribution of power between capital and labour in the US political economy. At least theoretically, it could reflect a shift in the overall 'hierarchy of priorities among conflicting goals' of monetary policy and amount to what Hall (1993) has called 'third order' or paradigm change.

We argue that the degree of ideational change at the Fed ultimately depends on how far the Federal Open Market Committee (FOMC) – the Fed's key decision-making body – distances itself from a particular model of the economy, namely from the so-called 'non-accelerating inflation rate of unemployment' or NAIRU. Traditionally, the NAIRU model has

been a foundational idea in the monetary policy paradigm of the Fed and other inflation-targeting central banks in both advanced and emerging economies. The model assumes that every economy has an optimal, supply-side determined unemployment rate at which inflation remains stable. According to the model, if the central bank allows unemployment to drop below this rate, it would set off a dangerous inflationary spiral. A key consequence of the Fed's traditional reliance on this model is that it *de facto* subordinated the pursuit of maximum employment to the goal of price stability as it implied a pre-emptive approach to inflation (Kaya et al., 2019; Shapiro and Wilson, 2019; see also Seydl and Spittler, 2016; Van Doorslaer and Vermeiren, 2021). In light of the centrality of the NAIRU model in the Fed's past monetary policy, on the one hand, and what seems to be a break with the NAIRU in the strategic review on the other, our article examines how prominent the NAIRU model figured in FOMC members' speeches to gauge the extent to which the Fed has (not) let go of its underlying assumptions and associated strategies.

The main argument of our study is the following: we interpret the Fed's strategy review as a case of incremental policy learning with regards to the NAIRU model. The model was challenged by several post-crisis macroeconomic anomalies, in particular a weakened unemployment-inflation link (i.e., a flatter Phillips curve). Through a systematic content analysis of 120 speeches given by key FOMC participants from the time of the last strategy review in 2012 to the time when the Fed responded to the post-pandemic inflation crisis in 2022, we provide three main findings. First, FOMC participants still invoke the NAIRU in their causal theories of inflation. Second, problems of squaring the anomalies with the NAIRU model are by and large not seen as fundamental and, consequently, FOMC members mostly did not radically change their views on the NAIRU. Third, some change is observable at the group-level of analysis. Echoing others in the policy learning literature, we highlight the role of the composition effects whereby the main mechanism of institutional change is the

appointment of policymakers with different prior beliefs (Ainsley, 2017; Bordo and Istrefi, 2023; cf. Schulz, 2017; Van Esch, 2007).

Our paper builds on recent scholarly work on ideational (non-)change in central banks after the great financial crisis (e.g., Johnson et al., 2019; Kaya, 2022; Levingston, 2021; van 't Klooster, 2022) but also seeks to contribute to a growing literature on the importance of macroeconomic models in economic policymaking and continuity and change in the underlying assumptions and ideas in these models (Helgadóttir and Ban, 2021; Braun, 2014; Fuglsang, 2023). We show how the inflation-targeting monetary policy framework of the Fed is intricately linked to monetary policymakers' beliefs about the NAIRU-model. By making the conceptual distinction between an epistemological and ontological problematisation of the NAIRU model and operationalising it through our coding scheme, we develop a new way to examine and gauge the degree of ideational change in what since the 1980s has been one of the key theoretical foundations of many central banks' monetary policy frameworks. As such, even though our analysis is a single case study, our findings should have purchase for other countries, too, because inflation-targeting is almost ubiquitous in advanced as well as in many emerging economies. Similarly, the NAIRU model remains firmly entrenched in the ideational framework of most of these central banks. Our results should also interest the IPE community more generally as the Fed often acts as an ideational leader and rule-maker in the central banking community such that its policy learning has a signalling effect to other central banks but also serves as a typical case. Our study also makes a methodological contribution in that it highlights the importance of in-depth data analysis when it comes to the study of ideational change. Considering the difficulty of examining complex policy beliefs such as the NAIRU model where context and nuances matter, we deliberately opted for manual instead of automated coding to avoid misinterpreting actors' thinking (Ban, 2022; Pashakhanlou, 2017).

The rest of the paper is organized as follows. Section 2 details the trajectory of the Fed's past monetary policy framework up to the emergence of the recent empirical anomalies and develops the notions of our two types of problematisation of the NAIRU model. In Section 3 we spell out the theoretical framework in which we embed our analysis, that is, policy learning. Section 4 comprises our empirical analysis of the speeches. Section 5 interprets these results in narrative form and Section 6 concludes our analysis.

2. The NAIRU model and the strategic review

2.1. The theory of the NAIRU and its empirical challenges

The Fed's strategy of pre-emptive tightening relied on the 'natural rate hypothesis', which is based on two claims (see Blanchard 2018 for a recent overview). The first claim is that macroeconomic variables such as output (y), unemployment (u) and the interest rates (r) can be influenced by discretionary policy in the short-run but tend towards their 'natural' but unobservable values (y*, u*, r*) in the long-run. That is, once cyclical demand shocks have worked their way through the system the economy returns to its steady-state where actual and natural unemployment coincide and the central bank's inflation target is met (Williams, Abdih, and Kopp, 2020). These natural variables are conventionally considered to be unique, slow-moving, and determined by the supply-side of the economy. The second claim of the 'natural rate hypothesis' is that monetary policy cannot sustain unemployment below the natural rate without triggering accelerating inflation. If unemployment were to fall below the NAIRU, an overly tight labour market would impel workers and firms to bid up wages and prices, engendering 'excessive' wage growth (i.e., higher than productivity growth) and upward-moving inflation expectations. The growth rate would remain unaltered as economic actors eventually see through this game given their adaptive or even rational expectations, but inflation would settle at a permanently higher level. Thus, while in the short-run there is a

trade-off between unemployment and inflation that the central bank can exploit because the short-run Phillips curve is non-vertical, in the long-run this trade-off evaporates as the Phillips curve becomes vertical. Consequently, to forestall a de-anchoring of inflation expectations in the first place, central banks ought to tighten their stance to prevent the labour market from 'overheating'.

Through these assumptions, the NAIRU model fulfils two important functions. On the one hand, it operates as a 'forecasting tool' helping to determine the appropriate policy stance since unemployment below the NAIRU is expected to lead to inflation and vice versa (Ball and Mankiw 2002, 121). FOMC members, for example, rely on the NAIRU model to infer the level which unemployment rate is consistent with price stability over the longer run (Tarullo, 2017). On the other, the NAIRU model also serves as a 'storytelling' device or a narrative, which enables monetary policymakers 'to explain something about the world' (Morgan, 2001, 376) and allows them to define a rate of unemployment that supposedly acts as quasi-natural limit to their ability to boost the economy and that can only be altered through supply-side reforms (Stockhammer, 2008).

Macroeconomic developments after the 2008 global financial crisis challenged both functions of the NAIRU model. Contrary to the assumption of an economy returning to its trend of output growth and employment, in many countries the crisis was followed by persistently lower levels of output and sometimes even lower growth rates of output relative to pre-crisis trends. This led to a revival of hysteresis theories, which also demonstrated its applicability to previous recessions (Ball, 2014; Blanchard et al. 2015). At its core, negative hysteresis describes a path-dependent economy where shortages in aggregate demand (i.e., the short-run) can permanently damage economic growth even in the long-run and cyclical unemployment turns into structural unemployment. The mechanisms that have been proposed to explain this are, for example, the detachment of unemployed workers from the active labour

force as the recessionary effects persist, either because of a loss of skills or motivation for job search. Similarly, businesses may decide to reduce investment in maintenance and upgrading of capital goods, permanently lowering the potential growth rate. A common post-crisis response to the empirical anomalies was to indict the NAIRU estimates and argue that the crisis simply revealed the 'true' NAIRU. The fallibility of estimates also served to explain the unexpected inertia ('missing disinflation') of inflation in response to the Great Recession (Daly *et al.*, 2011).

The puzzle persisted the other way around, too. Even in the face of an exceptionally accommodative monetary stance eventually leading to extraordinary low unemployment numbers in the later phases of the recovery, inflation remained subdued in the US. This missing upshot in inflation suggested that policymakers had overestimated the level of the NAIRU (e.g., Bell and Blanchflower, 2018). This was most commonly framed as a flattening of the Phillips Curve, implying a significantly weaker correlation between the unemployment and inflation rate. In the wake these discussions, the idea of reversing the effects of negative hysteresis or even deliberately chasing after 'positive hysteresis' gained some traction. In the case of reverse hysteresis, an accommodative monetary policy and consequent period of sustained 'excessive' (i.e., above-'potential') aggregate demand as well as tight labour markets might lead detached workers to be drawn back into the labour market. This would augment the supply of active labour and thereby lower the NAIRU itself (Aaronson et al. 2019; Cerra *et al.* 2020). The idea of positive hysteresis goes one step further and postulates that a high-pressure economy could have permanent positive effects on natural values by pushing firms to invest in labour-saving technologies and raising average productivity (Okun, 1973).

Defying a neat separation between the short- and long-run, the possibility of all three forms of hysteresis is at odds with a supply-side determined, exogenous NAIRU. This potentially has far-reaching implications: if the NAIRU were indeed endogenous to aggregate

demand and, by extension, monetary policy, the implications for policymakers at the Fed would be profound. It is therefore essential to know just how much the Fed has started to cast doubt on the NAIRU model. In the following, we develop two ideal-types of problematisation of the NAIRU model, which we use as the basis for our coding (Section 4).

2.2. Epistemological and ontological problematisation of the NAIRU

The uncertainty about whether an exogenous, unique and supply-side determined NAIRU exists and the concomitant difficulty of estimating such an unobservable variable is well-known (Hauptmeier et al., 2009). The concept of the NAIRU from, say, the actual unemployment rate in that it requires a causal assumption and a theoretical model about the link between unemployment and inflation, such as the Phillips curve. This model dependency is of primary concern and can in principle not be remedied by methodological improvements in estimates. In addition, estimates of 'natural' variables have been shown to exhibit pro-cyclicality – higher than expected in the downturn and vice versa – (Bundesbank, 2014). Even more, estimates might in fact performatively affect the very phenomena they are supposed to measure; Heimberger and Kapeller, 2017). An emerging literature on the possibility of endogeneity testifies to the vexing and well-known problems related to the possibility of endogeneity (Stockhammer and Jump, 2022) and, indeed, most central bankers will readily admit that natural rates are neither a perfect description of reality nor unproblematic policy tool (e.g., Weber, Lemke and Worms, 2008). However, to the extent that 'decision makers are not indifferent with respect to the direction of their errors' (Ainsley, 2017, 14), this then raises the possibility of varied learning processes of how central bankers try to reconcile the NAIRU with empirical evidence.

We describe what we see as the two distinctive ideal-type policy learning strategies of how this uncertainty is managed and couch this in terms of different ways to problematise the

NAIRU model, namely epistemologically or ontologically. For the current purpose, 'problematisation' refers to a process in which things – objects, phenomena or concepts – become viewed as a problem requiring attention and possibly intervention (Foucault, 2001, 171). This entails choices over which elements are relevant (e.g., is endogeneity considered) and therefore the type of problematisation embodies certain agenda-setting commitments as well as scientific choices that nullify the descriptive-normative distinction. In our framework, epistemological problematisation generally describes focusing more on methods and the reliability of data rather than deep-seated causal assumptions. The main *problematique* is one of knowing *how*. Ontological problematisation, on the other hand, describes a reconsideration of concepts and models as such, questioning their correspondence to reality. Its main *problematique* is one of knowing *what*. In the following, we spell out how these definitions apply to the NAIRU model and use the distinction between these two ideal-types as a template from which we developed the codes of our content analysis (Section 4).

Epistemological problematisation of the NAIRU model refers to a policy learning strategy where central bankers explicitly and increasingly acknowledge the risk of making their monetary policy strategy excessively reliant on fallible NAIRU estimates. Reasons invoked for this might be the intrinsic model uncertainty of such estimates (Taylor and Wieland, 2016; Weber, Lemke and Worms, 2008), a changed behaviour of inflation and the uncertainty about the form of the Phillips curve. In this interpretation, policymakers acknowledge that existing models to estimate the NAIRU have a bias towards overestimation during prolonged recessions. They will be reluctant to rely too heavily on these estimates, especially when monetary policy is close to the effective lower bound (ELB) and the neutral rate r* has fallen. The rationale here is not a fundamental scepticism towards the idea of a NAIRU but rather based on a cautionary attitude regarding its empirical knowability, especially when stakes are high. In practice, this is driven by a fear of slipping into a deflationary

environment where the central bank becomes relatively impotent because it cannot lower interest rates further. In this context, overestimating the NAIRU and r* can be especially problematic because it increases the risk of a downward de-anchoring of inflation expectations. While these critical considerations undermine the role of the NAIRU as a forecasting tool, policymakers still assume that in the long-run employment and output are exogenous to monetary policy, and thus that there is a supply-side determined NAIRU 'out there'. In this sense, this type of problematising the NAIRU model is less driven by a theoretical re-orientation away from New Keynesian macroeconomics and more about the management of uncertainty.

Ontological problematisation denotes a policy learning strategy wherein the assumption of a supply-side determined natural unemployment rate that is independent of dynamics of aggregate demand – and thus monetary policy – is fundamentally called into question. Ontological problematisation denotes a willingness to re-think assumptions about the causal structure of the economy. In terms of theory, this interpretation amounts to a shift towards heterodox, especially post-Keynesian, models that link labour supply and labour productivity endogenously to dynamics in aggregate demand and reject the long-term neutrality of money (Stockhammer, 2008; Dutt, 2010; Giraldi et al., 2020). The possibility of negative and reverse hysteresis is central and implies that an accommodative monetary policy can affect the NAIRU itself such as when an actively pursued high-pressure economy is hoped to lift both the level and growth rate of potential output above its pre-crisis trend. For example, labour market participation, an important supply-side factor of the economy, is seen as partly amenable to policy intervention such as when a high-pressure economy is actively pursued. Reliance on the NAIRU as an exogenous benchmark becomes absurd, not because of imprecise estimates but because the NAIRU itself is considered a policy variable.

Even though economic models always embed certain ontological and epistemological preconception (Kapeller and Heimberger, 2016), how exactly central banks problematise the

NAIRU model clearly matters. Both shifts entail a more expansionary monetary policy stance but with clearly distinct underlying rationales. At one extreme, the ontological problematisation leads to what might be called a strategy of 'assertive expansionism' that fully prioritizes the maximization of employment even at the risk of elevating inflation (at least temporarily) above target. Remaining accommodative for much longer, this strategy implies actively running demand ahead of potential output in a quest to cause aggregate supply (i.e., the productive capacity of the economy) to adjust to aggregate demand, i.e., positive hysteresis, and not vice versa. This interpretation would thus suggest a more radical change in policymaking. The epistemological problematisation, on the other hand, entails what could be called a strategy of 'restrained expansionism': monetary accommodation is applied and maintained more aggressively during recessions and the recovery, not in order to actively chase hot labour markets but in order to avoid the ELB and a downward de-anchoring of inflation expectations from below. Policymakers are still wary about the danger of 'overheating' labour markets and a softer form of pre-emptive tightening remains latent, as was revealed in the 'Covidflation' phase (see Section 5). This type of problematisation therefore implies a more incremental change in policymaking. In the next section, we spell out the broader theoretical framework of policy learning which we use to develop our analysis further.

3. Policy learning vis-à-vis the NAIRU at the Federal Reserve

The central claim of our study is that with regards to the NAIRU model the Fed has undergone a process of policy learning, but this learning is incremental rather than radical. In the following, policy learning will be understood as an updating of belief systems as a result of analysis and experience and is considered an important causal mechanism for policy change (Dunlop and Radaelli, 2018; Dunlop *et al.*, 2018; Heikkila and Gerlak, 2013; Sabatier and Weible, 2014). The impetus of such learning can come from external pressures as well as

from within the organization. While our analysis focuses on the latter, it is nonetheless important to consider seriously the competing explanation of learning induced from the outside. Specifically, even when they enjoy the privilege of formal independence, few central banks can afford to ignore partisan politics and the Fed is no exception in this regard. This became especially clear as criticisms became louder blaming the Fed for exacerbating inequality and racial disparities. As a case in point, only weeks before the announcement of the Fed's new framework in 2020, several Democratic senators introduced a new bill requiring the Fed to make the reduction of racial employment and wage gaps a central part of its mission (Connley, 2020). Similarly, former president Trump was notorious for repeatedly criticising the Fed's rate hikes, contributing to bipartisan support for a more expansionary monetary policy (Fleming, 2019). Indeed, Fed scholars have also noted how its new framework made it more attentive to the need to reduce inequality (Fontan *et al.*, 2022; Jacobs and King, 2021; Skinner 2021). While the role of politics in shaping the Fed's new framework is certainly important, our empirical analysis reveals two key elements that are not easily captured by such an explanation. First, FOMC members have been trying to make sense of the NAIRU anomalies long before such increased political pressure for a more expansionary policy emerged. Second, chasing hot labour markets and reducing racial disparities was never a central objective in revising the Fed's framework as it predominantly focused on avoiding the ELB and a downward de-anchoring of inflation expectations. Our analysis therefore zeros in on the policy learning process emanating from within the organisation itself.

The policy learning literature distinguishes various dimensions of policy learning (Bennett and Howlett, 1992; Dunlop and Radaelli, 2018). Firstly, *who* is learning? That is, ranging from individuals to specific groups, organisations or society at large, at which unit of analysis do we observe learning processes? In our case, this concerns the FOMC both as a group as well as in terms of individual members. Secondly, *what* is being learnt? This

includes both the content and form or depth of the learning. Most approaches concur that the more foundational a belief is to a paradigm, the more resistant to change it likely is. Importantly, however, even paradigmatic learning does not necessarily lead to paradigm change (cf. Kamkhaji and Radaelli, 2017). In practice, learning might take the form of a willingness to reconsider policy instruments but not policy goals (Johnson et al., 2019). The policy learning literature has dubbed the former 'single-loop learning' and the latter 'double-loop learning' (e.g., Quaglia and Verdun, 2022). Another related conceptual distinction based on the Actor Coalition Framework (e.g., Henry et al., 2014) is between a) deep core beliefs implying system-wide normative and ontological axioms, b) policy core beliefs that are instrumental for the achievement of deep core beliefs within a subsystem, and c) secondary aspects concerning instrumental propositions for specific policy goals within a subsystem. The NAIRU model can be seen as a policy core belief that is crucial for the defence of the deep core belief in central bank independence and inflation-targeting (Lavoie, 2014; Sener, 2019). Given this centrality, one would expect incremental rather than fundamental change in the beliefs of policymakers. This is captured by our ideal-type distinction between an epistemological and ontological problematisation of the NAIRU-model. Lastly, the third dimension of policy learning concerns *how* learning take place. Put differently, what are the underlying mechanisms (Kamkhaji and Radaelli, 2017)? In the following, elaborate on these three dimensions with respect to the specificity of the policy learning in central banks.

Policy learning in central banks is somewhat peculiar for several reasons. For one, it can be characterized as a form of 'epistemic' learning. In the theoretical framework developed by Dunlop and Radaelli (2018), this type of policy learning is characterized by a high degree of uncertainty ('low problem tractability') and strong reliance on figures of authorities ('high certification of actors'). Relatedly, Van Esch (2007, 80) notes that beliefs are more resistant to modification when the actor is an expert in the field. Policy learning in central

banks is also unique because monetary policymakers usually enjoy a high degree of technocratic discretion over the interpretation of their mandates. Learning instigated from within the institution, even radical or paradigmatic, might therefore take place merely through 'puzzling' at the meso- or organisational level without having to involve a 'powering' dimension at the macro-societal level (Hall, 1993; Wood, 2015). Indeed, some scholars have argued that the ECB has shifted to a new paradigm of 'technocratic Keynesianism' after the financial crisis without any political deliberation or legislative act (van 't Klooster, 2022). Other authors, however, find the learning process in central banks' ideational frameworks to be one of non-change or resilience in pre-crisis beliefs with new elements being 'layered' into rather than replacing the old paradigm (Johnson et al., 2019). In a similar vein, Levingston (2021) also finds that the Fed has ideationally moved to a form of 'depoliticized Keynesianism' whereby post-crisis learning took place mainly at the cognitive level, leaving the normative core – a commitment to depoliticization – unchanged. In this regard, the NAIRU model is an especially interesting case as it, arguably, cuts across cognitive and normative dimensions of monetary policymaking.

For the current purposes, we rely on Van Esch's (2007, 80) focus on two main mechanisms for a change in policy core beliefs: 1) individual FOMC members revising their beliefs, or 2) reshuffling of the set of actors – and thus of prior beliefs brought to the table – in the policy formation process. Indeed, Borio (2021, p.7) also underlined that priors always loom large because evidence must always be interpreted, adding that 'relying on unobserved variables helps to fit facts into one's own worldview'. Thus, when individual FOMC members' beliefs about the NAIRU change, this is likely to be the outcome of a 'conditioned' form of policy learning: learning will likely be circumscribed by the contours of the belief system already in place. In contrast to such intra-individual learning, group-level learning as a result of

composition effects seems a more promising candidate for interpreting our data and is indeed also bolstered by recent evidence on the FOMC members' views (Bordo and Istrefi, 2023).

4. Thematic content analysis of FOMC speeches

The explanandum of our case study is the nature of ideational change at the Fed. Specifically, how has the FOMC learnt to reconcile the recent empirical anomalies with its views on the NAIRU model? To answer this question, we conducted a systematic content analysis of public speeches given by key FOMC members. As such, our study contributes to a growing body of research that analyses textual data to study the political economy of central banks (e.g., Diessner and Lisi 2020; Johnson et al., 2020; Kaya, 2022; Moschella and Pinto 2018). A recent trend in this scholarship is to combine machine learning techniques with more qualitative methods. Automated or unsupervised topic modelling is commonly used to explore general semantic themes and patterns within a large corpus of documents (e.g., Ferrara, 2020; Thiemann et al., 2021). While such methods are useful for frequency-based assessments of certain ideas, they are less well-suited for deep examination of ideational changes in central bankers' ideational frameworks. Especially when it comes texts involving economically controversial topics, automated content analysis might gloss over important discursive nuances as Ban (2022) emphasizes. Similarly, Suddaby and Greenwood (2009) urge to focus not only on readily observable factors and utterances but also values, norms and shared meanings of actors. We therefore opted for a hand-coding approach that allowed for a more detailed and contextualized reading of speeches.

4.1. Data and coding procedure

Our dataset consists of 120 public speeches given by FOMC members from 2012 to 2022 and retrieved from the Fed and BIS websites. We selected speeches based on whether causal theories of the labour market-inflation link were mentioned. Our selection criteria

focused on title and keyword search (i.e., 'NAIRU', 'natural rate', 'unemployment', 'labour market', 'Phillips curve', 'star', 'hysteresis'). The selection was further narrowed by focusing on speeches given by the (vice-) chair and key figures that had a long stint as FOMC member during the period of interest (2012-2022) and were part of the voting process during the rate hikes between 2015-2019. We focus FOMC members since, despite being briefed by research staff, they are final decision-makers.

From the set of the 120 speeches, we generated our final dataset of relevant speech fragments. After a close reading of the selected speeches, we performed a preliminary content analysis at the latent level, seeking 'to identify or examine the underlying ideas, assumptions, and conceptualizations – and ideologies – that are theorized as shaping or informing the semantic content of the data' (Braun and Clarke, 2006, p. 84). We identified textual segments implicitly or explicitly conveying a view of the inflation-unemployment trade-off and its link to labour market developments. As such, identifying relevant fragments in the speeches required certain background knowledge in macroeconomics and involved an interpretative element. For example, we not only included explicit references to the NAIRU but also references to the natural rate of interest or potential output when they were used in a context of labour market discussions. The final dataset comprised 349 speech fragments that revealed a certain fashion of thinking about the NAIRU model.

In a first phase, we deductively developed an ordinal scale of categories covering the whole spectrum of adherence to the NAIRU model. At one end of the spectrum, category 0 ('deliberate defence') describes a stance where the NAIRU is seen as unproblematically descriptive, uncertainty around the NAIRU being either ignored or in practice overlooked. Empirical anomalies might be treated as mere mirages and wrong NAIRU estimates are adjusted ex post without raising further questions. At the other end, category 5 ('outright rejection') refers to viewing the NAIRU as a highly normative concept with little tractability for policy.

Categories 2-4 correspond to what we described as stances of problematising the NAIRU in Section 2: either on epistemological grounds – category 1 – or on ontological grounds – categories 2 and 3. The ontological category was further subdivided to distinguish between a stance accepting the idea of negative hysteresis, i.e., category 2 ('cautious ontological problematisation), and one also accepting reverse hysteresis, i.e., category 3 ('bold ontological problematisation').

In the second phase, descriptive codes were generated that could be mapped onto the ordinal scale just described. The code development was carried out inductively by identifying the central themes in the selected speech fragments. The procedure involved consecutive rounds of three raters independently going back and forth between using the codes for the actual coding and modifying them in the process. Some codes were dropped, others added, modified or re-assigned to a different category in the ordinal scale. After this, we came up with the final codebook for the actual analysis in the third phase. The motivation for this laborious development of a codebook was to prevent reading too much into the fragments while at the same time retaining only codes that are sensitive to the underlying construct that we aim to measure: the degree of adherence to a NAIRU-logic. Similar to the selection of the speech fragments, developing the codebook included an interpretative element and as such, our methodology was a pragmatic mix of both deductive and inductive coding.

[Table 1]

The third and final round comprised the actual analysis of the fragments and is based on the codes listed in Table 1. The coding was carried out by all three raters together but through blind coding, that is, without knowing who the author of the speech was, to avoid bias. To miss on the conservative side, some fragments were again dropped if during the coding we considered a fragment too indeterminate to assign a code. For every speech an average

score was computed based on the individual fragments although this should be interpreted with caution.

4.2. Results

The analysis of the FOMC speeches generated several findings. First, we observe an ideational shift away from the NAIRU model since 2012. Figure 1 shows the year-by-year evolution of the average category score from 2012 to 2022, revealing a gradual ideational shift away from a deliberate defence (category 0) of the NAIRU model.

Second, to differentiate the type of problematisation of the NAIRU model, Figure 2 presents the share of each category in the total of coded fragments from 2012 to 2022. It shows that the fragments associated with the epistemological problematisation (category 1) have been dominant during 2015-2020. The process of shifting away from a deliberate defence of the NAIRU was interrupted by the 2016 to 2017 period, which we interpret in the next section. From 2017 to 2019 we witness a retreat of the ontological problematisation (category 3) in favour of the epistemological problematisation (category 1). This suggests that the Fed's recent monetary policy framework has been characterized by a growing reluctance to rely on NAIRU estimates but not necessarily rejecting the model as such. One important driver for this reluctance was the fear of interest rates reaching the ELB and a consolidation of inflation expectations below 2 percent in the longer-term (see next section). By contrast, only few FOMC members appealed to negative or reverse hysteresis to justify this reluctance. This rationale became prominent only in the wake of the recession caused by restrictive measures to contain the Covid pandemic.

[Figure 1, 2, 3 and 4]

Third, the findings are strongly person-dependent with FOMC participants differing in how much they adhered to the NAIRU-model as shown by Figure 3. It shows the

significant variation among key FOMC members in how much they approached an ontological problematisation of the NAIRU model (categories 2-4). The figure shows that Chairman Jerome Powell and Governor Lael Brainard were the only decision-makers repeatedly highlighting benefits of actively chasing hot labour markets in terms of pulling workers back in, reducing disparities and lifting the growth potential of the economy (category 3 and 4). Other prominent FOMC members – John C. Williams and Richard Clarida – practically never spoke about hysteresis in their public speeches. Both members had built a track record of research about the fall in the natural rate of interest and its implications for monetary policy, especially the importance of avoiding the ELB and a downward de-anchoring of inflation expectations. By the time they joined the FOMC in 2018, they were already convinced by the arguments we associate with the epistemological problematisation. This confirms that individual actors' beliefs are more resistant to change when the actor is an expert in the topic and when policy core beliefs are concerned (Van Esch, 2007). It is telling, in this regard, that four of the total of five fragments we coded as pertaining to category 4 ('outright rejection') came from Jerome Powell, given that his background as a lawyer rather than a PhD in economics predisposed him to be less attached to conventional macroeconomic models.

Fourth, our results raise doubts about the degree to which individual FOMC participants engaged in policy learning and highlight the key role of staff turnover in driving ideational change at the group (and institutional) level. Indeed, Figure 4 shows the evolution of the average annual category score by individual FOMC members, although this should be interpreted cautiously as data points for individuals are sparse. Nonetheless, only for two FOMC members (Yellen and Brainard) we observe a change, namely a gradual increase, in their annual average category score during their tenure – with a notable collective retreat in 2017 (also in 2022 in the case of Brainard). Both Powell and Brainard were already sceptical about the pre-emptive tightening strategy and openly considered the risk of negative

hysteresis and possibility of reverse hysteresis before the Fed's first rate hike in December 2015. This finding lends support to scholars emphasizing the relevance of pre-existing ideas in policy learning (Swinkels and Van Esch, 2022). Lastly, with the advent of the Covid-crisis we see a more pronounced ontological problematisation in the first phase of the pandemic (March 2020 to mid 2021) and, in the second inflationary phase (mid 2021 to end 2022), a return of NAIRU-model related thinking. The next section gives a more detailed interpretation of these results, chronologically narrating how these findings can be traced back to the evolving macroeconomic context the Fed found itself in and how the ideational changes relate to both this context and the changing mental models of FOMC policymakers.

5. Narrating the ideational shift in the FOMC

5.1. How the GFC pushed the Fed to problematise the NAIRU model

The financial crisis of 2008 caused the steepest drop in real GDP and the largest increase in the unemployment rate in the United States since the Great Depression. The ensuing persistent weakness in US aggregate demand induced Fed officials and researchers to take the risk of negative hysteresis more seriously. In March 2012, Bernanke feared that 'if progress in reducing unemployment is too slow, the long-term unemployed will see their skills and labour force attachment atrophy further, possibly converting a cyclical problem into a structural one' (Bernanke, A/26/03/2012). Other FOMC members echoed this fear of a recession-induced 'permanent atrophying of skills', a 'persistently lower rate of labour force participation' in ways that had 'restrain[ed] the economy's growth potential' or increase in structural unemployment (Dudley, A/15/10/2012; Yellen, A/11/04/2012; see also Bernanke A/20/11/2012). In June 2013, a widely-discussed Fed study seemed to confirm this apprehension, claiming that 'a significant portion of the recent damage to the supply side of the

economy plausibly was endogenous to the weakness in aggregate demand' (Reifschneider, et al 2013).

The risk of negative hysteresis complicated estimations of the NAIRU at the Fed. Already in its 2012 review the FOMC explicitly acknowledged that the determinants of maximum employment 'may change over time and may not be directly measurable' and that assessments of the level of maximum employment 'are necessarily uncertain and subject to revision' (FOMC, 2012). This reflected a first cautious move towards an epistemological problematisation of the NAIRU model and is captured by our code *data-dependence*, references to which became more frequent in the years leading up to the Fed's first post-crisis rate hike end 2015 (Yellen, A/04/03/2013; Bernanke, A/9/11/2013; Yellen, A/22/08/2014; Powell, A/08/04/2015; Dudley, A/15/10/2015). In March 2013, Yellen extended the range of labour market indicators next to the unemployment rate consulted by the Fed to identify any 'substantial improvement in the outlook of the labour market'. The FOMC had set such improvements as a precondition to terminate the Fed's third quantitative easing program (Yellen, A/04/03/2013). The Fed's initiatives highlighted a key challenge for US monetary policymakers, namely, that to be able to know when to withdraw stimulus they had to make 'difficult judgments about the cyclical and structural influences in the labour market' (Yellen, A/22/08/2014). Monetary policy ought to influence only cyclical components, yet this depended on accurately appraising labour market developments and FOMC participants increasingly recognized that the actual unemployment rate did not adequately measure the degree of labour market slack.

The FOMC's decision to start tightening in December 2015 even in the face of considerable uncertainty about the degree of slack suggests that US monetary policymakers shied away from actively chasing hot labour markets. Notably, the above-cited Fed study on negative hysteresis discarded the possibility of reverse hysteresis, claiming that 'there is no special

advantage … to running a high-pressure economy' (Reifschneider *et al.*, 2013). The issue remained unsettled, however. In August 2014 Yellen alluded to the possibility of reverse hysteresis during her opening speech at the Jackson Hole Economic Symposium when she stated that 'some portion of the decline in labour force participation … might reverse in a stronger labour market' (Yellen, A/22/08/14). Several months later Dudley also considered the possibility that 'there could be a significant benefit to allowing the economy to run "slightly hot" for a while in order to get those that have been unemployed for a long time working again' (Dudley, A/01/12/14). While such statements would seem to indicate an ontological problematisation of the NAIRU during these years from 2012 to 2015, such statements remained the exception rather than the rule. Overall, the learning process was more incremental and cautious, leading to an epistemological instead of ontological problematisation.

5.2. Confronting the 'new normal'

Why did the FOMC decide to raise interest rates in December 2015 even though there were clear indications that the maximum employment level had not been reached? Underlying its decision was the desire to 'normalize' interest rates, that is, to create some distance to the ELB to gain policy space in the case of a future recessions. The majority of FOMC members also considered the hike justified on grounds of continuing improvements of labour market conditions as the unemployment rate neared their NAIRU estimates. While the decision was taken unanimously, recently published transcripts of the meeting reveal that not all FOMC members were equally in favour. A regular member of the FOMC at the time, Powell noted that 'there is enough uncertainty about the location of supply-side constraints to counsel a cautious approach in removing accommodation' (FOMC 12/12/15). During the meeting, Brainard likewise expressed her concern about the risk of underestimating labour market slack. In addition, she drew attention to the weakening of the Phillips curve relationship between labour market slack and inflation (see also our category 1 codes in *Table 1*). In the

years that followed, Powell and Brainard gained support as the flattening of the Phillips curve and the fall in neutral interest rates became seen as the 'new normal' by other members, too (Brainard A/12/09/2016, A/05/09/2017; 16/05/2019; Clarida, 20/05/2019; Powell A/23/08/2018; Williams, A/22/02/2019; Yellen, A/29/03/2016; Yellen, A/19/01/2017)).

Despite this growing recognition, our data (Figure 1 and 2) suggest a collective drop in the average category score in 2017 as a result of both a resurgence of traditional NAIRU thinking (category 0) and retreat of references to hysteresis (category 2-4). As the actual unemployment rate fell below the FOMC's estimates of its natural counterpart for the first time since the GFC, FOMC members became more cautious of overly tight labour markets. For instance, Yellen (A/19/01/2017) maintained that 'allowing the economy to run markedly and persistently "hot" would be risky and unwise' because '[actual unemployment] persistently operating below [the natural rate] pushes inflation higher' and thus '[w]aiting too long to remove accommodation could cause inflation expectations to begin ratcheting up' (see also Powell, A/01/06/2017). Brainard (A/09/05/2017) was the only governor who remained 'cautious about tightening policy further'. She argued that 'given the flatness of the Phillips curve, it could take a considerable undershooting of the natural rate of unemployment to achieve our inflation objective' (A/09/05/2017).

As the Fed continued to undershoot its inflation target despite an unemployment rate significantly below its NAIRU estimate, other FOMC members started to have second doubts about having reached maximum employment: 'given that estimates of the natural rate of unemployment are so uncertain', Yellen (A/15/10/2017) conceded that 'it is possible that there is more slack in US labour markets than is commonly recognized.' This recurring theme of the uncertainty about the measurement of slack was voiced as concerns about non-linearities in the Phillips Curve. This refers to the notion that the behaviour of inflation is not the same at all levels of unemployment, specifically that inflation could become accelerationist at very

high levels of employment and economic activity (Yellen, A/26/09/2017; Powell, A/20/06/2018; Williams, A/22/02/2019). Fears again changed course, however, as in the course of 2018 and 2019 the persistent undershooting of the Fed's inflation target caused FOMC members to become more concerned about the risk of a *downward* de-anchoring of inflation expectations (e.g., Brainard, A/07/03/2019, A/08/08/2019, A/16/05/2019, A/26/11/2019; Clarida, A/22/02/2019, Powell, A/08/03/2019; Williams, A/30/11/2018, A/22/02/2019, A/14/05/2019; A/18/07/2019). This view became dominant after the FOMC welcomed Williams and Clarida as new members in 2018. Their own research had already alluded to the risks of relying too much on natural rate estimates (e.g., Laubach and Williams, 2015; Clarida, 2015). This was combined with a growing understanding that a 'flatter Phillips curve permits the Federal Reserve to support employment more aggressively during downturns' (Clarida A/26/09/2019; Williams A/07/10/2020) and be more lenient about undershooting NAIRU estimates (Powell, A/26/05/2016; Brainard A/12/09/2016, A/05/09/2017).

Apart from avoiding a downward de-anchoring of inflation expectations and staying away from the ELB, Powell and Brainard frequently highlighted how a more accommodative monetary policy could also entail other long-term benefits associated with a high-pressure economy. When in 2018-2019 the unemployment rate continued to fall far below previous NAIRU estimates without unleashing inflationary pressures, both officials increasingly drew attention to the benefits of strong labour markets in terms of 'providing opportunities for workers who might previously have been left on the side lines', 'helping to narrow some of the long-standing disparities for some racial minorities' and 'add[ing] to the productive capacity of the economy (Brainard A/16/05/2019; see also Brainard, A/06/03/2018; Powell, A/20/06/08, A/28/02/2019, A/25/06/2019, A/23/08/2019, A/04/10/2019).

These newly underscored agenda points were also reinforced through fourteen 'FED listens' events held in 2019 throughout the country. FOMC members met with community

groups to hear about how monetary policy decisions affected peoples' daily lives and livelihoods. One of these events specifically focussed on 'The Sustainability and Trade-offs of a Hot Economy' and discussed Fed research showing that less advantaged groups – Afro-Americans, Hispanics, and workers with less than a college education – disproportionately suffer from weak and, conversely, benefit from strong labour markets (Aaronson *et al.*, 2019). Tight labour market conditions in 2019 continually corroborated these findings: staff reviews noted how the continued strengthening of the US labour market reduced the unemployment rates of Afro-American and Hispanic workers more than those of white workers. This was seen as 'consistent with the feedback received at the *Fed Listens* events', reinforcing 'the importance of sustaining the economic expansion so that the effects of a persistently strong job market reach more of those who, in the past, had experienced difficulty finding employment' (Minutes of the FOMC, 10-11 December 2019, 3).

5.3. The new framework: Staying away from the ELB but no more?

The Fed Listens events were a central pillar of the strategic review process launched in 2018 to deal with the challenges of the 'new normal'. The main outcomes of the review – the redefinition of the maximum employment goal and the establishment of an average inflation target – were a logical consequence of the shifting views in the FOMC discussed in the previous subsection. Yet, as our data show, there was only a consensus about an epistemological problematisation of the NAIRU model. Over the years, FOMC members had come to acknowledge 'the uncertainty … regarding structural aspects of the economy, including the natural rate of unemployment' (Powell, A/ 23/08/2019). This uncertainty was perceived predominantly as epistemological. Tellingly, Vice Chair Clarida remarked that since 'the true model of the economy is unknown, either because the structure is unknown or because the parameters of a known structure are evolving', monetary policymakers should 'study

incoming data and use models to extract signals that enable them to update and improve estimates of r* and u*' (Clarida A/20/05/2019).

The new monetary policy framework had to give the Fed more policy space by offering an antidote to the ELB and the associated risk of a downward de-anchoring of inflation expectations. After all, 'in a world of low r* … economic analysis indicates that flexible inflation-targeting monetary policy cannot be relied on to deliver inflation expectations that are anchored at the target, but instead will tend to deliver inflation expectations that, in each business cycle, become anchored at a level below the target' (Clarida, A/14/04/2021; see also: Brainard, A/01/09/2020; Clarida, A/16/11/2020; Powell, A/06/10/2020; Williams, A/02/09/2020, A/07/10/2020). Flexible *average* inflation targeting was seen as 'better suited for the highly uncertain and dynamic context in which policymaking takes place' (Brainard, 0A/1/09/2020), given that it aims 'for a moderate inflation overshoot away from the ELB that is calibrated to offset the inflation shortfall caused by the ELB' (Clarida, A/16/11/2020) and allows for 'opportunistic reflation' (Brainard A/01/09/2020). In this light, the new definition of maximum employment and its focus on eliminating only shortfalls instead of deviations in both directions are an instrument of 'outcome-based forward guidance' (Brainard, A/21/10 2020; Clarida, A/24/02/2021) to raise inflation expectations and increase the Fed's policy space.

Despite the common position embodied in the new monetary policy framework, heterogeneity within the FOMC persisted. As Figure 4 above showed, only Powell and Brainard went beyond this consensus by consistently and explicitly emphasising the benefits of tight labour markets as a goal worth pursuing in and of itself. The severe recession caused by the pandemic lockdowns enabled Powell and Brainard to bring these benefits more to the forefront. In their view, the Fed's new framework could contribute to avoiding hysteretic effects and even yield reverse hysteresis effects. As Brainard (A/24/02/2021) put it: 'our new monetary policy

framework recognizes that removing accommodation pre-emptively as headline unemployment reaches low levels in anticipation of inflationary pressures that may not materialize may result in an unwarranted loss of opportunity for many Americans' and hence curtail 'progress for racial and ethnic groups that have faced systemic challenges in the labour force' (see also Brainard, A/01/09/2020, A/13/01/2021, A/23/ 03/2021; Powell, A/10/02/2021). Importantly, the absence of a clear consensus on hysteresis would later stifle the Fed's audacity to test the boundaries of a high-pressure economy when in the second half of 2021 inflationary pressures eventually did materialize.

5.4. Covidflation: stress-testing the new framework

During the first three waves of the COVID pandemic and the first year of the Fed's new framework – from March 2020 to July 2021 – all hands were on deck to support the economy and return to the pre-pandemic labour markets. Monetary policy became extraordinarily supportive. As discussed above, this is consistent with both an epistemological and ontological problematisation of the NAIRU model given the strong adverse demand shock. The difference between the two became apparent in the Fed's response to the eruption of inflation afterwards, however, as voices admonishing about 'overheating' labour markets and de-anchoring inflation expectations re-emerged.

Indeed, the Fed's commitment to a 'wait-and-see' approach became increasingly challenged by the sharp rise in prices in the second half of 2021. By December 2021, the inflation rate in the US economy had risen to more than 6 percent – the highest level since the Volcker Shock era of 1979-1981. The spike was seen as resulting from a combination of pandemic-induced supply-side disruptions, a sharp recovery in aggregate demand due to supportive macroeconomic policies and a shift in consumption patterns away from services towards durable goods. Up until the autumn of 2021, the official interpretation of the FOMC was that

the inflation surge was only 'transitory' and would dissipate relatively quickly (Brainard 07/09/2021; see also A/27/08/Powell 2021; Waller 2021). Prominent critics like Lawrence Summers and Olivier Blanchard, who had previously defended expansionary fiscal policies to avoid secular stagnation and the associated ELB, now criticized the size of the American Rescue Plan (ARP). In their view, the inflation surge confirmed what they regarded as an 'excessive' and poorly targeted stimulus of the Fed and Biden administration that was a multiple of the US output gap and would thus lead to an 'overheating' economy (Summers 2021; Blanchard 2021). The Fed's new framework was seen as complicit and fuelling an upward de-anchoring of inflation expectations.

Powell and other FOMC members began to share these concerns by the end of 2021, when the Fed announced a faster bond-buying taper and both much earlier and dramatically faster pace of interest rate hikes than anticipated. We assigned 30 of a total of 44 speech fragments from October 2021 to December 2022 to category '0' ('deliberate defence of NAIRU'). In our data, the Fed's tightening was accompanied by a sharp retreat of references to reverse hysteresis and a growing concern about the inflationary risks of overheating labour markets, as indicated by a higher frequency of fragments coded as 'reference to normal employment-inflation trade-off' (see Appendix). When the Fed raised the federal funds rate in March 2022, Powell explicitly stated that the goal was to reduce inflationary pressures by 'moving down the number of job openings' and create 'less upward pressure on wages, less of a labour shortage', pointing to 'a very, very tight labour market, tight to an unhealthy level' (Powell, 2022). A central trope in FOMC speeches was that 'reducing vacancies from an extremely high level to a lower (but still strong) level has a relatively limited effect on hiring and on unemployment' (Waller, A/20/05/2022, A/14/07/2022, Bowman, A/26/08/2022). It reflects a reversal to more traditional NAIRU thinking, as evident in Figure 2, with the implicit assumption of a typical Phillips Curve relationship between labour market slack and

inflation. By raising the unemployment-to-job-vacancy ratio – a measure of labour market slack – rate hikes reduce the bargaining power of workers and prevent wages from creating additional inflationary pressures. This is especially important, so the argument goes, as inflation 'moves sideways' to the core (non-housing) services where 'wages make up the largest cost' and 'the labour market holds the key to understanding inflation' (Powell, A/30/11/2022).

FOMC participants also started to defend a more restrictive policy stance by fearing that 'an extended period of high inflation could push longer-term expectations uncomfortably higher' (Powell, A/21/03/2022; see also Brainard, A/07/09/2022, A/30/09/2022, A/28/11/2022, Cook, A06/10/2022, Waller, A/30/05/2022) as well as by highlighting the need to sustain the Fed's credibility in ensuring price stability (see also Bowman, A/30/06/2022; Waller, A/24/07/2022, A/09/09/2022, A/17/11/2022; Powell, A/26/08/2022). At the same time, FOMC members frequently acknowledged that available market- and survey-based measures of long-term inflation expectations did not (yet) reveal any upward de-anchoring (Brainard, A/28/11/2022; Powell, A/26/08/2022). This was important as FOMC members believed that 'policy judgments must be based on whether and *when we see inflation actually falling in the data*, rather than just in forecasts' (Cook, A/06/10/2022; emphasis added; Powell, A/30/11/2022) – a data-dependent commitment 'to avoid pulling back prematurely' (Brainard, A/30/09/2022) not unlike the Fed's pledge to abandon its pre-emptive tightening strategy. Interestingly, a staff note also noted a year earlier that focusing on unmeasurable long-term inflation expectations meant 'adding a new unobservable to the mix' (Rudd, 2021, 17). In line with the date-dependence commitment, references to natural rate estimates almost disappeared in FOMC speeches, indicating more reluctance to use the NAIRU model as a forecasting instrument: in 2022, only 3 of the 27 or 11 percent of the segments that we assigned to category 0 ('deliberate defence of NAIRU') received the code 'reference to natural rate estimates',

whereas from 2012-2019 almost 40 percent of these segments (n = 72) in category 0 received this code (see Appendix).

In sum, the Fed's response to the Covid-inflation surge corroborates our conclusion that the epistemological rather than the ontological problematisation of the NAIRU model offered the main ideational justification of the Fed's new monetary policy framework. Its central motivation is not to actively chase hot labour markets but to avoid the ELB and a downward de-anchoring of inflation expectations. The strong resurgence of fragments embodying a defence of the traditional NAIRU model suggests that its intuitive appeal did not disappear during the Fed's learning process of moving to an epistemological problematisation but rather remained latent. If most FOMC members had rejected the NAIRU model on ontological terms, a more assertive expansionism ready to 'see through' the pandemic-induced and largely supply-side determined inflation surge could have been expected (see Mason, 2022).

6. Concluding reflections

The nature and degree of ideational change we can observe in the world of central banking remains a contentious topic and the Fed's new framework provides an interesting case with potentially broad and pervasive implications. Our study examined this framework through the lens of how FOMC members' view of the NAIRU model changed over time and in the face of empirical anomalies. This model is a policy core belief that figures as a central element in the justification of the broader monetary policy paradigm of independent, inflation-targeting central banks. Our examination of how the FOMC learned vis-à-vis the NAIRU model throughout the 2020 strategic review process built on an ideal-type distinction of the way in which FOMC members started to cast into doubt the NAIRU model: epistemological and ontological problematisation. Based on this distinction, our analysis of key FOMC speeches given from 2012 to 2022 shows that by and large the FOMC has moved to

an epistemological problematisation of the NAIRU model with two notable exceptions where a return of the NAIRU model can be observed: from 2016 to 2017 and in the wake of 'Covid-flation'.

In contrast to pre-emptive tightening, the epistemological problematisation of the NAIRU is based on a rationale of data dependency, staying away from the ELB or avoiding a de-anchoring of inflation expectations. While select FOMC members already had a somewhat more visible history of also problematising the NAIRU model on ontological grounds, this view comes onto the scene more fully only in the first phase of the Covid-pandemic while in the second inflationary phase the traditional NAIRU-interpretation saw a comeback. Nevertheless, although no radical change has taken place, it is important to stress that the Fed's monetary policy framework has been altered to enable a more expansionist stance that could be exploited when inflation returns to more acceptable levels. Indeed, as the IMF argued in its April 2023 World Economic Outlook, 'as inflation returns to target, the effective lower bound on interest rates may become binding again' (IMF, 2023, 46).

Given the ubiquity of inflation-targeting monetary policy regimes and, by implication, their reliance on the NAIRU model, our analysis also bears on the wider literature on central banking. It shows that policy core beliefs can be relatively resilient even in the light of empirical anomalies, especially when they involve an unobservable variable. Nonetheless, anomalies pose opportunity and impetus for policy learning. Yet, exactly how such anomalies are reconciled with a paradigm depends, among others, on the priors brought to the decision-making table and the centrality of such beliefs as they relate to the institutional interests of key decision-makers. Importantly, our data analysis generated some specific insights pertaining to the level at which we analyse policy learning, highlighting the need for in-depth examination of the actors involved in ideational change. While there seems to have been at least for some members a gradual learning process, the more profound change is observed at the

group-level. Rather than an intra-individual change of priors over time, the key mechanism appears to be the turnover of FOMC members. It is through such composition effects that the stance of the committee as a whole seems to change, a finding backed by other studies, too (Ainsley, 2017; Bordo and Istrefi, 2023; cf. Schulz, 2017; Van Esch, 2007). In simple terms, it looks like it is more likely for ideas to change as a result of newly arriving policymakers than as a consequence of learning on the part of existing policymakers. The political appointment of monetary policymakers with alternative views should thus be seen as a key channel for radical change in central banks, highlighting the deeply political nature of the appointment process and the need to establish a status quo-busting political majority to enact paradigmatic change in monetary policymaking.

An important limitation of our study is that it cannot shed light on *why* given policymakers do not seem to change their policy core belief substantially. A simple answer would be that empirical evidence on hysteresis effects remains too scarce: the few Fed studies about the benefits of hot labour markets have mixed results (e.g., Aaronson *et al.* 2019; Hotchkiss and Moore, 2018). This reasoning can fast become somewhat circular, though, as empirical examinations of the effects of reverse or positive hysteresis are only possible if such cases were tried in practice. Another possible reason might be that central bankers dread the possible consequences either way: if a high-pressure economy fuels inflation, their credibility is undermined. But if tight labour markets would indeed yield reverse or even positive hysteretic effects, this could undermine the postulate of the long-term neutrality of money. The latter is, as post-Keynesian authors have repeatedly stressed, a key theoretical justification for the de-politicisation of monetary policy (Sener, 2019, 107). Similarly, if the NAIRU were endogenous and, thus, possibly a policy variable in itself, monetary policy decisions would involve trade-offs not only in the short- but also in the long-run, reinvigorating a debate about the legitimacy of leaving this power to unelected technocrats. As such, Kaya (2022, 1629) put

it well when she observes that ‘a policy that undermines the independence of a central bank might be politically palatable but technically and organizationally unattractive for the policy-makers.’

Whatever the reasons actors might put forward as explanation, studying the underlying reasons for intra-individual (non-)change will likely remain a notoriously difficult methodological endeavour. Even in the best case where interviewees truthfully introspect, deeply held convictions might be both difficult to reflect upon and, thus, empirically evasive. Still, both surveys and elite interviews regarding how and why policymakers think the way they do with regards to the NAIRU model might shed some more light on different forms of policy learning. More generally, we hope to see more empirical research on the potential linkages between the norm of central bank independence and monetary policymakers’ adherence to NAIRU.

References

Aaronson, S.R., Daly, M., Wascher, W., and Wilcox, D. (2019). *Okun revisited: Who benefits most from a strong economy?*, Brookings Papers on Economic Activity, 333–404.

Ainsley, C. (2017). The politics of central bank appointments. *The Journal of Politics*, *79*(4), 1205-1219.

Autor, D., Dube, A. and McGrew, A. (2023). *The Unexpected Compression: Competition at Work in the Low Wage Labor Market*, NBER Working Paper n°31010, Cambridge, MA: National Bureau of Economic Research.

Ball, L. (2014), '*Long-term damage from the Great Recession in OECD countries'*, NBER Working Paper, No 20185, Cambridge, MA: NBER.

Ball, L., and Mankiw, G.N. (2002). The NAIRU in Theory and Practice, *Journal of Economic Perspectives*, 16(4), 115-136.

Ban, C. (2021). Content Analysis in International Political Economy. In Pevehouse, and Seabrooke (eds). *The Oxford Handbook of International Political Economy,* (online edn, Oxford Academic), C46.S1–C46.N1.

Barker, T. (2023). Inflation Is About Class Struggle, *Jacobin*, January 11, 2023.

Bell, D. and Blanchflower, D. (2018). *The Lack of Wage Growth and the Falling NAIRU*, NBER Working Paper, No. 24502, Cambridge, MA: NBER.

Bennett, Colin J., and Howlett, M. (1992). The Lessons of Learning: Reconciling Theories of Policy Learning and Policy Change. *Policy Sciences* 25 (3): 275–94.

Blanchard, O. J., Cerutti, E., and Summers, L. (2015). *Inflation and activity–Two explorations and their monetary policy implications*, NBER working paper No. 21726, Cambridge, MA: NBER.

Blanchard, O. (2018). Should We Reject the Natural Rate Hypothesis?, Journal of Economic Perspectives, 32(1), 97–120.

Blanchard, O. (2021). "*In Defense of Concerns over the $1.9 Trillion Relief Plan*", Peterson Institute Blog, Washington: Peterson Institute.

Bluedorn, J. C. and Leigh, D. (2019). *Hysteresis in Labour Markets? Evidence from Professional Long-Term Forecasts*, IMF Working Paper No. 19/114, Washington: IMF.

Bordo, M., and Istrefi, K. (2023). Perceived FOMC: The making of hawks, doves and swingers. *Journal of Monetary Economics (forthcoming)*.

Borio, C. (2021). Back to the Future: Intellectual Challenges for Monetary Policy. *Economic Papers* 40 (4): 273–287.

Braun, B. (2014). Why Models Matter: The Making and Unmaking of Governability in Macroeconomic Discourse, *Journal of Critical Globalisation Studies*, 7, 48-79.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology, *Qualitative Research in Psychology*, 3:2, 77-101.

Bundesbank, D. (2014). On the reliability of international organisations' estimates of the output gap. Monthly Report, 66(4).

Cerra, V., Fatas, A. and Saxena, S. (2020). *Hysteresis and Business Cycles*, IMF Working Paper, No. 20/73, Washington: IMF.

Connley, C. (2020). Democrats introduce new bill that would require the Fed to close racial employment and wage gaps. *CNBC News*, August 6/

Daly, M., Hobijn, B. and Valletta, R. (2011). *The Recent Evolution of the Natural Rate of Unemployment*, Federal Reserve Bank of San Francisco Working Paper Series, Working Paper 2011-05, January 2011.

Diessner, S. and Lisi, G. (2019) 'Masters of the "masters of the universe"? Monetary, fiscal and financial dominance in the Eurozone', *Socio-Economic Review*, 18(2), 315–335.

Downey, L. (2022). The Fight Against Inflation Is Becoming a Class War, *Foreign Policy*, February 16, 2022.

Dunlop, C.A. and Radaelli, C.M. (2018) The lessons of policy learning: types, triggers, hindrances and pathologies, *Policy and Politics*, vol 46(2), 255–72.

Dunlop, C.A., Radaelli, C.M. and Trein, P. (eds.). (2018). Learning in Public Policy: Analysis, Modes and Outcomes. Basingstoke, UK: Palgrave.

Dutt, A.K. (2010). Reconciling the Growth of Aggregate Demand and Aggregate Supply, in: Mark Setterfield (ed.), *Handbook of Alternative Theories of Economic Growth*, chapter 11, Edward Elgar Publishing.

Ferrara, F.M. (2020) The battle of ideas on the euro crisis: evidence from ECB inter-meeting speeches, *Journal of European Public Policy*, 27(10), 1463-1486.

Fleming, S. (2019). Trump's easy-money stance chimes with wider Republican shift. *Financial Times*, April 11 2019.

Fontan, C. (2022), Dietsch, P., Claveau, F. and Dion, J. (2022). Central Banking and Inequalities: Old Tropes and New Practices. In: Kappes, S., Rochon, L.P. and Vallet; G. (eds). *Central Banking, Monetary Policy and Social Responsibility*, Cheltenham: Edward Elgar.

FOMC (2012). *Statement on Longer-Run Goals and Monetary Policy Strategy*. Washington, DC: Federal Reserve System.

Foucault, M. (2001). *Fearless Speech,* New York: SemiotextI.

Fuglsang, N. (2023). The 'strange non-death' of economic models: how modelling contributed to neoliberal resilience in Denmark, *New Political Economy*, DOI: 10.1080/13563467.2023.2172147

Furman, J. (2022). Four Reasons to Keep Worrying About Inflation, *Wall Street Journal*, Jan. 13, 2022.

Gabor, D. (2021). *Revolution Without Revolutionaries: Interrogating the Return of Monetary Financing*, Berlin: Finanzwende and Heinrich Böll Stiftung.

Galbraith, J. K. (1997). Time to Ditch the NAIRU, *The Journal of Economic Perspectives*, 11(1), 93–108.

Gali, J. (2020). *Insider-Outsider Labour Markets, Hysteresis and Monetary Policy*, NBER Working Paper, No. 27385, Cambridge, MA: NBER.

Girardi, D., Paternesi-Meloni, W. and Stirati, A. (2020). Reverse hysteresis? Persistent effects of autonomous demand expansions, *Cambridge Journal of Economics*, 44(4), 835–869.

Hall, P. (1993). Policy Paradigms, Social Learning and the State: The Case of Economic Policy-Making in Britain, *Comparative Politics*, 25, 275–96.

Hauptmeier, S., Heinemann, F., Kappler, M., Kraus, M., Schrimpf, A., Trautwein, H. M., & Wang, Q. (2009). *Projecting Potential Output: Methods and Problems* (Vol. 42). Springer Science & Business Media.

Hess, G.D. (2021), *The Anguish and Progress of Central Banking*, Shadow Open Market Committee (SOMC), April 14, 2021.

Heikkila, T. and Gerlak, A.K. (2013), Building a Conceptual Approach to Collective Learning, *Policy Stud J*, 41, 484-512.

Heimberger, P., and Kapeller, J. (2016). A model-based measurement device in European fiscal policy-making: The ontology and epistemology of potential output. *ICAE Working Paper Series*, No. 55.

Heimberger, P., and Kapeller, J. (2017). The performativity of potential output: Procyclicality and path dependency in coordinating European fiscal policies. *Review of international political economy*, 24(5), 904-928.

Helgadóttir, O. and Ban, C. (2021) Managing Macroeconomic Neoliberalism: Capital and the Resilience of the Rational Expectations Assumption since the Great Recession, *New Political Economy*, 26:5, 869-884.

Henry, A. Ingold, K., Nohrstedt, D. and Weible, C. (2014) Policy Change in Comparative Contexts: Applying the Advocacy Coalition Framework Outside of Western Europe and North America, *Journal of Comparative Policy Analysis*, 16:4, 299-312.

Hotchkiss, J. L., and Moore. R.E. (2018). "*Some Like It Hot: Assessing Longer-Term Labour Market Benefits from a High-Pressure Economy*.", Working Paper 2018-1, Atlanta: Federal Reserve Bank of Atlanta.

Hung, H., Thompson, D. (2016). Money Supply, Class Power, and Inflation: Monetarism Reassessed. *American Sociological Review*, 81(3), 447-466.

IMF. (2023). *World Economic Outlook*, Washington, DC: International Monetary Fund.

Jacobs, L. and King, D. (2021). *Fed Power. How Finance Wins*, Oxford University Press (2nd edition).

Johnson, J., Arel-Bundock, V. and Portniaguine, V. (2019). Adding rooms onto a house we love: Central banking after the global financial crisis, Public Admin., 97, 546– 560.

Kamkhaji, J. C., and Radaelli. C.M. (2016). "Crisis, Learning and Policy Change." *Journal of European Public Policy,* 24(5), 714–34.

Kaya, A.(2022). The Federal Reserve's move to an explicit inflation target: incremental policy shifts in techno-political institutions, Review of International Political Economy, 29(5), 1625-1649.

Kaya, A., Golub, S., Kuperberg, M. and Lin, F. (2019), The Federal Reserve's Dual Mandate and the Inflation-Unemployment Trade-off, Contemp Econ Policy, 37, 641-651.

Laubach, T. and Williams, J.C. (2015). *Measuring the Natural Rate of Interest Redux*, Federal Reserve Bank of San Francisco Working Paper 2015-16, San Francisco: FRBSF.

Lavoie M. (2014), *Post-Keynesian Economics: New foundations*, Cheltenham, Edward Elgar.

Levingston, O. (2021). Minsky's moment? The rise 38epoliticizedsed Keynesianism and ideational change at the Federal Reserve after the financial crisis of 2007/08, *Review of International Political Economy*, 28(6), 1459-148.

Mason, J.W. (2022). *Inflation, Interest Rates and the Fed: A Dissent*, Blogpost, 25 March 2022.

Morgan, M.S. (2001). Models, stories and the economic world, *Journal of Economic Methodology*, 8(3), 361-384,

Moschella, M. and Pinto, L. (2018). Central banks' communication as reputation management: How the Fed talks under uncertainty, *Public Administration*, 97, 513–529.

Okun, Arthur M. (1973). Upward Mobility in a High-Pressure Econom. *Brookings Papers on Economic Activity*, 1973:1.

Palley, T. I. (2018). Recovering Keynesian Phillips curve theory: hysteresis of ideas and the natural rate of unemployment, *Review of Keynesian Economics*, 6(4), 473–492.

Pashakhanlou, A.H. (2017). "Fully Integrated Content Analysis, *International Relations,* 31(4): 447–65.

Quaglia, L. and Verdun, A. (2022): Explaining the response of the ECB to the COVID-19 related economic crisis: inter-crisis and intra-crisis learning, *Journal of European Public Policy*, DOI: 10.1080/13501763.2022.2141300.

Reifschneider, D., Wascher, W. and Wilcox, D. (2013). *Aggregate Supply in the United States: Recent Developments and Implications for the Conduct of Monetary Policy*, FEDS Working Paper, No. 2013-77, November 5, 2013.

Rudd, J.B. (2021). *Why Do We Think That Inflation Expectations Matter for Inflation? (And Should We?*. Finance and Economics Discussion Series, 2021-062, Washington: Board of Governors of the Federal Reserve System.

Sabatier, P.., and Weible, C. (2014). *Theories of the Policy Process*, 3rd ed. Boulder, CO: Westview Press.

Sener, U. (2019). Central Bank Independence and the Idea of Money Neutrality: Re-considering the Theoretical Link.

Seydl, J. and Spittler, M. (2016). Did globalization flatten the Phillips curve? U.S. consumer price inflation at the sectoral level, *Journal of Post Keynesian Economics*, 39:3, 387-410.

Shapiro, A.H., and Wilson, D. (2019). Taking the Fed at its Word: A New Approach to Estimating Central Bank Objectives using Text Analysis. Federal Reserve Bank of San Francisco Working Paper 2019-02.

Skinner, C. (2021). Central Bank Activism. *Duke Law Journal*, 71, 247-328.

Snowdon, B., and Vane, H. R. (2005). *Modern macroeconomics: its origins, development and current state*, Edward Elgar Publishing.

Stockhammer, E., & Jump, R. C. (2022). *An Estimation of Unemployment Hysteresis* (No. PKWP2221).

Stockhammer, E. (2008). Is the NAIRU theory a monetarist, new Keynesian, post Keynesian or a Marxist theory?. *Metroeconomica*, 59(3), 479–510.

Suddaby, R., and Greenwood, R. (2009). Methodological issues in researching institutional change. *The Sage handbook of organizational research methods*, 177-195.

Summers, L. (2021). The Biden stimulus is admirably ambitious. But it brings some big risks, too, *Washington Post*, February 4, 2021.

Swinkels, M., and van Esch, F. (2022). Deciding upon the Banking Union: How a joint belief shift instigated deep institutional change in Eurozone governance. *European Policy Analysis*, 8, 9– 32

Thiemann, M., Melches, C.R., and Ibrocevic, E. (2021) Measuring and mitigating systemic risks: how the forging of new alliances between central bank and academic economists legitimize the transnational macroprudential agenda, *Review of International Political Economy*, 28(6), 1433-1458

Van Doorslaer, H. and Vermeiren, M. (2020). Pushing on a String: Monetary Policy, Growth Models and the Persistence of Low Inflation in Advanced Capitalism, *New Political Economy*, 26(5), 797-816.

Van Esch, F. (2007). *Mapping the Road to Maastricht. A Comparative Study of German and French Pivotal Decision Makers' Preferences concerning the Establishment of a European Monetary Union during the early 1970s and late 1980s*. Unpublished Phd. Thesis. Nijmegen: Radboud University Nijmegen.

Van Esch, F. (2015). 'A Matter of Personality? Stability and Change in Leaders' Beliefs during the Euro-Crisis', in Damon Alexander and Jenny Lewis (eds.), Making Public Policy Decisions: Expertise, Skills and Experience. London: Routledge, 53–72

van 't Klooster, J. (2022). Technocratic Keynesianism: a paradigm shift without legislative change. *New Political Economy,* 27:5, 771-787.

Weber, A. A., Lemke, W., & Worms, A. (2008). How useful is the concept of the natural real rate of interest for monetary policy?. *Cambridge Journal of Economics*, *32*(1), 49-63.

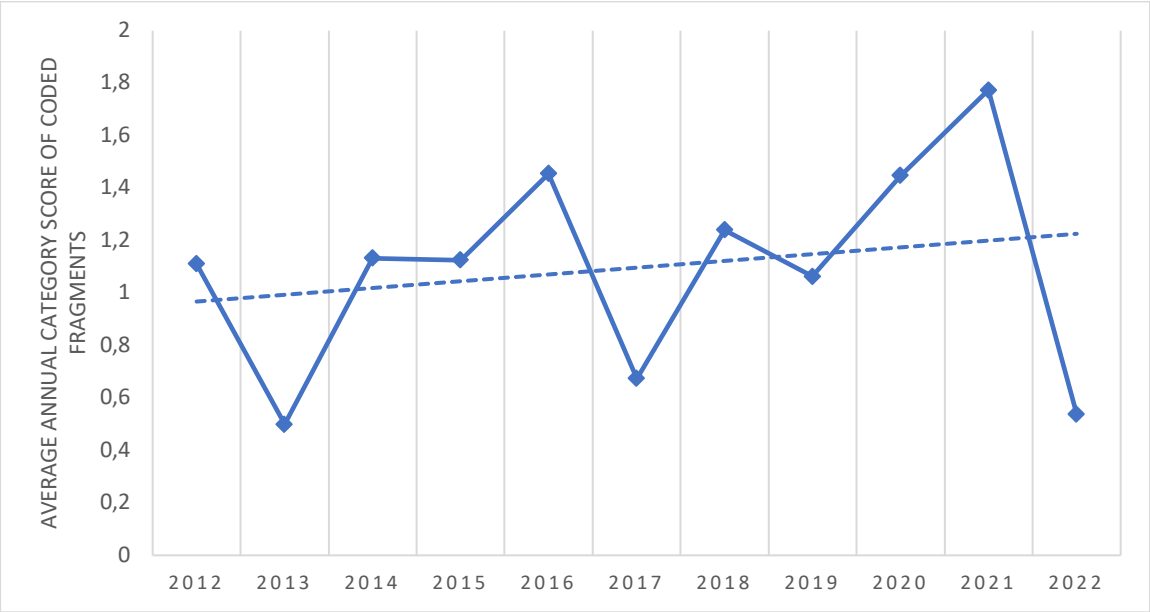
Williams, P., Abdih, Y. and Kopp E. (2020). *Reading the Stars*, IMF Working Paper No. 20/136, Washington: IMF.

Wood, M. (2015). Puzzling and powering in policy paradigm shifts: politicization, depoliticization and social learning. *Critical Policy Studies*, 9(1), 2-21.

Table 1: Categories and codes

Categories	**Codes**
Deliberate defence of NAIRU (=0)	References to *natural rate estimates*, *normal employment-inflation trade-off*, *need to sustain credibility in ensuring price stability*, *necessity of pre-empting wage or price inflation*, *structural/supply-side factors explaining high unemployment and/or lower labour market participation*, *non-linearity of unemployment-inflation relationship*
Epistemological problematization (=1)	References to *wrong estimates of natural rate*, *underestimation of slack*, *possibility of exploiting flatter Phillips curve to sustain lower unemployment*, *leniency to undershooting NAIRU estimates/wait and see*, *changed behaviour of inflation*, *data-dependence (less reliance on unobservables)*, *falling (and uncertain) r**, *need to avoid downward de-anchoring of inflation expectations/stay away from ELB*
Cautious ontological problematization (=2)	References to *negative hysteresis effects.*
Bold ontological problematization(=3)	References to *reverse hysteresis effects*, *pulling workers back in*, *actively chasing after a hot labour market*, *reducing labour market disparities*
Outright rejection (=4):	References to *supply adapting to increased demand*

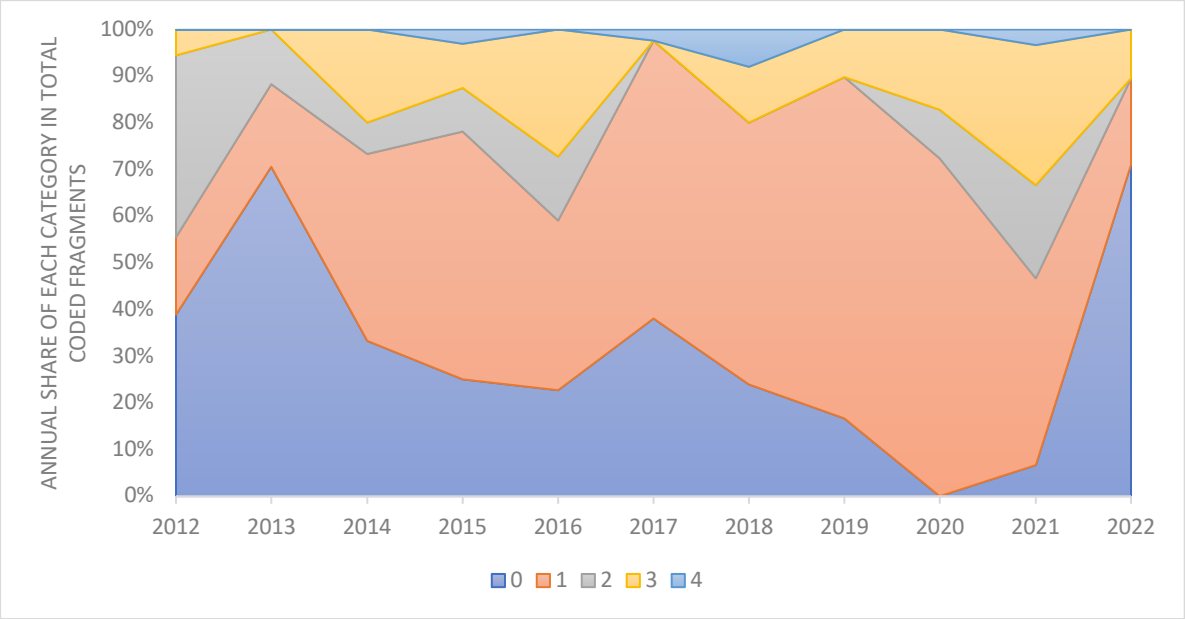
Figure 1: Evolution of FOMC members away from a deliberate defense of the NAIRU model year-by-year



Source: Authors' creation based on thematic analysis of FOMC speech database

Note: Our ordinal scale categorizes the degree of adherence to the NAIRU model whereby the categories refer to 0 = deliberate defence of NAIRU, 1 = epistemological problematization, 2 = cautious ontological problematization, 3 = bold ontological problematization, 4 = outright rejection.

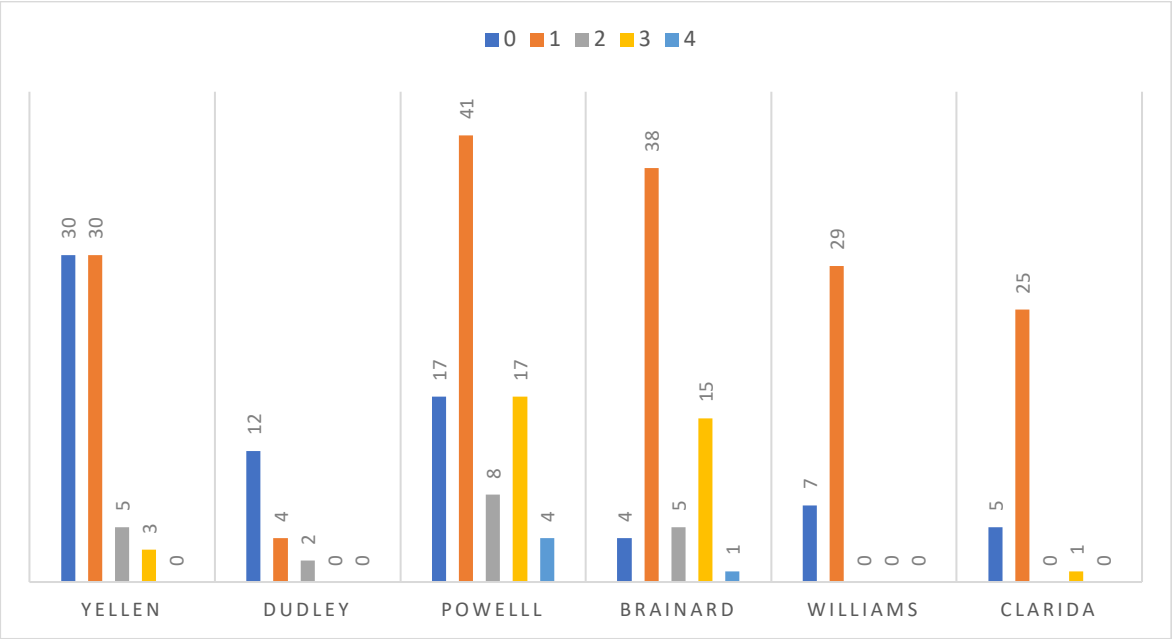
Figure 2: Predominance of epistemological problematization of the NAIRU in strategic review



Source: Authors' creation based on thematic analysis of FOMC speech database

Note: Our ordinal scale categorizes the degree of adherence to the NAIRU model whereby the categories refer to 0 = deliberate defence of NAIRU, 1 = epistemological problematization, 2 = cautious ontological problematization, 3 = bold ontological problematization, 4 = outright rejection.

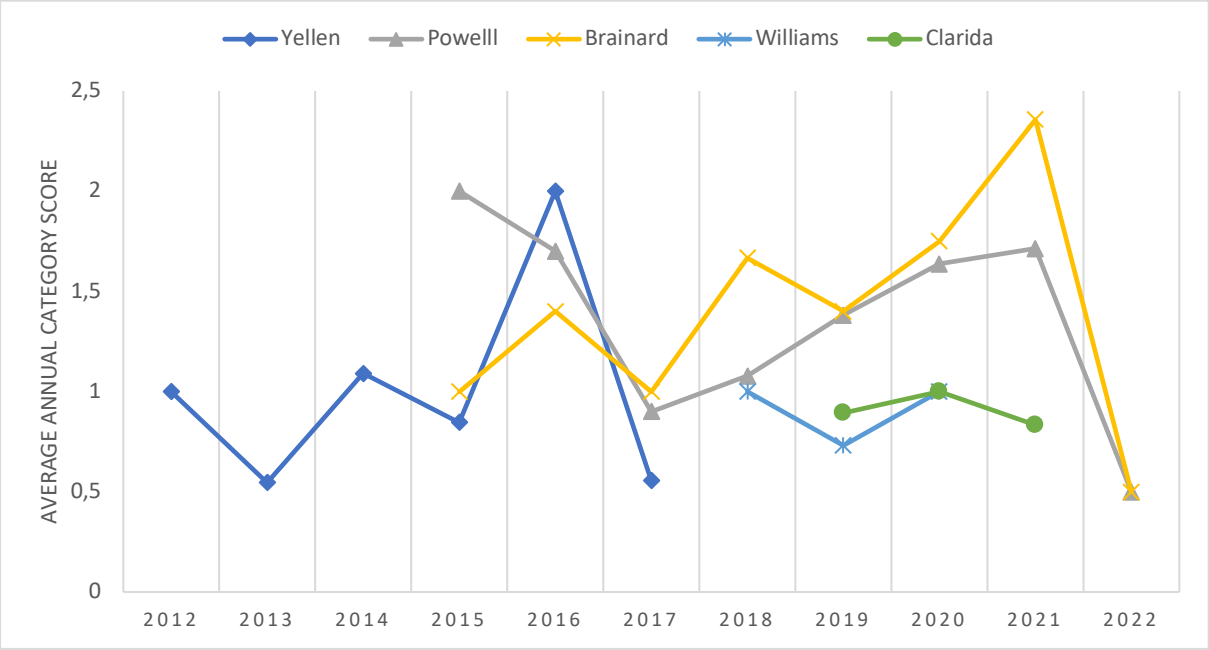
Figure 3: Key FOMC members engaged very differently with NAIRU inconsistencies (as shown by the assigned categories of their coded fragments).



Source: Authors' creation based on thematic analysis of FOMC speech database

Note: Our ordinal scale categorizes the degree of adherence to the NAIRU model whereby the categories refer to 0 = deliberate defence of NAIRU, 1 = epistemological problematization, 2 = cautious ontological problematization, 3 = bold ontological problematization, 4 = outright rejection

Figure 4: Evolution of average annual category score of individual FOMC members' coded fragments: learning *apparent for only some members*

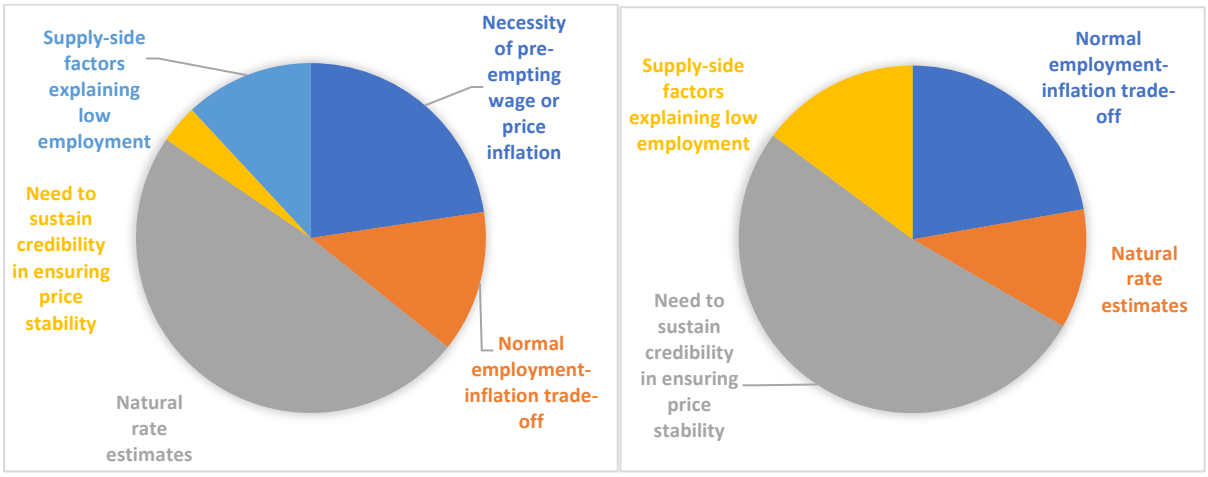


Source: Authors' creation based on thematic analysis of FOMC speech database

Note: Our ordinal scale categorizes the degree of adherence to the NAIRU model whereby the categories refer to 0 = deliberate defence of NAIRU, 1 = epistemological problematization, 2 = cautious ontological problematization, 3 = bold ontological problematization, 4 = outright rejection; Bernanke and Dudley were not included because of lack of data (only two years of speeches)

Figure 5: Relative code use for category 0 (‘deliberate defense of NAIRU’) speech segments

(a) 2012-2019 (b) 2022



Source: Authors’ creation based on thematic analysis of FOMC speech database