

The ECB and the inflation monsters: strategic framing and the responsibility imperative (1998-2023)

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Abstract

The recent resurgence of inflation in Europe has led the ECB to increase interest rates and phase out asset purchase programs designed to address the effects of the Great Financial Crisis. This article investigates how the ECB adjusts its logic of responsibility throughout this series of crises. Using a topic model and in-depth analysis of speeches, we examine the ECB's strategic framing of causal linkages related to inflation during three historical periods: the Central Bank Independence (CBI) era (1998-2011), the secular stagnation era (2011-2021), and the new inflation era (2021-). Our findings indicate that modifications made to the CBI's causal linkages during the secular stagnation era shaped the ECB's framing of the new inflation era in a novel way. However, despite acknowledging difficult policy tradeoffs, which they tended to obscure in the past, ECB policymakers still seek to uphold the imperative of responsibility by adapting it to varying policy contexts.

1. Introduction

In June 2010, the European Central Bank (ECB) released a short pedagogical video and leaflets featuring two dreaming teenagers who travel back in time to a setting resembling the Weimar Republic¹. There, they confront a blue inflation monster that is about to wreck the economy by unleashing banknotes falling from the sky. At that moment, the teenagers wake up from this nightmare and visit the ECB, where they learn that the inflation monster has been downsized and encapsulated by independent central bankers whose main responsibility is to ensure price stability.

¹ <https://www.ecb.europa.eu/ecb/educational/pricestab/html/index.en.html>

Thirteen years later, Christine Lagarde, the ECB president, stated in an interview that the ECB must do more to tackle "the inflation monster" (Arnold 2023). Indeed, since mid-2021, several factors, including demands for ecological transition, disruptions in global supply chains and, later on, the Russian invasion of Ukraine, have significantly altered economic dynamics and driven prices up by more than 10%. This sharp rise in inflation compelled the European Central Bank to increase interest rates for the first time in a decade, and to announce the winding down of asset purchase programs that were designed to address the effects of the 2007-2009 Great Financial Crisis and its aftermath.

In line with the theme of this special issue, this sequence of crises provides insights into how an independent institution, in this case the ECB, adapts the logic of responsibility that underpins its legitimacy in difficult times (Mair 2013; Authors, Introduction, this issue). The ECB is a paradigmatic case of a technocratic institution that is bound to a logic of responsibility: it is largely exempt from the norms of liberal democratic politics (van't Klooster 2018; Best 2018). Its high level of independence from political authorities is partly motivated by popular economic ideas, such as the "Central Bank Independence template" (CBI; Dietsch, Claveau, and Fontan 2018), which influenced the negotiations on the ECB statute during the late 1980s and early 1990s.

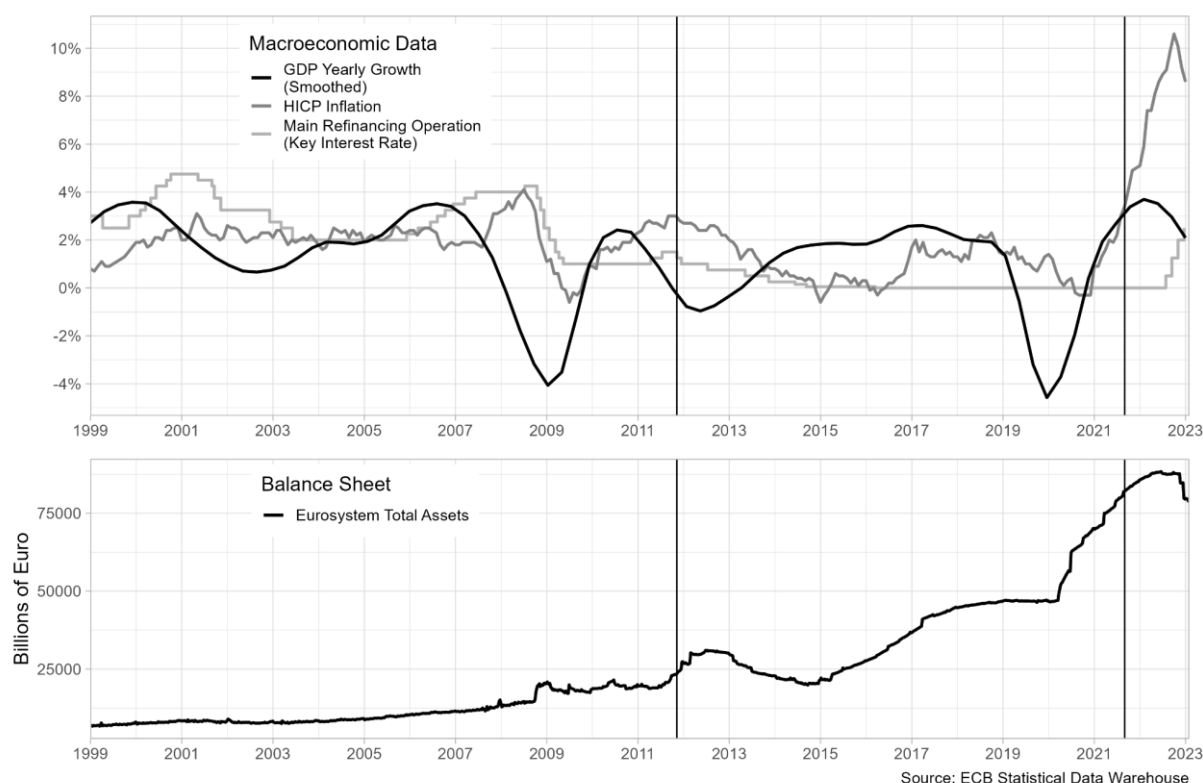
Supporters of the CBI template argue that providing central banks with a high level of independence while limiting their objectives to price stability is an optimal institutional arrangement (Issing et al. 2001). Indeed, one of the dominant macroeconomic explanations of inflation that remains today is that central banks' responsiveness to other economic objectives is inflationary: attempts to address issues such as unemployment, poverty or financial stability would put price stability at risk.² The CBI template assigns central banks a role of "guardian" against democratic demands whereby they limit the capacities of national governments by reducing the range of policy instruments, and thus, their capacity of responsiveness towards their electorates (Mair 2013, 115). The ECB's mandate prioritizes the logic of responsibility over responsiveness, with price stability being its overarching objective, and support for other EU economic policies being provided only without prejudice to this objective.³

Since the Great Financial Crisis, the ECB has faced numerous policy challenges that are not directly related to both the logic of responsibility underpinning the CBI template and its main objective of price stability: financial stability, lackluster growth and, more recently, climate change. The growth of the ECB's balance sheet since the start of the crisis reflects this expanded role (Figure 1). In response, the ECB has adopted several framing strategies to link this new role to the imperative of responsibility underlying the CBI template (as discussed below). However, with the resurgence of inflation since mid-2021, the question remains as to whether the ECB has returned to its original framing of its principle of responsibility. In other words, does the ECB frame its approach to tackling inflation in the same manner today as it did in its 2010 cartoon?

² See section 2 below.

³ Treaty on the Functioning of the EU (TFEU), Article 127

Figure 1: Evolution of the euro area macroeconomic environment and ECB policy (1999-2023)



This article analyzes the continuities and changes in the ECB's strategic framing of the causal linkages related to inflation. More precisely, we provide insights into the institution's handling of its responsibility imperative during three historical sequences: the CBI paradigm era (1998-2011), the secular stagnation era (2011-2021) and the new inflation era (2021-).

Existing research has analyzed how the ECB strategically frames the causes of the Great Financial Crisis and its monetary answer (Lombardi and Moschella 2016; Tesche 2019; Högenauer and Howarth 2016), its concerns for financial stability and macroprudential policies (Jones 2015; Schmidt 2016), or its efforts in greening the financial system (Deyris 2022; Tesche 2023). This strategic framing has allowed the ECB to reinterpret its mandate and other euro area rules to ensure greater legitimacy in policy performance, governance processes and citizens' politics (Jones 2009; Schmidt 2018). In a similar way, out of concern for how its different audiences perceive its reputation, the ECB has intensified its communication to respond to increasing contestation against its answer to the crisis (McPhilemy and Moschella 2019; Moschella, Pinto, and Diodati 2020). These analyses share a similar finding: in their legitimation and reputational efforts, central bankers engage in strategic ambiguity whereby they obfuscate novelty and try to subsume their new policies within the old set of justifications

related to the CBI paradigm (Johnson, Arel-Bundock, and Portniaguine 2018; Van't Klooster and Fontan 2020; van't Klooster 2022a).

Our article presents two novel contributions to the existing literature. First, we examine how the ECB is adapting its principle of responsibility, established in the early 1990s, to address the new challenges posed by the 2021 inflation era. Second, we provide a comprehensive analysis of how the ECB has framed inflation and price stability since its inception. In contrast to most existing research that examines the ECB's communication and framing efforts in general, our study focuses exclusively on the inflation theme. This enables us to isolate and analyze the ECB's strategic framing of its primary economic objective, which underpins its imperative of responsibility.

We operationalize the concept of strategic framing by examining how the ECB establishes internal and external causal linkages related to inflation.⁴ Internal causal linkages aim to adapt the principle of responsibility by framing inflation and related mechanisms according to the changing macroeconomic context. By doing so, the ECB can pursue a variety of macroeconomic goals while arguing that it still remains within its mandate and the CBI template. External causal linkages refer to factors outside of the ECB's control that contribute to inflation levels. By attributing inflation levels to external factors, the ECB can deflect criticism over the evolution of prices, which are influenced by a multitude of decisions made by economic and governmental actors. These external causal linkages also vary according to the changing macroeconomic context.

Our methodology relies on a combination of quantitative and qualitative approaches. To start with, we construct a corpus consisting only of ECB speeches that are significantly relevant to inflation. Then, we run a topic model that identifies the different topics tackled in each speech of our corpus for two purposes. First, we compare the prevalence of different topics across the three different eras. Second, we measure the correlation between topics strictly related to inflation and price stability with other topics such as climate change, structural reforms, or financial stability. This allows us to identify how the ECB puts forward different causal linkages to adapt its responsibility imperative overtime. Finally, we rely on the categorization produced by our topic model to detect and read the most representative speeches for relevant topics.

Our findings indicate that modifications made to the CBI's key causal linkages during the secular stagnation era shaped the ECB's framing of the new inflation era in a novel way. However, although ECB policymakers now acknowledge difficult policy tradeoffs, which they used to downplay in the past, they still aim to maintain the imperative of responsibility by adjusting it to different policy contexts.

⁴ This is in line with Beland (2009) definition of ideas as “claims about causal relationships in the world”, or Rosenhek’s (2013) “causal account.”

2. From inflation-nutters to growth enhancers and back again: the ambiguous ECB framing of inflation.

In this section, we review existing research to detect how the ECB may have framed inflation for each era. This allows us to build a set of expectations that we test systematically in sections 3 and 4.

The CBI era

The CBI era started in 1998, when the ECB began to operate and ended in November 2011, when the ECB stopped its interest rates' hikes against risks of financial implosion and deflation. As the 2010 cartoon on the inflation monster shows, the main priority of the ECB during this era was to build its anti-inflationary credibility (Howarth and Loedel 2005; Braun, Carlo, and Diessner 2022). This priority was in line with the imperative of responsibility associated with the CBI paradigm, which has ideational roots dating back from the late 1970's. Monetary policies face a time inconsistency problem: if policymakers have the possibility to reverse their previous commitments, economic agents anticipate inflation surprises and push prices higher, for example when negotiating wages (Kydland and Prescott 1977; Barro and Gordon 1983). Against this issue, there are two ways to make central banks credible enough in their anti-inflationary commitments. First, central banks should adhere to strict institutional rules that limit potential policy trade-offs with other goals than price stability and thereby restrict discretionary decision-making. Second, central banks should build an anti-inflationary reputation to "anchor" expectations about future inflation (Drazen 2002). These macroeconomic theories gained traction in the EU in the early and mid-1990s (Goutsmedt and Truc 2023) when European policymakers were trying to find an agreement on the institutional design of the ECB (Verdun 1999; McNamara 2002). The influence of the CBI template was conducive to the ECB's high level of independence and the prioritization of price stability over other macroeconomic objectives.

Another important factor in the design of the ECB was the influence of the Bundesbank, which was the most powerful central bank in Europe in the postwar era (Marsh 1992). While the Bundesbank was, in fact, heavily coordinating with social partners and governments to keep prices stable, it was nevertheless perceived as the most independent central bank in Europe with the best track record in terms of inflation control (Hall and Franzese 1998; Berger and De Haan 1999). This "myth" of the Bundesbank independence as the main cause of the low inflation levels in Germany (Sturm 1995) was actively promoted by Otmar Issing, a former top Bundesbank policymaker and the first chief economist of the ECB. In particular, he insisted that the most important task for the ECB in its early years was to promote its anti-inflationary credibility, which had "to be built over time by establishing a reputation" (Issing et al. 2001, 38).

We expect that the combination of the CBI template and the Bundesbank influence led to an internal causal linkage whereby the ECB prioritized price stability over other potential objectives such as growth, unemployment, and financial stability. This enabled the ECB to demonstrate its alertness and commitment to maintaining low inflation, thereby hoping to “anchor” the inflation expectations of market operators and gaining their confidence to achieve its inflation target. This commitment was demonstrated prominently when the ECB made the decision to increase interest rates between April and July 2011, despite the risks of economic recession and financial instability at the time (Gabor 2014; van’t Klooster 2022b).

Finally, existing research has indicated that between 1998 and 2011, the ECB placed significant emphasis on two external causal linkages associated with the CBI template. First, it consistently advocated for the flexibilization of labor markets, which aligns with the traditional role of central bankers as a safeguard against wage inflation (Epstein 2005; Fontan 2018). It also addresses the governability challenges arising from the incomplete architecture of the euro area (Braun, Carlo, and Diessner 2022). Second, the ECB was a strong proponent of the Stability and Growth Pact, which aims to ensure fiscal discipline among Member States, and remained steadfast in its opposition to potential fiscal profligacy by member states (Howarth and Loedel 2005; Heipertz and Verdun 2010). The ECB policymakers believed that this stance was crucial for establishing the institution's anti-inflationary credibility, as maintaining low levels of debt would reduce the risk of fiscal dominance and, in turn, inflationary pressures.

The secular stagnation era

In November 2011, the ECB began to alter their policy stance due to the potential threats to financial stability and growth potential (Gabor and Ban 2016). As a result, it decided to decrease its key interest rates, which remained in close proximity to zero for over a decade, alongside inflation levels. During this era, the ECB revised the internal causal linkages of the CBI template, resulting in a shift towards granting more autonomy to the objectives of financial stability and growth support, rather than being subordinate to price stability (Johnson, Arel-Bundock, and Portniaguine 2018). For example, the ECB started to implement large asset purchases programs, which were clearly designed to stabilize specific market segments and, later, to revive growth in the euro area (Gabor and Ban 2016). In addition, the ECB was assigned new macro and micro prudential objectives, raising concerns about potential trade-offs between the objectives of price stability and financial stability.

Moreover, despite unprecedented monetary expansion, both interest and inflation rates remained low in the euro area until 2021. This gave rise to a debate over whether the European Union was experiencing a secular stagnation, characterized by structural forces that permanently hindered the return to substantial growth and higher inflation levels (Teulings and Baldwin 2014; Van Doorslaer and Vermeiren 2021). Following this ongoing discussion, and persistent lackluster growth in the EU throughout the decade, the ECB revised its monetary policy strategy in the summer of 2021⁵. The ECB adopted a "symmetric 2% inflation target,"

⁵ <https://www.ecb.europa.eu/home/search/review/html/index.en.html>

meaning that it is equally undesirable for inflation to rise above or remain below the target. Furthermore, the ECB introduced a principle of proportionality whereby, among a set of instruments equally conducive to price stability, priority is given to those that assist in achieving its secondary objectives. This new strategy is not merely a technical adjustment to the new macroeconomic environment. Rather, it represents a clear departure from the CBI template, which precluded trade-offs between price stability and other objectives, as well as from the 2011 "signaling" interest rate hike (Grunewald and van 't Klooster 2023).

In accordance with this shift in internal causal linkages, the ECB also adjusted its external causal linkages related to price stability. During the CBI era, policymakers emphasized budget cuts and structural reforms aimed at increasing the flexibility of labor markets. However, the secular stagnation debate tempered this approach. In fact, one of the main lessons learned by the ECB between the 2007-2009 crisis and the Covid 19 crisis is that fast and substantial fiscal spending measures can ease its stabilization burden without causing inflation, while more flexible labor markets can hinder wage growth and, consequently, economic growth (Ferrara 2019; Quaglia and Verdun 2023).

Finally, since 2018, the ECB has incorporated risks related to climate change into its policy purview. This shift in focus can be attributed to various factors, including the advocacy efforts of think-tank-based 'field arbitrageurs' who have urged central banks to intervene against the risk of a carbon bubble (Quorning 2023), the engagement of small groups of insiders within national central banks who brought the issue to Frankfurt's headquarters (Siderius, 2022), as well as the strategic nominations of "climate-friendly" board members by governments and pressure from NGOs (Deyris 2022). However, the new climate objectives have faced criticism on the grounds that they might undermine the ECB's responsibility towards price stability. To address these concerns, in July 2021, the ECB has put in place an action plan that integrates climate change considerations into its monetary policy strategy.⁶ Crucially, the action plan draws an internal causal link between the objective of price stability and the fight against climate change.

The new inflation era

History can be ironic at times. In the summer of 2011, when the ECB unveiled its new monetary policy strategy and climate action plan, inflation began to rise again. A year later, it had reached double-digit numbers for the first time since the 1970s. After deliberating on whether the inflation was temporary or permanent, the ECB ultimately concluded that it was the latter and decided to raise interest rates. Additionally, it announced the phase out of its asset purchases, beginning in the summer of 2022.

This creates a dilemma for ECB policymakers. On the one hand, the resurgence of inflationary pressures compels them to adhere to the imperative of responsibility developed during the CBI era. On the other hand, they cannot ignore the new arguments that emerged during the secular stagnation era, which called for an expansion of its responsibility to objectives beyond price

⁶ https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html

stability. As a result, we anticipate that the ECB approaches the new inflation era by considering both the external and internal causal linkages from both the CBI and secular stagnation era, without a clear indication of which ones will ultimately prevail. Table 1 below summarizes our set of expectations by outlining which logic and causal linkages we expect to prevail for each era.

Table 1: Summary of our expectations by era

Era	Causal linkages
The CBI era	<p><i>Internal</i></p> <ul style="list-style-type: none"> ➤ Causal linkages between the tropes underlying the CBI framework: price stability, independence, credibility, anchoring expectations, reputation, and confidence. ➤ Other macroeconomic objectives (employment, growth, financial stability) are subordinated to the objective of price stability <p><i>External</i></p> <ul style="list-style-type: none"> ➤ Causal linkages between price stability and structural reforms. ➤ Causal linkages between price stability and fiscal sustainability.
The secular stagnation era	<p><i>Internal</i></p> <ul style="list-style-type: none"> ➤ Causal linkages whereby growth, financial stability and fight against climate change become necessary conditions for price stability. <p><i>External</i></p> <ul style="list-style-type: none"> ➤ Causal linkages between fiscal expansion and price stability
The new inflationary era	<p><i>Internal</i></p> <ul style="list-style-type: none"> ➤ Causal linkages between price stability and external factors (war, climate change) ➤ Reemergence of some causal linkages from the CBI era (price stability, credibility, anchoring expectations) <p><i>External</i></p> <ul style="list-style-type: none"> ➤ Causal linkages from the CBI era between price stability, fiscal sustainability and wages' moderation

3. Methodology

We test our set of expectations thanks to a mixed method approach: a quantitative analysis based on topic modeling for the whole timeline and a qualitative analysis that includes in depth reading of the most relevant speeches and excerpts of speeches identified by the algorithm. Our online appendix provides information on all the detailed steps of our methodology.⁷

Topic modeling is an unsupervised machine learning method used to uncover hidden themes (the topics) in a large corpus of text data. Topic modeling looks at the correlation between words and expressions in the paragraphs of the speeches included in our corpus and is tasked with finding k topics.⁸ It provides two measures. First, each word or expression is given k values measuring the strength of its association with the k topics. To understand the meaning of a given topic, we look at the words and expressions that have the highest value in relation to this topic. This allows us to sort topics in two categories: those closely related to “inflation” and “price stability” and the other ones. Second, each paragraph is given k values measuring the strength of its association with k topics. To understand the meaning of a given paragraph, we look at the topics that have the highest value associated with this paragraph⁹.

Existing research has employed topic modeling on ECB discourse in various ways. Some contributions used topic modeling on datasets that include all ECB speeches to study the general structure of its communication and the emergence of novel topics (Johnson, Arel-Bundock, and Portniaguine 2019; Cross and Greene 2020; Moschella, Pinto, and Diodati 2020) or to isolate and trace the evolution of specific topics over time (Diessner and Lisi 2020). Topic modeling may also be used to observe political conflict surrounding specific topics between the ECB and national central banks (Moschella and Diodati 2020) as well as to explore how the European Parliament holds the ECB accountable (Ferrara et al. 2022).¹⁰

In this article, we focus on the ECB's strategic framing efforts on its main imperative of responsibility, that is, to keep inflation under control. This is why we employ two strategies. First, we built a corpus of speeches from the Executive Council members that deal substantially with inflation from June 1998 to February 1st, 2023.¹¹ Second, we differentiate between two categories of topics: those about inflation and price stability and the other topics. Then, (*i*) we

⁷ URL addresses later on.

⁸ In our study, words and expressions mean unigrams (like “price”), bigrams (“price stability”) and trigrams (“maintain price stability”).

⁹ For example, the highest value words associated with topic 14 are “price stability”, “stability” “objective” and “maintain price stability”. This indicates that topic 14 is about the ECB mandate on price stability. Then, we read the paragraphs that have the highest value attached to this topic (see appendix).

¹⁰ Ferrara et al. (2022) do not look at ECB's public speeches but at the hearings of the ECB president by the European Parliament.

¹¹ We select ECB's speeches that display mentions of “inflation” of at least twice the number of pages of the speech. We include in this calculation all the terms that are composed of the chain of characters “inflation”, i.e. “disinflation”, “inflationary”, etc. See the appendix for further details on how we tested different thresholds.

evaluate the prevalence of each topic over time and (ii) we perform similarity measures to detect which other topics exhibit greater similarity to the inflation topics. In other words, when a paragraph substantially addresses inflation, we determine the other topics that are closely associated with the inflation topics within that paragraph.¹²

To run our topic model, we use a usual algorithm: the Latent Dirichlet Allocation (Blei, Ng, and Jordan 2003). After assessing quantitatively and qualitatively different models, we decided to explore further a model with 120 topics.¹³ We examine the words most associated with each topic to gain an initial understanding of the topics' content and we identify 14 topics that deal substantially with inflation and price stability (Table 2 in the appendix at the end of the document).¹⁴

Unsupervised machine learning techniques like topic modeling serve dual purposes in the research process: fostering the discovery process and measuring (Nelson 2020; Grimmer, Roberts, and Stewart 2022). Apart from the measures outlined above, our use of topic modeling also allows a computational “pre-reading” of our corpus and reduces its complexity. It provides categories to structure the corpus systematically. We use this categorization to pinpoint the most significant and representative speeches and speech excerpts. We then conduct a thorough reading and analysis of this sample of speeches.

4. Empirical analysis

We analyze the ECB strategic framing of inflation for each era in three steps. First, we analyze the prevalence of the fourteen “core topics” related to inflation in each era (Table 2, appendix, end of document), mainly to detect shifts in internal causal linkages related to inflation between eras. Second, we rank non-inflation topics according to their correlation with these core topics for each era (Table 3, appendix, end of document), mainly to detect new causal linkages. Third, we read the five speech excerpts that are the most representative for each topic identified during the two previous steps, for all eras.

The CBI era

The analysis of topic prevalence delivers a striking result: among the inflation topics, the five topics that are the most prevalent during the CBI era are the five topics closely related to price stability (Figure 2; Table 2). Topics 14 and 40 are related to the core causal linkages underlying the CBI template and topic 80 indicates the framing of the ECB answer to the 2007 inflation

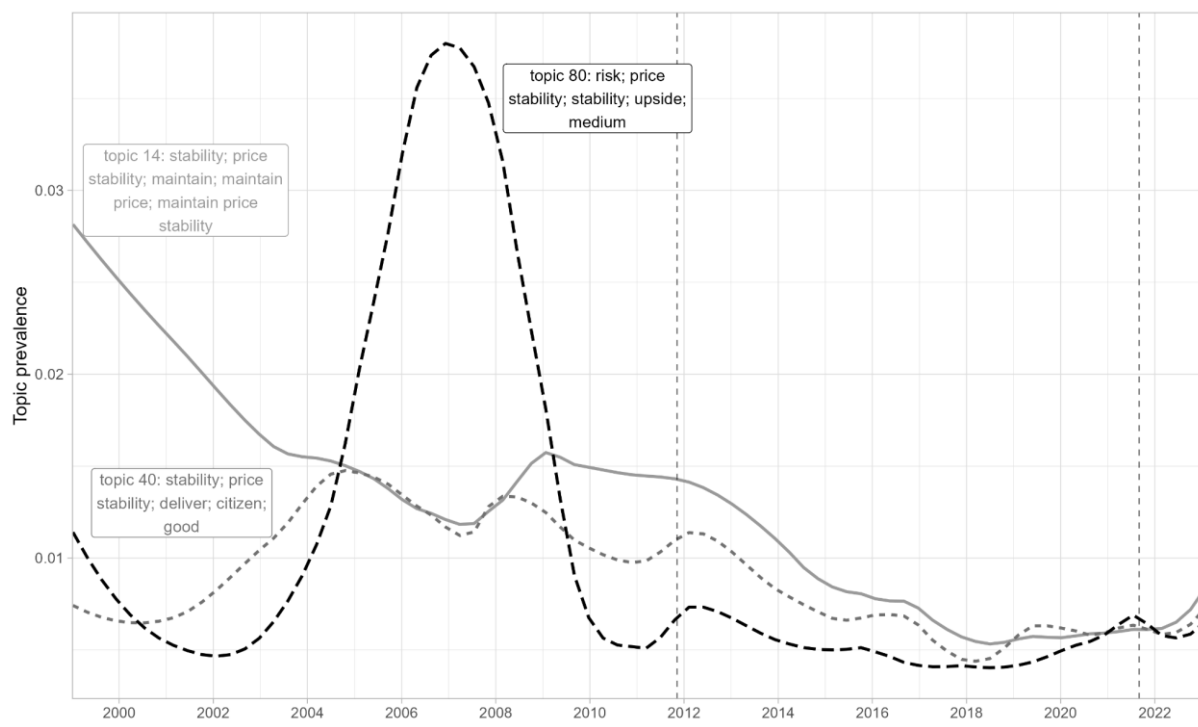
¹² Table 2 lists the relevant topics with the highest correlation for each of our three periods. See Appendix at the end of the document for details on similarity measures.

¹³ Further details in the Appendix.

¹⁴ The topics on inflation are topics in which “price” or “inflation” are among the 5 words most associated with a topic.

surge.¹⁵ The correlation of non-inflation topics with core inflation topics also confirm our expectations for the CBI era as the two first topics refer to fiscal issues and structural reforms (Table 3)¹⁶.

Figure 2: Topics on price stability¹⁷



Our reading of speech excerpts outlines the centrality of one crucial internal causal linkage of the CBI era: the prioritization of price stability as a necessary condition to achieve other macroeconomic objectives (Topic 14). For example, Jean Claude Trichet, the second ECB president, underlines that:

“Price stability, and economic growth and employment, rather than being substitutes, are complements in a relationship which makes price stability a necessary condition for sustainable growth and job creation.” (Trichet 2006, 2)

¹⁵ Two other topics refer to technical specifications related to the CBI model: inflation targeting (topic 102) and the definition of medium term inflation (topic 49). See online appendix for details.

¹⁶ Topics 63 and 16. Other non-inflation topics include growth, financial integration, transmission of monetary policy and financial instability.

¹⁷ For each date of publication of a speech, we average the strength of association between the paragraphs published at this date and the topics we are interested in. We thus obtain the prevalence of these topics over time. The figures with topics are built by estimating the relationship between dates and prevalence, using a local polynomial regression. The result is a smoothed representation of the data allowing us to observe the overall trend of various topics. See more details in the online appendix.

Jurgen Stark also detailed the theoretical underpinning of this prioritization of price stability. He quoted Kydland & Prescott (1977) and Barro & Gordon (1983) articles to underline that “any blurring of responsibilities can potentially lead to a loss of credibility for the central bank” (Stark 2011, 2–3). In the midst of the worst financial crisis experienced since 1929, Stark was adamant that “price stability is the best contribution we can make to financial stability” (Stark 2009, 10).

In parallel, ECB policymakers detail how the CBI template addresses the issue of time inconsistency by providing a framework that “anchors” the confidence of economic operators in sustained low inflation in the future (Topic 40):

“The degree of confidence in all economic constituencies, (...) is a key factor to foster growth and job creation. A central bank is an anchor of confidence. We, in the ECB and in the eurosystem, are doing all what is necessary to preserve and consolidate confidence: confidence in our currency, confidence in our capacity to deliver price stability, confidence in the stability of our monetary and financial environment” (Trichet 2004, 4).

When inflation surged in 2007, policymakers maintained their efforts to establish ECB’s anti-inflationary reputation (Topic 80). They stated they were monitoring potential inflationary factors, such as surging food and oil prices, while also accentuating the presence of “more fundamental” factors at play. These include “stronger than currently expected wage developments [that] would pose significant upward risks to price stability” (Trichet and Papademos 2007, 2).

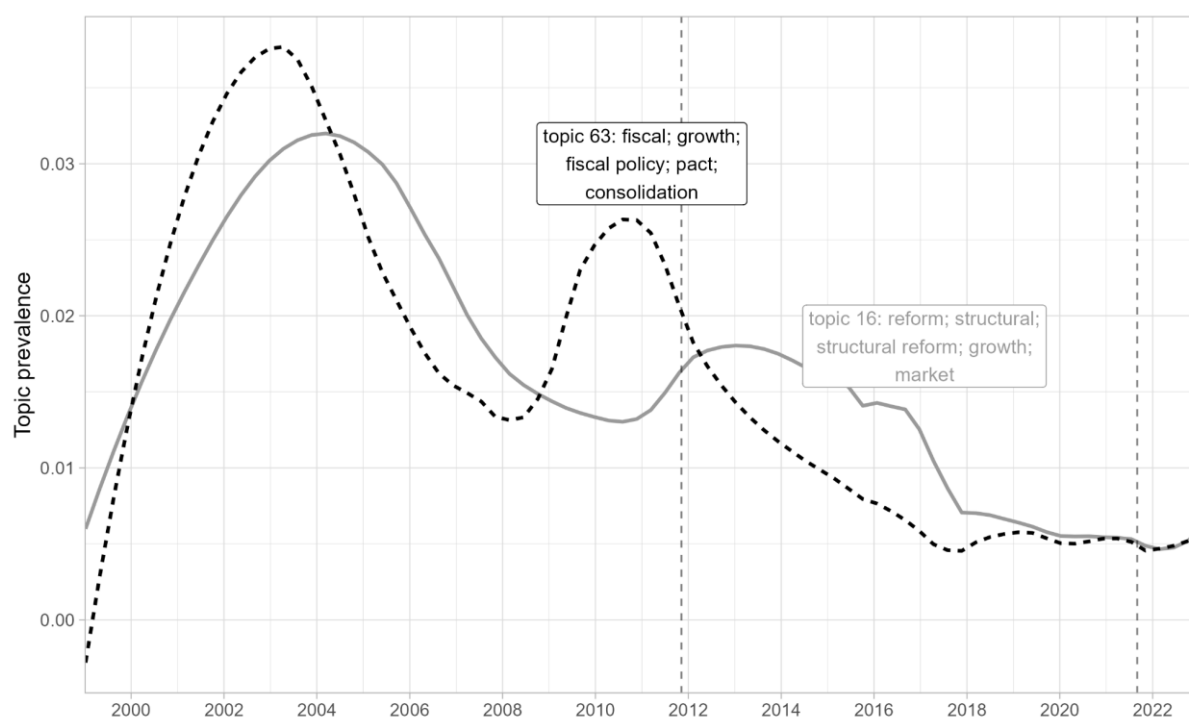
Jean Claude Trichet and ECB vice-president, Lucas Papademos, also called on “all parties concerned [to] meet their responsibilities” and stressed “the importance of avoiding wage developments that would eventually lead to inflationary pressures and harm the purchasing power of all euro area citizens” (*ibid.*). They also criticized wage-indexation “schemes” and the related risks of “wage-price spiral” (Trichet and Papademos 2008, 3)—a sentiment that resonates with the critiques levied by 1980s macroeconomic theories advocating for the CBI template.

In the same vein, our analysis shows an asymmetry in the ECB's attention between wages and oil as potential drivers of inflation. This is reflected by the significantly higher prevalence of the topic on wages in comparison to the oil topic during the first period.¹⁸ While both factors were likely to pose inflationary risks, the ECB was emphasizing the causal linkages of the CBI template, i.e. wages’ development, in framing the 2007 inflation.

Turning to external causal linkages, the fiscal issue and the SGP rules (topic 63) as well as structural reforms (Topic 16) were prevalent during the CBI era (Figure 3).

¹⁸ Topic 7 refers to “cost; wage; labour; competitiveness; growth; labour cost; adjustment; unit; unit labour; unit labour cost”; Topic 119 refers to “oil; increase; oil price; commodity; impact”. See also the Online Appendix.

Figure 3: Topics on fiscal issues and structural reforms



ECB policymakers pursue specific framing strategies when putting forward arguments about fiscal policies and structural reforms. First, central bankers wanted to be perceived as guardians of market discipline in the euro area in all circumstances. In fact, the fiscal “topic” has two prevalence peaks: one between 2003 and 2005 when France and Germany breached the SGP rules and one in 2010, when the bailout of the banking system caused large budget deficits. Second, they frame the issues of weak growth and unemployment in the euro area as promoting structural reforms as the main solution to them¹⁹.

In sum, during the CBI era, central bankers put forward internal and external causal linkages that allow them to frame their anti-inflationary role in alignment with Peter Mair's (2013) imperative of responsibility. They argued that their independence from political authorities and their anti-inflation commitments were necessary to maintain credibility and “anchor” market expectations of price stability, a prerequisite for achieving any other macroeconomic goal. Furthermore, they contended that governments should not directly intervene in the economy with expansionary fiscal measures but instead provide a market-friendly environment. This reflects the division of labor prescribed by the CBI framework, in which independent central banks should focus solely on inflation while governments should avoid fiscal expansion and instead implement “growth-enabling” structural reforms. Wim Duisenberg, the first ECB president, summarizes this well:²⁰

“Although monetary policy cannot lift the euro area's growth potential, the benefits of price stability for growth are evident, as stable prices provide the proper environment for structural

¹⁹ “stepping up structural reforms in these areas is indispensable for improving the euro area’s unsatisfactory growth potential and its ability to create employment” (Issing 2004, 2).

²⁰ President of the ECB (1998-2003).

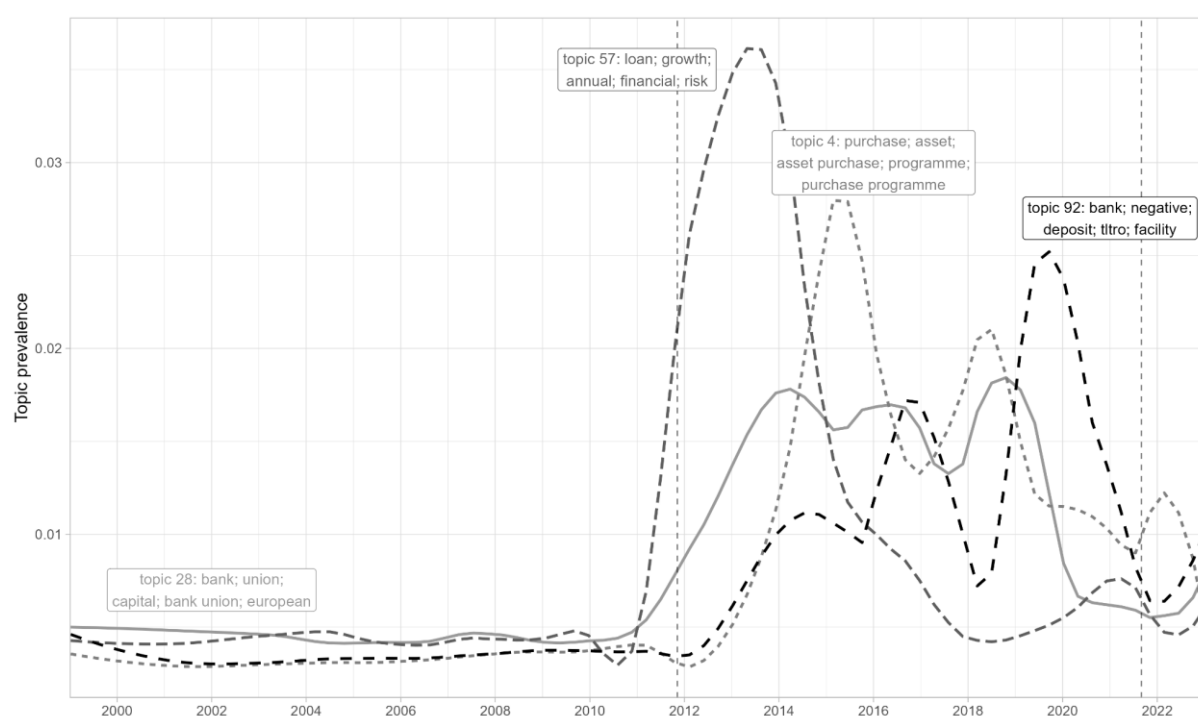
reforms to work. While the ECB will maintain its commitment to the maintenance of price stability, other policy-makers should assume responsibility for increasing the growth potential of the euro area. This, in turn, is the best allocation of responsibilities to contributing to sustainable non-inflationary growth” (Duisenberg 2001, 2).

The secular stagnation era

The framing of inflation shifted between the CBI and the secular stagnation era. To start with, the prevalence of topics that were aligned in the closest way with the CBI paradigm displays a steep decline (Figure 2). Conversely, the emergence of other topics indicate new policy trade offs faced by central bankers during the secular stagnation era (Figure 4; Figure 5; Table 2).

Topics with the highest correlation to inflation during this era relate to financial stability issues and how the ECB answered it with new monetary instruments²¹ as well as the persistent lackluster growth and its implications for the ECB role²² (Table 3).

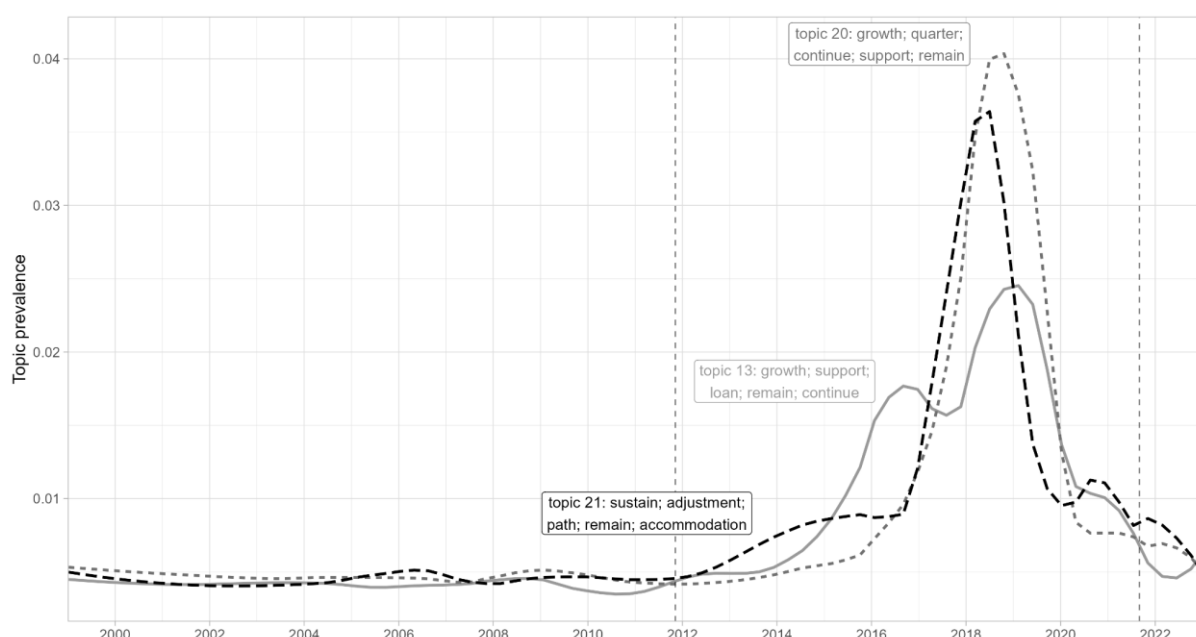
Figure 4: Topics related to the ECB new monetary instruments



²¹ Topics 57, 84, 46, 28, 4, 92.

²² Topics 13, 20 and 21.

Figure 5: Topics related to lackluster growth



The emergence of these topics mean that the ECB policymakers reframe CBI causal linkages to the new macroeconomic environment. The first significant modification to the CBI framing was about its main internal causal linkage, that is, the prioritization of price stability over other objectives. To start with, central bankers recognised that price stability alone was “not a sufficient condition of financial stability” (Draghi 2015, 3) and that they had an active role to play in stabilizing market segments. Moreover, the most prevalent topic (Topic 46) during the secular stagnation era relates to issues around the transmission mechanisms of monetary policy and how central bankers could make sure that their decisions have an impact on credit provision and, thereby, growth.²³ In other words, the objectives of financial stability and growth support started to gain autonomy to the extent that they were not directly subordinated to the price stability objective.

The second challenge to the previous era was the “missing inflation puzzle”, which questioned crucial mechanisms underlying the CBI template. In fact, the most prevalent topic associated with inflation during this period relates to the secular stagnation debate²⁴. More precisely, Vitor Constancio, the former ECB vice-president, directly quotes the concept to outline why low inflation remained persistent in the euro area (Constâncio 2016). ECB policymakers hoped for “self-sustained” inflation, that is, inflation reaching the 2% target without constant monetary stimulus (Constâncio 2017, 6; Draghi 2017a, 4). These discussions were also linked to the Phillips Curve, which describes the negative correlation between the levels of inflation and unemployment (Topic 1). Indeed, the validity of the relationship between these two variables

²³ “This recalibration of our asset purchases (...) helps to maintain the necessary degree of accommodation and thereby to accompany the economic recovery in an appropriate way” (Draghi 2017c, 4).

²⁴ Topic 47 refers to “underlie; headline; headline inflation; core; measure”. For example, “the strengthening of economic activity has yet to find correspondence in inflation developments: underlying inflation and domestic price pressures remain subdued” (Praet 2017, 5).

was questioned, as inflation did not seem to pick up when unemployment started to decline (Constâncio 2018, 7–10).

ECB policymakers looked for factors explaining low inflation levels despite monetary stimulation and lower unemployment levels. First, Peter Praet underlined that “to achieve a sustained adjustment in the path of inflation wage growth has to be stronger” (Praet 2017, 5). He was also concerned that “higher employment levels (do not) feed through into wage dynamics” (*ibid.*). Mario Draghi outlined the factors explaining this broken relationship, including weakened trade unions and the disappearance of wage indexation schemes (Draghi 2017a, 5). Second, Vitor Constancio pointed out that low inflation was also caused by “fiscal policy mistakes made in 2011–12”, which should “not be repeated so that we do not suffer from avoidable double dip recessions.” (Constâncio 2018, 12).²⁵ In other words, the external causal linkages that were pushed forward by central bankers in their framing of inflation during the CBI era (fiscal moderation and structural reforms) were conducive to the issue of low inflation during the secular stagnation era (Draghi 2017b, 3–4).

This led the ECB to shift its stance on both external and internal causal linkages in its framing of inflation. First, ECB policymakers changed the policy message addressed to other actors as they called for both fiscal (Schnabel 2020, 4–5) and wage expansion (Praet 2017, 5). For example, Luis de Guindos, the current ECB Vice-President, called for reforming the SGP for fiscal policy to have a role to play in answering shocks (De Guindos 2019, 3). Second, the analysis of the causes of secular stagnation and low inflation fed the revision of the ECB monetary policy strategy and its adoption of a “symmetric” inflation target under and above 2% (Draghi 2016).

However, we should not overestimate the extent of change in the framing of the ECB main imperative of responsibility. Some core elements of the CBI template remained during the secular stagnation era. For example, the anchoring of market expectation was still framed as a key element in how the ECB impacts the real economy. In the same vein, Peter Praet was still adamant that “over the longer-term, however, monetary policy cannot increase growth” (Praet 2015, 6) since growth is influenced by supply side rather than demand side factors. Finally, structural reforms aiming at flexibilizing labor markets were still recommended by the ECB to propel growth (Praet 2015).

In sum, some key causal linkages from the CBI era were abandoned to be subsisted by new ones that expand the objectives of the ECB beyond price stability, including financial stability and support for growth. But other core elements of the CBI template remained in place. Shortly before inflation started to pick up again, Isabel Schnabel summarized this articulation:

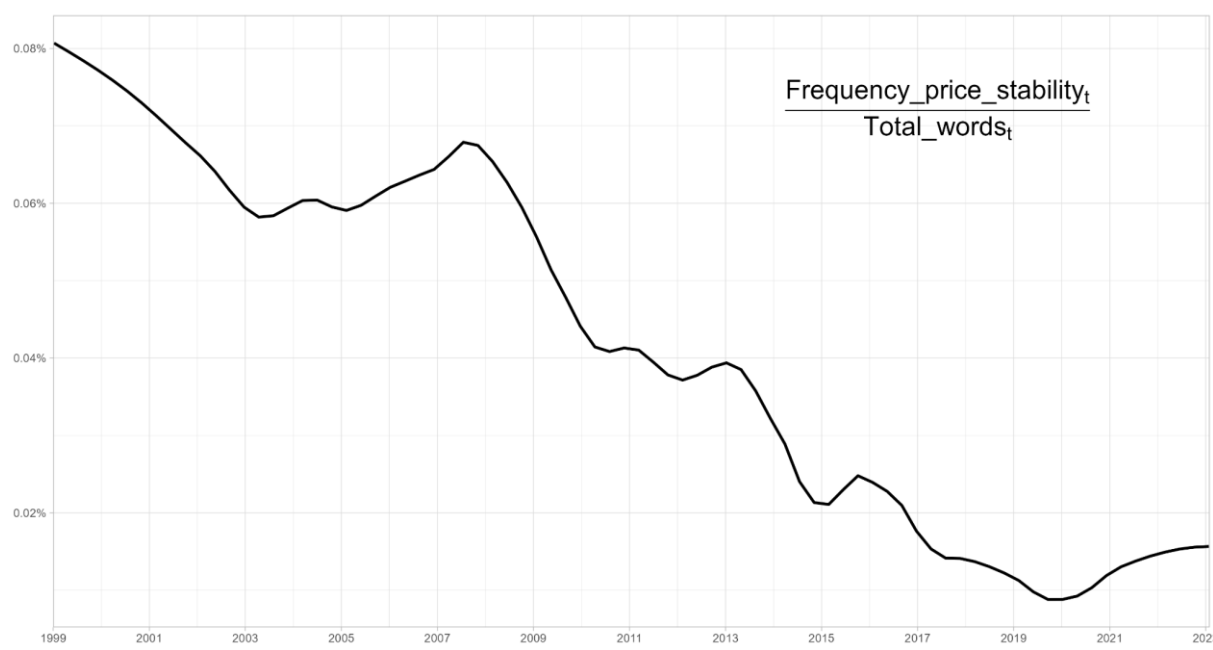
“Inflation may not be a serious threat to society at the current juncture. But the factors that motivated central bank independence four decades ago, and the safeguards that were put in place to protect it, remain important pillars of stability and prosperity” (Schnabel 2020, 6).

²⁵ Constancio explained that “the negative demand shock could be the delayed result of the fiscal policy tightening since 2010, or possibly the consequence of weakened economic sentiment after two recessions” (Constâncio 2018, 5).

The new inflation era

The evolution of the prevalence of the 14 topics directly related to inflation shows a clear change in the framing of inflation (Table 1). The five topics about price stability that were prevalent during the CBI era do not pick up after 2011 (Figure 2). The change in frequency of the mention of price stability corroborates this observation (Figure 6).

Figure 6: Change in the frequency of use of the expression “price stability”



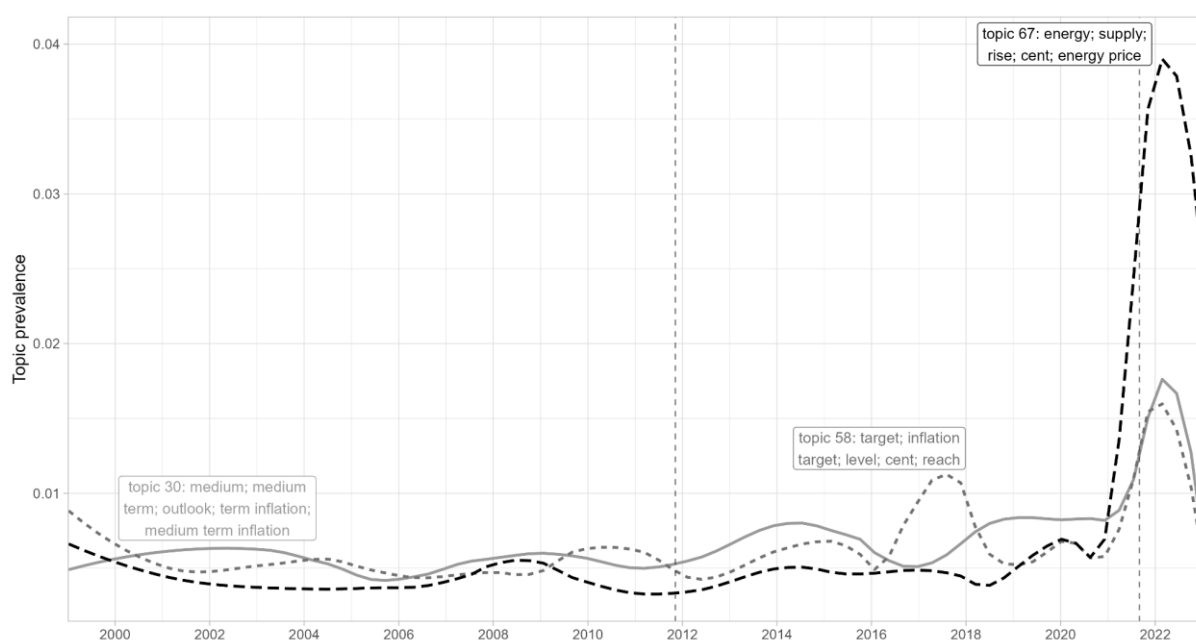
Conversely, out of the 14 core inflation topics, most of the topics that have the higher prevalence during the new inflation era emerge at the start of this era (Table 2 ; Figure 7).²⁶ This change in topics is obviously related to the new sources of inflation such as bottlenecks in the supply chains and the rise in energy costs (Topic 67). Two other topics (30 and 58) refer to the 2021 monetary strategy revision. This indicates that changes in the framing of inflation made during the secular stagnation era persist during the new inflation era. But, some crucial causal linkages of the CBI era, such as “anchoring” expectations and inflation targets, remain prevalent during the new inflation era (Topics 35 and 60).

Moreover, the ten topics that have the highest correlation (Table 3) to the new inflation era refer to potential inflationary factors of this era such as the effects of Covid 19, war and climate change (Topic 12, 15 and 88), wages and fiscal policies (Topics 91 and 103), as well as the ECB measurement and answer to rising prices (Topics 46, 52 and 112) and climate change (Topic 51).²⁷

²⁶ Topics 30, 58, 67. Topics 35, 47 and 60 have a high prevalence during the new inflation era but they were also prevalent during the CBI or the secular stagnation eras.

²⁷ Topic 88 refers to climate change and takes off from early 2021, reflecting debates about the new ECB climate strategy.

Figure 7: New topics on inflation



In-depth reading confirms these quantitative tendencies. On the one hand, there is a hybridization of causal linkages put forward during the CBI and the secular stagnation era. On the other hand, the hierarchical CBI framing of price stability as a necessary condition to achieve other macroeconomic objectives is partly substituted by a framing in terms of policy trade-offs.

First, Isabel Schnabel underlined that euro area authorities needed to move away from the fiscal-monetary policy mix of the secular stagnation era to come back to the division of labor of the CBI era. In her words, “governments must avoid an overly expansionary stance that fuels inflationary pressures and adds to the historically high public debt burden”, while the ECB “must remain determined to bring inflation back to target in a timely manner, so as to prevent current high inflation from becoming entrenched in expectations” (Schnabel 2022c, 1). But, she also brings some nuance by acknowledging that fiscal policy has a role to play “to protect the most vulnerable parts of society from the consequences of the energy and food price shocks” and foster investments in green energy utilities (2).²⁸

The latter element about fiscal investments points to our second point; the emergence of new policy trade-offs. Since the end of the secular stagnation era, the ECB has put forward a new causal linkage whereby the fight against climate change contributes to the objective of price stability. In the words of Isabel Schnabel, making the ECB’s “monetary policy framework climate change-proof” (Schnabel 2023, 4) is necessary to avoid “fossilflation” and “greenflation.” (Schnabel 2022a). For example, investment in green technology today will result in lower energy prices in the future.

²⁸ These citations come from the most prevalent speeches in topic 103 for the last period. This topic picked up first in late 2019 and during the Covid period: prevalent speeches in this period defended the need for active and expansive fiscal policies to sustain economic growth and help EU countries to recover.

But Isabel Schnabel also points out to a tradeoff between these greening efforts and the ECB's answer to current inflation:

“These developments now risk being reversed by the marked rise in global interest rates over the past year. Since fossil fuel-based power plants have comparably low upfront costs, a persistent rise in the cost of capital may discourage efforts to decarbonise our economies rapidly.” (Schnabel 2023, 1)

This dilemma is part of what Daniela Gabor (2022) calls “Zugwang central banking,” where every policy option worsens the situation. Gabor argues that abandoning the CBI paradigm and increasing policy coordination with governments may be the best way out of this dilemma, but it is unlikely that central bankers will advocate for this approach as it would compromise their privileged independent position in financial and democratic systems.

Our analysis confirms Gabor's conclusion; Isabel Schnabel has re-articulated causal linkages to adapt the imperative of responsibility to this tradeoff. On the one hand, she put forward the CBI prioritization of price stability as a necessary condition for reaching other objectives, including the green transition: “restoring price stability in a timely manner provides the conditions under which the green transition can thrive sustainably” (Schnabel 2023, 6). The theoretical mechanisms underlying her reasoning directly refers to the internal linkages related with the issue of time inconsistency and the CBI logic of responsibility:

“A central bank that is perceived as being committed to protecting its mandate can contain inflation at a lower economic cost, since the expectation that adequate policy action will be taken is itself stabilising. Such credibility is vital for the conduct of monetary policy”. (Schnabel 2022b, 6)

On the other hand, while Isabel Schnabel underlines that “overly expansionary fiscal policy would increase the risk of a de-anchoring of inflation expectation” (*ibid.*), she also points out that fiscal tools have an important role to play:

“protect the most vulnerable households and firms from the energy price shock in a targeted way; and second, foster potential growth and energy independence through public investment and structural reforms”. (Schnabel 2022c, 3)

This external causal linkage is closely related to the secular stagnation era as Isabel Schnabel frames fiscal activism as a necessary element for the monetary-fiscal policy mix to reach its macroeconomic goals. This is in contrast with the CBI era where fiscal expansion was systematically framed as a threat for price stability.

In sum, during the new inflation era, ECB policymakers expose difficult tradeoffs. These trade-offs are closely linked to changes in the framing of inflation since the end of the CBI era. Indeed, the integration of new policy goals and the missing inflation puzzle led to a wider understanding of the imperative of responsibility attached to the ECB, by comparison with the CBI era. Our analysis of the ECB framing of inflation since 2021 shows how central bankers try to articulate the causal linkages of both the CBI and the secular stagnation era in order to adapt its imperative

of responsibility to the new macroeconomic environment. These efforts are visible in this conclusion of a speech given by Christine Lagarde on “new challenges in a changing world”:

“As we head into 2023, a changing world brings with it new challenges, but also opportunities. (...) But some things never change: namely, the ECB’s commitment to price stability. We will play our part in Europe’s next chapter by bringing inflation back to our 2% target.” (Lagarde 2023, 3)

Conclusion

Our study provides a systematic analysis of how the ECB has strategically framed its handling of “inflation monsters” since 1998. In doing so, we validate the conclusions of existing research that central bankers adapt their anti-inflationary role to new policy challenges, by framing it in different ways to meet the imperative of responsibility.

Moreover, our study provides new insights on the recent inflationary era. In line with previous research on crisis-learning effects, we demonstrate that the ECB does not frame its fight against inflation monsters in 2023 as in its 2010 cartoon. We observe three changes. First, the lessons from secular stagnation have altered how the ECB frames fiscal issues: some forms of fiscal activism are now pushed forward while they used to be framed as fuelling the growth of inflation monsters. Second, the hierarchical framing of price stability as the sole objective under the CBI template vanished after 2011. Third, a new framing that recognizes the policy trade-offs between different macroeconomic objectives has emerged, with the ECB explicitly acknowledging the difficult choices it faces.

This shift in framing inflation is likely driven by the emergence of new policy challenges and causal linkages that were forged in response to past crises. For instance, the challenges posed by rising interest rates create a difficult policy trade-off with the shift towards greener energy systems. The connection between price stability and combating climate change was formed during the secular stagnation era. Without this linkage, the ECB may have prioritized price stability at the expense of other objectives. Facing this situation of *Zugwang* central banking, where every move risks to increase the salience of these trade-offs, ECB policymakers have continued to reframe the imperative of responsibility in the hope of avoiding policy discussions on regime change.

References

- Arnold, Martin. 2023. ‘ECB Must Do More to Tackle Inflation “Monster”, Says Christine Lagarde’. *Financial Times*, 5 March 2023.
- Barro, Robert J., and David B. Gordon. 1983. ‘Rules, Discretion and Reputation in a Model of Monetary Policy’. *Journal of Monetary Economics* 12 (1): 101–21.
[https://doi.org/10.1016/0304-3932\(83\)90051-X](https://doi.org/10.1016/0304-3932(83)90051-X).
- Béland, Daniel. 2009. ‘Ideas, Institutions, and Policy Change’. *Journal of European Public Policy* 16 (5): 701–18.

- Berger, Helge, and Jakob De Haan. 1999. 'A State within the State? An Event Study on the Bundesbank (1948–1973)'. *Scottish Journal of Political Economy* 46 (1): 17–39.
- Best, Jacqueline. 2018. 'Technocratic Exceptionalism: Monetary Policy and the Fear of Democracy'. *International Political Sociology* 12 (4): 328–45.
- Blei, David M., Andrew Y. Ng, and Michael I. Jordan. 2003. 'Latent Dirichlet Allocation'. *Journal of Machine Learning Research* 3 (Jan): 993–1022.
- Braun, Benjamin, Donato Di Carlo, and Sebastian Diessner. 2022. 'Planning Laissez-Faire: Supranational Central Banking and Structural Reforms'. *Zeitschrift Für Politikwissenschaft* 32 (3): 707–16. <https://doi.org/10.1007/s41358-022-00322-6>.
- Constâncio, Vitor. 2016. 'The Challenge of Low Real Interest Rates for Monetary Policy'. *At the Macroeconomics Symposium, Utrecht School of Economics, Utrecht*, 15 June 2016. <https://www.bis.org//review/r160616h.pdf>.
- . 2017. 'Effectiveness of Monetary Union and the Capital Markets Union'. *At the EUROFI Conference, Malta*, 6 April 2017. <https://www.bis.org//review/r170410b.pdf>.
- . 2018. 'Past and Future of the European Central Bank Monetary Policy'. *At the Conference on "Central Banks in Historical Perspective: What Changed After the Financial Crisis?"*, Organised by the Central Bank of Malta, Valletta, 4 May 2018. <https://www.bis.org//review/r180511b.pdf>.
- Cross, James P., and Derek Greene. 2020. 'Talk Is Not Cheap: Policy Agendas, Information Processing, and the Unusually Proportional Nature of European Central Bank Communications Policy Responses'. *Governance* 33 (2): 425–44. <https://doi.org/10.1111/gove.12441>.
- De Guindos, Luis. 2019. 'Improving Macroeconomic Stabilisation in the Euro Area'. *At the Global Interdependence Center Central Banking Series Conference, Madrid*, 3 October 2019. <https://www.bis.org//review/r191007f.pdf>.
- Deyris, Jérôme. 2022. 'Too Green to Be True? Forging a Climate Consensus at the European Central Bank'. *New Political Economy*, 1–18.
- Diessner, Sebastian, and Giulio Lisi. 2020. 'Masters of the "Masters of the Universe"? Monetary, Fiscal and Financial Dominance in the Eurozone'. *Socio-Economic Review* 18 (2): 315–35.
- Dietsch, Peter, François Claveau, and Clément Fontan. 2018. *Do Central Banks Serve The People? Future of Capitalism*. Cambridge, UK ; Medford, MA: Polity Press.
- Draghi, Mario. 2015. 'Hearing at the Committee on Economic and Monetary Affairs of the European Parliament'. *Before the Hearing at the Committee on Economic and Monetary Affairs of the European Parliament, Brussels*, 23 March 2015. <https://www.bis.org//review/r150324a.pdf>.
- . 2016. 'Delivering a Symmetric Mandate with Asymmetric Tools - Monetary Policy in a Context of Low Interest Rates'. *At the Ceremony to Mark the 200th Anniversary of the Central Bank of the Republic of Austria, Vienna*, 2 June 2016. <https://www.bis.org//review/r160608c.pdf>.
- . 2017a. 'Monetary Policy and the Economic Recovery in the Euro Area'. *At The ECB and Its Watchers XVIII Conference, Organised by the Center for Financial Studies and the Institute for Monetary and Financial Stability at Goethe University Frankfurt, Frankfurt Am Main*, 6 April 2017. <https://www.bis.org//review/r170410f.pdf>.
- . 2017b. 'Accompanying the Economic Recovery'. *At the ECB Forum on Central Banking, Sintra*, 27 June 2017. <https://www.bis.org//review/r170707b.pdf>.
- . 2017c. 'Monetary Policy and the Outlook for the Economy'. *At the Frankfurt European Banking Congress "Europe into a New Era – How to Seize the Opportunities"*, Frankfurt Am Main, 17 November 2017. <https://www.bis.org//review/r171121f.pdf>.
- Drazen, Allan. 2002. *Political Economy in Macroeconomics*. Édition : New Ed. Princeton, N.J: Princeton University Press.
- Duisenberg, Willem F. 2001. 'What Exactly Is the Responsibility of Central Banks of Large Economic Areas in the Current Slowdown of the World Economy?' *At the International Monetary Conference, Singapore*, 4 June 2001. <https://www.bis.org//review/r010607a.pdf>.
- Epstein, Gerald A. 2005. *Financialization and the World Economy*. Cheltenham: Edward Elgar Publishing.

- Ferrara, Federico M. 2019. 'The Battle of Ideas on the Euro Crisis: Evidence from ECB Inter-Meeting Speeches'. *Journal of European Public Policy* 27 (10): 1463–86.
<https://doi.org/10.1080/13501763.2019.1670231>.
- Ferrara, Federico M., Donato Masciandaro, Manuela Moschella, and Davide Romelli. 2022. 'Political Voice on Monetary Policy: Evidence from the Parliamentary Hearings of the European Central Bank'. *European Journal of Political Economy* 74 (September): 102–143.
<https://doi.org/10.1016/j.ejpoleco.2021.102143>.
- Fontan, Clément. 2018. 'Frankfurt's Double Standard: The Politics of the European Central Bank during the Eurozone Crisis'. *Cambridge Review of International Affairs* 31 (2): 162–82.
<https://doi.org/10.1080/09557571.2018.1495692>.
- Gabor, Daniela. 2014. 'Learning from Japan: The European Central Bank and the European Sovereign Debt Crisis'. *Review of Political Economy* 26 (2): 190–209.
<https://doi.org/10.1080/09538259.2014.881010>.
- . 2022. 'Zugzwang Central Banking (ECB Edition)'. *Financial Times*, 8 September 2022.
- Gabor, Daniela, and Cornel Ban. 2016. 'Banking on Bonds: The New Links Between States and Markets'. *JCMS: Journal of Common Market Studies* 54 (3): 617–35.
- Goutsmedt, Aurélien, and Alexandre Truc. 2023. 'An Independent European Macroeconomics? A History of European Macroeconomics through the Lens of the European Economic Review'. *Working Paper*. <https://dial.uclouvain.be/pr/boreal/object/boreal:270923>.
- Grimmer, Justin, Margaret E. Roberts, and Brandon M. Stewart. 2022. *Text As Data: A New Framework for Machine Learning and the Social Sciences*. Princeton University Press.
- Grunewald, Seraina N., and Jens van 't Klooster. 2023. 'New Strategy, New Accountability: The European Central Bank and the European Parliament after the Strategy Review'. SSRN Scholarly Paper. Rochester, NY. <https://doi.org/10.2139/ssrn.4420805>.
- Hall, Peter A., and Robert J. Franzese. 1998. 'Mixed Signals: Central Bank Independence, Coordinated Wage Bargaining, and European Monetary Union'. *International Organization* 52 (03): 505–35. <https://doi.org/10.1162/002081898550644>.
- Heipertz, Martin, and Amy Verdun. 2010. *Ruling Europe: The Politics of the Stability and Growth Pact*. Cambridge ; New York: Cambridge University Press.
- Högenauer, Anna-Lena, and David Howarth. 2016. 'Unconventional Monetary Policies and the European Central Bank's Problematic Democratic Legitimacy'. *Zeitschrift Für Öffentliches Recht* 71 (2): 1–24.
- Howarth, David, and Peter H. Loedel. 2005. *The European Central Bank: The New European Leviathan?* Basingstoke: Palgrave Macmillan.
- Issing, Otmar. 2004. 'The Euro and the Lisbon Agenda'. *At the 32nd Economics Conference of the Austrian National Bank*, 28 May 2004. <https://www.bis.org//review/r040604h.pdf>.
- Issing, Otmar, Vitor Gaspar, Ignazio Angeloni, and Oreste Tristani. 2001. *Monetary Policy in the Euro Area: Strategy and Decision-Making at the European Central Bank*. Cambridge: Cambridge University Press.
- Johnson, Juliet, Vincent Arel-Bundock, and Vladislav Portniaguine. 2018. 'Adding Rooms onto a House We Love: Central Banking after the Global Financial Crisis'. *Public Administration*.
- Johnson, Juliet, Vincent Arel-Bundock, and Vladislav Portniaguine. 2019. 'Adding Rooms onto a House We Love: Central Banking after the Global Financial Crisis'. *Public Administration* 97 (3): 546–60. <https://doi.org/10.1111/padm.12567>.
- Jones, Erik. 2009. 'Output Legitimacy and the Global Financial Crisis: Perceptions Matter'. *JCMS: Journal of Common Market Studies* 47 (5): 1085–1105.
- . 2015. 'Getting the Story Right: How You Should Choose between Different Interpretations of the European Crisis (And Why You Should Care)'. *Journal of European Integration* 37 (7): 817–32. <https://doi.org/10.1080/07036337.2015.1079376>.
- Klooster, Jens van't. 2018. 'Democracy and the European Central Bank's Emergency Powers'. *Midwest Studies in Philosophy* 42: 270–93.
- Klooster, Jens van't. 2022a. 'Technocratic Keynesianism: A Paradigm Shift without Legislative

- Change'. *New Political Economy* 27 (5): 771–87.
- Klooster, Jens van't. 2022b. 'The Politics of the ECB's Market-Based Approach to Government Debt'. *Socio-Economic Review*.
- Kydland, Finn E., and Edward C. Prescott. 1977. 'Rules Rather than Discretion: The Inconsistency of Optimal Plans'. *Journal of Political Economy* 85 (3): 473–91.
- Lagarde, Christine. 2023. 'New Challenges in a Changing World'. *At the Deutsche Börse Annual Reception in Eschborn*, 23 January 2023. <https://www.bis.org//review/r230124j.pdf>.
- Lombardi, Domenico, and Manuela Moschella. 2016. 'The Government Bond Buying Programmes of the European Central Bank: An Analysis of Their Policy Settings'. *Journal of European Public Policy* 23 (6): 851–70. <https://doi.org/10.1080/13501763.2015.1069374>.
- Mair, Peter. 2013. *Ruling the Void: The Hollowing of Western Democracy*. Verso books.
- Marsh, David. 1992. *The Bundesbank: The Bank That Rules Europe*. Heineman.
- McNamara, Kathleen. 2002. 'Rational Fictions: Central Bank Independence and the Social Logic of Delegation'. *West European Politics* 25 (1): 47–76.
- McPhilemy, Samuel, and Manuela Moschella. 2019. 'Central Banks under Stress: Reputation, Accountability and Regulatory Coherence'. *Public Administration* 97 (3): 489–98. <https://doi.org/10.1111/padm.12606>.
- Moschella, Manuela, and Nicola M Diodati. 2020. 'Does Politics Drive Conflict in Central Banks' Committees? Lifting the Veil on the European Central Bank Consensus'. *European Union Politics* 21 (2): 183–203. <https://doi.org/10.1177/1465116519890412>.
- Moschella, Manuela, Luca Pinto, and Nicola M. Diodati. 2020. 'Let's Speak More? How the ECB Responds to Public Contestation'. *Journal of European Public Policy* 27 (3): 400–418.
- Nelson, Laura K. 2020. 'Computational Grounded Theory: A Methodological Framework'. *Sociological Methods & Research* 49 (1): 3–42. <https://doi.org/10.1177/0049124117729703>.
- Praet, Peter. 2015. 'Lifting Potential Growth in the Euro Area'. *At the Welt-Währungskonferenz, Berlin*, 23 April 2015. <https://www.bis.org/review/r150427f.pdf>.
- . 2017. 'Ensuring Price Stability'. *At the Belgian Financial Forum Colloquium on 'The Low Interest Rate Environment'*, Brussels, 4 May 2017. <https://www.bis.org//review/r170505d.pdf>.
- Quaglia, Lucia, and Amy Verdun. 2023. 'Explaining the Response of the ECB to the COVID-19 Related Economic Crisis: Inter-Crisis and Intra-Crisis Learning'. *Journal of European Public Policy*, 1–20.
- Quorning, Stine. 2023. 'The 'Climate Shift' in Central Banks: How Field Arbitrageurs Paved the Way for Climate Stress Testing'. *Review of International Political Economy*, 1–23.
- Rosenhek, Zeev. 2013. 'Diagnosing and Explaining the Global Financial Crisis: Central Banks, Epistemic Authority, and Sense Making'. *International Journal of Politics, Culture, and Society* 26 (3): 255–72.
- Schmidt, Vivien A. 2016. 'The Roots of Neo-Liberal Resilience: Explaining Continuity and Change in Background Ideas in Europe's Political Economy'. *The British Journal of Politics and International Relations* 18 (2): 318–34.
- . 2018. 'Reinterpreting the Rules 'by Stealth' in Times of Crisis: A Discursive Institutional Analysis of the European Central Bank and the European Commission'. In *Europe's Union in Crisis*, 118–38. Routledge.
- Schnabel, Isabel. 2020. 'The Shadow of Fiscal Dominance: Misconceptions, Perceptions and Perspectives'. *At the Centre for European Reform and the Eurofi Financial Forum on "Is the Current ECB Monetary Policy Doing More Harm than Good and What Are the Alternatives?"*, Berlin, 11 September 2020. <https://www.bis.org/review/r200914f.pdf>.
- . 2022a. 'A New Age of Energy Inflation - Climateflation, Fossilflation and Greenflation'. *At a Panel on 'Monetary Policy and Climate Change' at 'The ECB and Its Watchers XXII' Conference, Frankfurt Am Main*, 17 March 2022. <https://www.bis.org/review/r220317b.pdf>.
- . 2022b. 'Managing Policy Trade-Offs'. *At a Workshop Organised by the European House – Ambrosetti on "The Agenda for Europe: Macroeconomic and Structural Policy Challenges"*,

- Cernobbio, 2 April 2022. <https://www.bis.org//review/r220413f.pdf>.
- . 2022c. ‘Finding the Right Mix: Monetary-Fiscal Interaction at Times of High Inflation’. *At the Bank of England Watchers’ Conference*, 24 November 2022. <https://www.bis.org//review/r221124g.pdf>.
- . 2023. ‘Monetary Policy Tightening and the Green Transition’. *At the International Symposium on Central Bank Independence, Sveriges Riksbank, Stockholm*, 10 January 2023. <https://www.bis.org//review/r230110k.pdf>.
- Stark, Jürgen. 2009. ‘The Economic Crisis and the Response of Fiscal and Monetary Policy’. *At the Austrian Industrial Organisation, Linz*, 8 June 2009. <https://www.bis.org//review/r090615e.pdf>.
- . 2011. ‘The Global Financial Crisis and the Role of Monetary Policy’. *At the 13th Annual Emerging Markets Conference 2011, Washington DC*, 24 September 2011. <https://www.bis.org//review/r110926b.pdf>.
- Sturm, Roland. 1995. ‘How Independent Is the Bundesbank?’ *German Politics* 4 (1): 27–41. <https://doi.org/10.1080/09644009508404385>.
- Tesche, Tobias. 2019. ‘Instrumentalizing EMU’s Democratic Deficit: The ECB’s Unconventional Accountability Measures during the Eurozone Crisis’. *Journal of European Integration* 41 (4): 447–63.
- . 2023. ‘Trustee Strategies, Politicization and de-Delegation: The Case of the European Central Bank’. *Governance* 36 (1): 125–40.
- Teulings, Coen, and Richard Baldwin, eds. 2014. *Secular Stagnation: Facts, Causes and Cures*. London: CEPR Press.
- Trichet, Jean-Claude. 2004. ‘European Economy - Current State and Prospects’. *Keynote Speech at the Annual Dinner 2004 of Financial Services Ireland (FSI), Dublin*, 23 September 2004. <https://www.bis.org//review/r040929d.pdf>.
- Trichet, Jean-Claude, and Lucas Papademos. 2007. ‘European Central Bank: Press Conference – Introductory Statement’. *At the ECB*, 5 July 2007. <https://www.bis.org//review/r080610b.pdf>.
- . 2008. ‘European Central Bank: Press Conference – Introductory Statement’. *At the ECB*, 5 June 2008. <https://www.bis.org//review/r080610b.pdf>.
- Van Doorslaer, Hielke, and Mattias Vermeiren. 2021. ‘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’t Klooster, Jens, and Clément Fontan. 2020. ‘The Myth of Market Neutrality: A Comparative Study of the European Central Bank’s and the Swiss National Bank’s Corporate Security Purchases’. *New Political Economy* 25 (6): 865–79.
- Verdun, Amy. 1999. ‘The Role of the Delors Committee in the Creation of EMU: An Epistemic Community?’ *Journal of European Public Policy* 6 (2): 308–28. <https://doi.org/10.1080/135017699343739>.

Appendix

Table 2: List of all topics

Topic	Topic on Inflation	Total Prevalence	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
Topic 67: energy; supply; rise; cent; energy price	TRUE	0.0151 (1)	0.0044 (114)	0.0058 (107)	0.0351 (1)

Topic	Topic on Inflation	Total Prevalence	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
Topic 14: stability; price stability; maintain; maintain price; maintain price stability	TRUE	0.01 (10)	0.0158 (6)	0.0074 (68)	0.0067 (68)
Topic 80: risk; price stability; stability; upside; medium	TRUE	0.0099 (13)	0.0187 (3)	0.0051 (118)	0.0059 (91)
Topic 35: expectation; inflation expectation; survey; base; measure	TRUE	0.0095 (17)	0.006 (82)	0.0088 (39)	0.0136 (12)
Topic 30: medium; medium term; outlook; term inflation; medium term inflation	TRUE	0.0092 (20)	0.0055 (91)	0.0073 (72)	0.0147 (10)
Topic 60: expectation; inflation expectation; anchor; term inflation expectation; term inflation	TRUE	0.009 (22)	0.0089 (45)	0.0076 (63)	0.0106 (19)
Topic 47: underlie; headline; headline inflation; core; measure	TRUE	0.0084 (38)	0.0046 (107)	0.0097 (29)	0.0108 (17)
Topic 119: oil; increase; oil price; commodity; impact	TRUE	0.0083 (42)	0.0092 (41)	0.0067 (91)	0.0091 (25)
Topic 58: target; inflation target; level; cent; reach	TRUE	0.0083 (42)	0.0052 (97)	0.0069 (84)	0.0129 (13)
Topic 68: hicp; hicp inflation; annual; inflation rate; annual hicp inflation	TRUE	0.0082 (52)	0.0103 (33)	0.0074 (69)	0.007 (62)
Topic 102: stability; price stability; definition; objective; define	TRUE	0.0081 (54)	0.0118 (17)	0.007 (82)	0.0055 (101)
Topic 40: stability; price stability; deliver; citizen; good	TRUE	0.008 (57)	0.0115 (19)	0.0064 (98)	0.0062 (83)
Topic 49: medium; medium term; stability; price stability; short	TRUE	0.008 (57)	0.0115 (20)	0.0063 (102)	0.0061 (87)
Topic 108: pressure; inflationary; inflationary pressure; time; downward	TRUE	0.0078 (73)	0.0077 (61)	0.0065 (96)	0.0091 (24)
Topic 78: paper; journal; economics; review; reserve	FALSE	0.0137 (2)	0.0108 (29)	0.0159 (2)	0.0143 (11)
Topic 115: speech; series; paper; european; bulletin	FALSE	0.0126 (3)	0.0058 (87)	0.0117 (11)	0.0203 (5)
Topic 43: percentage; note; chart; observation; late	FALSE	0.0124 (4)	0.005 (100)	0.0086 (44)	0.0237 (2)
Topic 16: reform; structural; structural reform; growth; market	FALSE	0.0118 (5)	0.02 (2)	0.0104 (23)	0.005 (115)
Topic 63: fiscal; growth; fiscal policy; pact; consolidation	FALSE	0.011 (6)	0.0211 (1)	0.007 (79)	0.005 (116)
Topic 46: bank; lend; credit; loan; bank lend	FALSE	0.0107 (7)	0.0053 (96)	0.0161 (1)	0.0106 (18)
Topic 39: bank; central; central bank; major central; dimension	FALSE	0.0106 (8)	0.012 (16)	0.0115 (14)	0.0083 (37)
Topic 52: raise; meet; normalisation; basis; interest	FALSE	0.0105 (9)	0.0045 (111)	0.0057 (111)	0.0212 (3)
Topic 79: shock; demand; supply; aggregate; aggregate demand	FALSE	0.01 (10)	0.0064 (78)	0.0084 (48)	0.0153 (8)
Topic 88: change; transition; climate; energy; green	FALSE	0.01 (10)	0.0039 (116)	0.0058 (109)	0.0203 (4)
Topic 91: labour; wage; labour market; unemployment; market	FALSE	0.0098 (14)	0.0077 (60)	0.0089 (38)	0.0127 (14)
Topic 15: pandemic; pepp; support; emergency; purchase	FALSE	0.0097 (15)	0.0032 (120)	0.01 (24)	0.0158 (7)
Topic 4: purchase; asset; asset purchase; programme; purchase programme	FALSE	0.0096 (16)	0.0034 (119)	0.015 (3)	0.0103 (20)
Topic 85: development; growth; remain; continue; stability	FALSE	0.0095 (17)	0.0176 (4)	0.0052 (117)	0.0057 (95)
Topic 61: hand; slide; firm; chart; leave	FALSE	0.0093 (19)	0.0046 (108)	0.0083 (49)	0.0149 (9)

Topic	Topic on Inflation	Total Prevalence	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
Topic 32: financial; stability; financial stability; risk; prudential	FALSE	0.0091 (21)	0.011 (24)	0.0087 (41)	0.0077 (46)
Topic 117: analysis; decision; forecast; information; policy decision	FALSE	0.009 (22)	0.0144 (9)	0.0059 (106)	0.0068 (67)
Topic 90: european; union; monetary union; europe; european union	FALSE	0.009 (22)	0.0109 (27)	0.0087 (42)	0.0074 (57)
Topic 74: projection; staff; macroeconomic; ecb staff; macroeconomic projection	FALSE	0.0089 (25)	0.0067 (72)	0.0097 (30)	0.0103 (21)
Topic 103: fiscal; fiscal policy; support; stabilisation; economy	FALSE	0.0089 (25)	0.0052 (98)	0.0098 (27)	0.0117 (16)
Topic 11: remain; growth; continue; development; quarter	FALSE	0.0088 (27)	0.0164 (5)	0.0048 (120)	0.0052 (110)
Topic 69: council; govern; govern council; decision; decide	FALSE	0.0088 (27)	0.0106 (31)	0.009 (36)	0.0069 (66)
Topic 112: income; household; consumption; house; real	FALSE	0.0088 (27)	0.0055 (92)	0.0086 (45)	0.0124 (15)
Topic 10: risk; bank; financial; credit; institution	FALSE	0.0087 (30)	0.0096 (38)	0.0084 (46)	0.0082 (38)
Topic 12: war; economy; impact; ukraine; time	FALSE	0.0087 (30)	0.0046 (105)	0.0056 (112)	0.0158 (6)
Topic 84: purchase; continue; asset; ecb interest rate; ecb interest	FALSE	0.0087 (30)	0.0038 (117)	0.0137 (5)	0.0087 (31)
Topic 64: remain; medium; expect; medium term; support	FALSE	0.0086 (33)	0.0149 (7)	0.0055 (114)	0.0053 (108)
Topic 1: model; curve; phillips; phillips curve; estimate	FALSE	0.0086 (33)	0.0064 (76)	0.0108 (18)	0.0085 (32)
Topic 29: european; eu; commission; level; supervisory	FALSE	0.0085 (35)	0.0109 (25)	0.008 (54)	0.0067 (70)
Topic 42: trade; service; good; increase; import	FALSE	0.0085 (35)	0.0105 (32)	0.0072 (74)	0.0077 (47)
Topic 118: interest; interest rate; cut; key; negative	FALSE	0.0085 (35)	0.0071 (68)	0.0108 (19)	0.0076 (52)
Topic 99: decision; communication; public; transparency; policy decision	FALSE	0.0084 (38)	0.0128 (13)	0.0069 (85)	0.0056 (97)
Topic 2: global; globalisation; international; domestic; economy	FALSE	0.0084 (38)	0.0102 (35)	0.0074 (67)	0.0075 (53)
Topic 109: continue; quarter; remain; real; analysis	FALSE	0.0084 (38)	0.0081 (51)	0.0121 (10)	0.005 (117)
Topic 9: country; convergence; member; eu; process	FALSE	0.0083 (42)	0.0145 (8)	0.0053 (116)	0.005 (114)
Topic 94: financial; market; integration; financial integration; cross	FALSE	0.0083 (42)	0.0134 (10)	0.0062 (103)	0.0054 (103)
Topic 8: central; central bank; bank; objective; banker	FALSE	0.0083 (42)	0.011 (23)	0.0081 (52)	0.0059 (89)
Topic 59: market; liquidity; money; money market; collateral	FALSE	0.0083 (42)	0.0089 (44)	0.0084 (47)	0.0076 (49)
Topic 87: change; structural; economy; set; factor	FALSE	0.0083 (42)	0.0082 (48)	0.0078 (56)	0.009 (26)
Topic 33: output; potential; gap; estimate; growth	FALSE	0.0083 (42)	0.0075 (62)	0.009 (34)	0.0083 (36)
Topic 21: sustain; adjustment; path; remain; accommodation	FALSE	0.0083 (42)	0.0045 (110)	0.013 (9)	0.0073 (58)
Topic 92: bank; negative; deposit; tltro; facility	FALSE	0.0083 (42)	0.0035 (118)	0.0138 (4)	0.0076 (50)

Topic	Topic on Inflation	Total Prevalence	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
Topic 114: real; interest; interest rate; nominal; equilibrium	FALSE	0.0082 (52)	0.0056 (89)	0.0115 (15)	0.0076 (51)
Topic 77: treaty; independence; institutional; mandate; independent	FALSE	0.0081 (54)	0.0117 (18)	0.0073 (73)	0.0052 (111)
Topic 20: growth; quarter; continue; support; remain	FALSE	0.0081 (54)	0.0047 (104)	0.0133 (6)	0.0064 (77)
Topic 24: growth; remain; loan; development; annual	FALSE	0.008 (57)	0.0127 (14)	0.0061 (104)	0.0053 (106)
Topic 44: financial; market; financial market; impact; volatility	FALSE	0.008 (57)	0.0109 (26)	0.0064 (99)	0.0066 (75)
Topic 25: growth; real; gdp; real gdp; gdp growth	FALSE	0.008 (57)	0.0092 (40)	0.0073 (70)	0.0075 (54)
Topic 100: investment; increase; reduce; firm; capital	FALSE	0.008 (57)	0.0082 (49)	0.0088 (40)	0.007 (63)
Topic 19: guidance; future; policy rate; path; condition	FALSE	0.008 (57)	0.0054 (93)	0.0098 (25)	0.0089 (27)
Topic 51: bond; market; yield; government; sovereign	FALSE	0.008 (57)	0.0049 (101)	0.009 (35)	0.01 (22)
Topic 28: bank; union; capital; bank union; european	FALSE	0.008 (57)	0.0046 (106)	0.0133 (7)	0.0061 (85)
Topic 81: development; money; analysis; growth; aggregate	FALSE	0.0079 (66)	0.013 (12)	0.0058 (108)	0.0049 (119)
Topic 48: conference; challenge; issue; address; discuss	FALSE	0.0079 (66)	0.0107 (30)	0.0068 (88)	0.0061 (86)
Topic 34: crisis; financial; financial crisis; pre; pre crisis	FALSE	0.0079 (66)	0.0072 (64)	0.0086 (43)	0.0078 (45)
Topic 54: activity; economic activity; quarter; expect; remain	FALSE	0.0079 (66)	0.0072 (65)	0.0076 (62)	0.0088 (29)
Topic 76: european; parliament; report; committee; european parliament	FALSE	0.0079 (66)	0.0072 (66)	0.008 (55)	0.0084 (34)
Topic 31: recovery; support; economic recovery; continue; remain	FALSE	0.0079 (66)	0.006 (81)	0.0107 (20)	0.0069 (65)
Topic 53: germany; people; german; draghi; saver	FALSE	0.0079 (66)	0.0058 (86)	0.0116 (12)	0.0063 (81)
Topic 23: single; currency; single currency; single monetary; single monetary policy	FALSE	0.0078 (73)	0.0133 (11)	0.0055 (113)	0.0046 (120)
Topic 75: country; differential; dispersion; difference; average	FALSE	0.0078 (73)	0.0123 (15)	0.0055 (115)	0.0057 (94)
Topic 65: asset; asset price; bubble; boom; credit	FALSE	0.0078 (73)	0.0113 (22)	0.0066 (92)	0.0056 (96)
Topic 7: cost; wage; labour; competitiveness; growth	FALSE	0.0078 (73)	0.0108 (28)	0.0057 (110)	0.0069 (64)
Topic 36: strategy; policy strategy; monetary policy strategy; ecb monetary; ecb monetary policy	FALSE	0.0078 (73)	0.0097 (37)	0.0064 (97)	0.0074 (56)
Topic 18: debt; government; public; fiscal; finance	FALSE	0.0078 (73)	0.0091 (42)	0.0077 (57)	0.0067 (69)
Topic 101: demand; growth; domestic; expect; factor	FALSE	0.0078 (73)	0.007 (69)	0.0083 (50)	0.008 (42)
Topic 5: good; time; question; lot; discussion	FALSE	0.0078 (73)	0.0059 (84)	0.011 (16)	0.0066 (73)
Topic 107: yield; risk; curve; market; premia	FALSE	0.0078 (73)	0.0051 (99)	0.0095 (31)	0.0089 (28)
Topic 120: condition; finance; finance condition; favourable; favourable finance condition	FALSE	0.0078 (73)	0.0048 (103)	0.0107 (21)	0.0079 (44)

Topic	Topic on Inflation	Total Prevalence	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
Topic 116: growth; productivity; productivity growth; labour; population	FALSE	0.0077 (84)	0.0103 (34)	0.007 (83)	0.0058 (93)
Topic 56: increase; average; period; level; decline	FALSE	0.0077 (84)	0.008 (52)	0.0071 (76)	0.0079 (43)
Topic 96: transmission; mechanism; channel; economy; transmission mechanism	FALSE	0.0077 (84)	0.0063 (79)	0.0082 (51)	0.0085 (33)
Topic 62: country; national; individual; development; shock	FALSE	0.0076 (87)	0.0099 (36)	0.0071 (77)	0.0059 (90)
Topic 106: risk; uncertainty; downside; outlook; downside risk	FALSE	0.0076 (87)	0.0065 (75)	0.0075 (65)	0.0088 (30)
Topic 41: economy; emerge; global; market; advance	FALSE	0.0075 (89)	0.0079 (56)	0.0076 (61)	0.007 (61)
Topic 72: challenge; conclude; environment; conclusion; time	FALSE	0.0075 (89)	0.0079 (57)	0.0072 (75)	0.0075 (55)
Topic 13: growth; support; loan; remain; continue	FALSE	0.0075 (89)	0.0042 (115)	0.0132 (8)	0.0051 (112)
Topic 113: evidence; empirical; research; study; time	FALSE	0.0074 (92)	0.0091 (43)	0.0066 (93)	0.0064 (80)
Topic 82: ensure; measure; time; continue; support	FALSE	0.0074 (92)	0.0071 (67)	0.007 (80)	0.0081 (40)
Topic 66: negative; fall; deflation; zero; positive	FALSE	0.0074 (92)	0.006 (83)	0.0098 (26)	0.0063 (82)
Topic 3: dynamic; range; percent; macroeconomic; wide	FALSE	0.0074 (92)	0.0055 (90)	0.0067 (90)	0.0099 (23)
Topic 86: european; central; european central bank; european central; board	FALSE	0.0074 (92)	0.0054 (94)	0.0089 (37)	0.008 (41)
Topic 105: instrument; mandate; tool; unconventional; measure	FALSE	0.0074 (92)	0.0045 (113)	0.0109 (17)	0.0067 (72)
Topic 89: cash; banknote; eurosystem; changeover; national	FALSE	0.0073 (98)	0.0115 (21)	0.0051 (119)	0.0054 (102)
Topic 27: economy; cycle; business; lead; time	FALSE	0.0073 (98)	0.0064 (77)	0.0073 (71)	0.0083 (35)
Topic 50: response; action; policy response; policy action; reaction	FALSE	0.0073 (98)	0.0061 (80)	0.0077 (58)	0.0081 (39)
Topic 93: short; short term; interest; interest rate; term interest	FALSE	0.0072 (101)	0.0075 (63)	0.0077 (59)	0.0064 (79)
Topic 97: country; government; italy; france; greece	FALSE	0.0072 (101)	0.0069 (70)	0.0091 (33)	0.0055 (99)
Topic 111: crisis; bank; debt; sovereign; sovereign debt	FALSE	0.0072 (101)	0.0046 (109)	0.0105 (22)	0.0065 (76)
Topic 55: time; experience; lead; history; lesson	FALSE	0.0071 (104)	0.0083 (47)	0.007 (78)	0.0061 (88)
Topic 98: question; view; issue; concern; debate	FALSE	0.0071 (104)	0.008 (54)	0.0077 (60)	0.0055 (100)
Topic 45: stance; policy stance; monetary policy stance; accommodative; level	FALSE	0.0071 (104)	0.0058 (85)	0.0081 (53)	0.0073 (59)
Topic 57: loan; growth; annual; financial; risk	FALSE	0.0071 (104)	0.0045 (112)	0.0116 (13)	0.0051 (113)
Topic 26: framework; macroeconomic; maker; policy maker; policy framework	FALSE	0.007 (108)	0.0095 (39)	0.0063 (100)	0.0053 (107)
Topic 37: market; expectation; participant; market participant; agent	FALSE	0.007 (108)	0.0087 (46)	0.0068 (87)	0.0055 (98)
Topic 95: balance; sheet; balance sheet; bank; credit	FALSE	0.007 (108)	0.0049 (102)	0.0094 (32)	0.0067 (71)
Topic 38: unite; federal; reserve; difference; federal reserve	FALSE	0.0069 (111)	0.0079 (55)	0.0063 (101)	0.0066 (74)

Topic	Topic on Inflation	Total Prevalence	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
Topic 6: measure; standard; policy measure; monetary policy measure; impact	FALSE	0.0069 (111)	0.0056 (88)	0.0097 (28)	0.0053 (104)
Topic 110: december; month; january; key; march	FALSE	0.0069 (111)	0.0054 (95)	0.0075 (66)	0.0077 (48)
Topic 73: rule; economy; simple; change; approach	FALSE	0.0068 (114)	0.0078 (58)	0.0068 (89)	0.0058 (92)
Topic 70: current; situation; environment; risk; future	FALSE	0.0068 (114)	0.0066 (73)	0.0065 (95)	0.0072 (60)
Topic 22: operation; refinance; refinance operation; main; eurosystem	FALSE	0.0067 (116)	0.0077 (59)	0.0075 (64)	0.0049 (118)
Topic 104: role; play; level; key; good	FALSE	0.0067 (116)	0.0069 (71)	0.0069 (86)	0.0062 (84)
Topic 83: sector; private; private sector; economy; good	FALSE	0.0067 (116)	0.0066 (74)	0.007 (81)	0.0064 (78)
Topic 17: exchange; exchange rate; development; external; account	FALSE	0.0066 (119)	0.0081 (50)	0.0065 (94)	0.0053 (105)
Topic 71: money; issue; payment; account; currency	FALSE	0.0064 (120)	0.008 (53)	0.0059 (105)	0.0053 (109)

Table 3: Highest similarity per period

Order	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
1	Topic 63: fiscal; growth; fiscal policy; pact; consolidation (0.99)	Topic 78: paper; journal; economics; review; reserve (1)	Topic 43: percentage; note; chart; observation; late (0.7)
2	Topic 16: reform; structural; structural reform; growth; market (0.92)	Topic 46: bank; lend; credit; loan; bank lend (0.9)	Topic 115: speech; series; paper; european; bulletin (0.62)
3	Topic 85: development; growth; remain; continue; stability (0.75)	Topic 84: purchase; continue; asset; ecb interest rate; ecb interest (0.8)	Topic 52: raise; meet; normalisation; basis; interest (0.57)
4	Topic 11: remain; growth; continue; development; quarter (0.74)	Topic 4: purchase; asset; asset purchase; programme; purchase programme (0.78)	Topic 88: change; transition; climate; energy; green (0.54)
5	Topic 64: remain; medium; expect; medium term; support (0.67)	Topic 13: growth; support; loan; remain; continue (0.75)	Topic 78: paper; journal; economics; review; reserve (0.4)
6	Topic 9: country; convergence; member; eu; process (0.67)	Topic 92: bank; negative; deposit; tltro; facility (0.73)	Topic 15: pandemic; pepp; support; emergency; purchase (0.33)
7	Topic 94: financial; market; integration; financial integration; cross (0.59)	Topic 28: bank; union; capital; bank union; european (0.73)	Topic 12: war; economy; impact; ukraine; time (0.31)
8	Topic 117: analysis; decision; forecast; information; policy decision (0.55)	Topic 20: growth; quarter; continue; support; remain (0.69)	Topic 61: hand; slide; firm; chart; leave (0.31)
9	Topic 24: growth; remain; loan; development; annual (0.52)	Topic 109: continue; quarter; remain; real; analysis (0.66)	Topic 91: labour; wage; labour market; unemployment; market (0.26)
10	Topic 75: country; differential; dispersion; difference; average (0.51)	Topic 115: speech; series; paper; european; bulletin (0.61)	Topic 79: shock; demand; supply; aggregate; aggregate demand (0.26)
11	Topic 99: decision; communication; public; transparency; policy decision (0.49)	Topic 57: loan; growth; annual; financial; risk (0.6)	Topic 46: bank; lend; credit; loan; bank lend (0.25)
12	Topic 78: paper; journal; economics; review; reserve (0.49)	Topic 21: sustain; adjustment; path; remain; accommodation (0.58)	Topic 103: fiscal; fiscal policy; support; stabilisation; economy (0.24)
13	Topic 89: cash; banknote; eurosystem; changeover; national (0.48)	Topic 53: germany; people; german; draghi; saver (0.52)	Topic 112: income; household; consumption; house; real (0.23)
14	Topic 23: single; currency; single currency; single monetary; single monetary policy (0.47)	Topic 114: real; interest; interest rate; nominal; equilibrium (0.51)	Topic 51: bond; market; yield; government; sovereign (0.22)

Order	Prevalence (1999-2011)	Prevalence (2011-2021)	Prevalence (2021-2023)
15	Topic 81 : development; money; analysis; growth; aggregate (0.46)	Topic 1 : model; curve; phillips; phillips curve; estimate (0.47)	Topic 4 : purchase; asset; asset purchase; programme; purchase programme (0.21)