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Central banks' communication as reputation management: How the Fed talks under uncertainty

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This article advances a reputation-based account to explain the relative salience that different issues assume in central banks' communication. Based on an innovative dataset consisting of a corpus of speeches by the members of the Board of Governors of the Federal Reserve System of the United States (also known as the Fed) delivered from 2006 to 2016, the analysis shows that the most salient issues in the Fed's communication are shaped by reputational concerns about policy reversals. Specifically, when these concerns are higher, the Fed is more likely to focus on issues related to areas where its reputation is weak or not yet established—that is, issues related to credit easing and systemic financial regulation. In contrast, issues related to activities where the Fed's reputation is established are likely to become less salient—that is, issues related to economic activity and inflation. A similar pattern of issue attention is observed when the Fed addresses political audiences compared to other audiences.

1 | INTRODUCTION

The carefully chosen words of central banks have long attracted scholarly attention, and even more so since the start of the recent global financial crisis. As financial markets entered a tailspin and economic activity collapsed, central banks' communication became particularly important to boost confidence and restore the conditions for economic growth (de Haan 2013).

The importance of regulatory communication is not new to scholars of public administration, and research on this particular aspect of organizational behaviour has made recent advances through the application of a reputation-based approach (Maor et al. 2013; Gilad et al. 2015). A key insight of this scholarship is that agencies craft their rhetoric in order to increase their popularity and protect themselves from audience-based pressures. Reputational risks have clear consequences for the way in which agencies communicate.

This article builds on this scholarship in order to explain the communication output of the most powerful central bank in the group of advanced economies: the Federal Reserve System of the United States (also known as the Fed). Specifically, we built an innovative dataset consisting of a corpus of speeches delivered by the members of the Federal Board of Governors from 2006 to 2016 to shed light on the content of central bank communication. Our

reputational argument is based on the observation that agencies face reputational costs for future policy reversals (Carpenter 2010b; Carpenter and Krause 2012, p. 29), and their communication is thus strategically oriented to minimize those costs. Since reputational risks are higher if policy reversals undermine the agency's unique reputation (Carpenter 2001, p. 5; Carpenter 2010b, pp. 33, 45) or 'primary organizational mission' (Maor 2010, p. 134), we expect communication to be oriented away from issues related to the Fed's distinctive reputation when the agency acts in an environment that raises the prospect of future policy reversals—namely, under conditions of uncertainty. Under these conditions, issues related to weak or evolving reputation will gain more salience because the potential reputational costs of policy reversals are comparatively lower. We also expect the agency's communication to be differentiated across audiences, with comparatively more emphasis on issues related to the Fed's evolving reputation when political audiences are addressed.

While building on the existing reputational literature, the article also advances it in two important respects. First, most existing scholarship models communication as a response to negative media coverage regarding specific dimensions of bureaucratic reputation (Maor et al. 2013; Gilad et al. 2015). This article complements this scholarship by showing that agencies craft their communication not only to address specific allegations but also to manage uncertainty in their operating environment (Krause 2003). Second, we argue and illustrate that regulatory communication is as much about degrees as types. That is to say, public agencies strategically choose not just a type of communication output—be it silence, talk or a particular 'presentational strategy' (Hood 2011; Gilad et al. 2015)—they also strategically choose the salience attributed to one specific topic compared to another.

Although our contribution is based on a single case study, we apply an innovative method to study the content of agencies' communication that is easily replicable in other analyses. Specifically, we use structural topic models (Roberts et al. 2014; Roberts et al. 2016) to identify inductively the issues central banks focus on in their external communication and to gauge the prevalence of different issues as a function of reputational concerns. Furthermore, the case analysed here is particularly important for the study of central banks' communication because of the leading role of the Fed in the community of central banks especially at times of market instability (Broz 2015). The Fed's case is also particularly interesting because important changes have occurred to the Fed's communication policy over the past two decades (Schonhardt-Bailey 2013).

Before proceeding, some clarifications are in order regarding the empirical evidence used in this article. Although the empirical analysis that follows is based on the examination of public speeches by high-level officials, speeches do not exhaust the list of communication outputs produced by the Fed and central banks at large. Central banks communicate with their audiences (market participants, households and firms, policy-makers and the public at large) through a variety of channels, including research papers, publications of the minutes of monetary policy decisions, and of inflation forecasts. In this article, we focus only on speeches because their format offers a number of advantages for the purposes of the analysis. First, speeches are addressed to multiple audiences, and their format is much less constrained than are other official documents. Second, speeches are strategically delivered; that is, Fed Board members generally choose what audiences to address and what to say.[1] Furthermore, the speeches delivered by Fed Board members offer a unique opportunity to observe reputation-protection behaviour, as this behaviour is usually more common among higher officials within an organization (Carpenter 2010b, p. 67).

The article is organized as follows. The following section provides the tenets of a reputation-based analytical framework to explain issue salience in central banks' communication. The next section reviews the Fed's organizational missions and distinct reputations. The subsequent two sections discuss data and methods and provide the empirical test of our arguments. The last section presents the article's conclusions and implications.

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[1]Of course, central banks are required to address their political principals as part of their accountability requirements. Beyond that, however, they are still free to choose what other audiences to speak to.

2 | CENTRAL BANKS, COMMUNICATION AND REPUTATION

> A few decades ago, conventional wisdom in central banking circles held that monetary policymakers should say as little as possible and say it cryptically. Over recent years, the understanding of central bank transparency and communication has changed dramatically. As it became increasingly clear that managing expectations is a central part of monetary policy, communication policy has risen in stature from a nuisance to a key instrument in the central banker's toolkit. (Blinder et al. 2008a)[2]

As this quote suggests, if external communication is a key preoccupation for most public administrations, nowhere is such a preoccupation so pressing as for central banks. Indeed, communication is crucial for monetary policy to achieve its goals of price stability and output stabilization. To understand why this is the case, it is useful to briefly summarize how monetary policy works.

Conventional monetary policy typically involves influencing short-term interest rates by managing the rate at which private banks can borrow short-term funds from the central bank. Often referred to as the key policy rate, it is the federal funds rate in the US. That rate in turn affects the interest rates charged in consumer and institutional lending and thus translates to the real economy. That is, central banks control interest rates only at the shorter end of the maturity spectrum, but the impulse of their decisions is transmitted throughout the economy via the expected impact on longer-term interest rates as well as on asset prices and exchange rates. This transmission mechanism is thus essential for monetary policy to work, that is, for lowering (or raising) interest rates to stimulate (or reduce) demand and, in turn, boost (or cool down) economic activity. This means that monetary policy is more effective when the central bank is able to influence markets' and households' expectations, which are so critical to the transmission of monetary policy. This is where communication becomes key: communication allows central banks to guide financial markets' understanding and expectations concerning current and future monetary policy decisions, shape firms' and households' consumption and investment decisions, and facilitate actions that move the economy toward the central bank's intended goals (Blinder et al. 2008b).

Beyond considerations of policy effectiveness, the importance of communication also rests on motives of democratic accountability: the way central banks communicate their policy objectives, deliberations and decisions to the public is of central importance to remaining accountable as a public policy institution. The quest for democratic accountability became evident during the recent financial crisis when central banks' communication grew increasingly attentive to reaching out to the public at large (Wessel 2017). In other words, the 'accountability forums' (Busuioc and Lodge 2016) for central banks have expanded on the heels of the crisis and so has the attendant public visibility of central banks' (unconventional) actions (Lombardi and Moschella 2016).

How changes in a central bank's political environment affect its communication patterns, however, is still an under-researched theme in central banking scholarship. While economists have mainly focused on the consequences of central banks' communication, especially market reactions (see Blinder et al. 2008b), the factors that shape its content have received comparatively less attention.

To redress this imbalance, reputational scholarship provides a valuable starting point. Indeed, several studies in this tradition have helped to illuminate how changes in the external environment are translated into organizational behaviour via the filter of bureaucratic reputation. Among other contributions, the existing scholarship has shown that reputation matters to the way in which agencies prioritize among multiple tasks (Gilad 2015) and the speed with which they make decisions (Carpenter 2002) as well as agency performance (Maor and Sulitzeanu-Kenan 2016), accountability behaviour (Busuioc and Lodge 2016), jurisdictional claim-making (Maor 2010), and inter-agency cooperation (Busuioc 2016). Still, and particularly important for the purposes of this analysis, several studies have

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[2]Although central banks' communication is closely linked to transparency, for the purposes of this article, we focus solely on communication practices. That is, one of the aims of this article is to investigate what central bankers talk about, not how much they talk.

provided illuminating insights into the ways in which agencies communicate (Maor et al. 2013; Gilad et al. 2015) and produce signals to influence stakeholders' assessments of reputation (Abolafia and Hatmaker 2013).

Drawing from a reputation-based approach, this article investigates how reputational concerns impact on central banks' communication and, specifically, on the salience central banks attribute to specific issues. In line with the existing scholarship, bureaucratic reputation is here conceived as 'a set of symbolic beliefs about the unique or separable capacities, roles, and obligations of an organization, where these beliefs are embedded in audience networks' (Carpenter 2010b, p. 45). Reputations are linked to the agency's distinctive traits in performing a task relative to other agencies. Reputation is thus an 'organizational claim to uniqueness' (Busuioc 2016, p. 43) that, once established, becomes an important source of power because it can be used 'to generate public support, to achieve delegated authority and discretion from politicians, and to recruit and retain valued employees' (Carpenter 2002, p. 491).

Given the importance of reputation, public agencies devote time to its strategic management and engage in protective behaviours in response to reputational threats (Maor 2010, 2011; Maor and Sulitzeanu-Kenan 2016). Central banks are no different, as they explicitly cultivate a reputation as guardians of macroeconomic stability as a way to defend their independence (Singer 2004). Furthermore, reputation (or credibility in central banking parlance) is often regarded as a prerequisite of successful monetary policy (Hayo and Hefeker 2010, p. 185).

The theoretical framework here advanced is staked on the observation that, in order to cultivate and protect their reputation, central banks are reluctant to expose themselves to the charge of being seen as incompetent. As the Governor of the Bank of England Mark Carney recently explained this rationale for central banks' communication, 'what you want [from communication] is for the institution to be viewed as credible or just competent'.[3] If communication has to project competence and ultimately protect the agency's reputation, however, it has to avoid the pitfalls that might undermine these objectives. Among these pitfalls, central banks are largely aware of the risk that stems from 'surprising' their audiences by reversing an earlier announcement. Indeed, ample evidence indicates that monetary 'surprises' are associated with a stronger financial market reaction (for a review of this literature see Coenen et al. 2018, p. 137). More importantly, repeated surprises lead financial markets and the public to raise questions about the central bank's reaction function. This, in turn, disrupts the ability of the central bank to manage expectations and ultimately impairs the effectiveness of monetary policy (see Woodford 2005).

Based on these reasons, the prevailing wisdom among central banks is 'to avoid unintended surprises in the conduct of policy' (Fischer 2017). From this perspective, predictability becomes paramount. For instance, monetary policy rates are usually changed gradually, so that turning points from an earlier path are likely to signal a number of future changes in the same direction (Rudebusch 1995). Furthermore, central banks aim to familiarize their audiences with the language they use and provide them with tips for what to expect from the agency in the near future given a specific set of conditions. As former Fed Chairman Ben Bernanke (2004) put it, 'the more guidance the central bank can provide the public about how policy is likely to evolve (or about the principles on which policy decisions will be based), the greater the chance that market participants will make appropriate inference'. Predictability thus implies stability in communication output. As the current Vice-President of the Fed monetary policy committee recently stated, '[w]e tend to make relatively few changes to the statement language' (Dudley 2016). In short, central banks—like other public agencies—regard their communication output as fundamentally irreversible (or reversible only with costs) (Carpenter 2004, p. 616).

Committing to irreversibility in monetary policy communication, however, is far from unproblematic. This is particularly so because of the 'pervasive' uncertainty that characterizes monetary policy-making (Bernanke 2007). To start with, as anticipated, central banks' decisions impact the real economy via markets' and households' expectations. However, the inferences that these audiences draw from central banks' actions and communication are largely unknown to the central banks. Furthermore, policy-makers make decisions subject to informational constraints

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[3]Comment made by Mark Carney during the ECB conference 'Communications challenges for policy effectiveness, accountability and reputation' (Frankfurt am Main, 14–17 November).

because of the complex and constantly changing nature of the economy and because of measurement problems for some key economic indicators (see Greenspan 2004).

Uncertainty thus challenges central banks' commitment to policy irreversibility and, consequently, puts reputation on the line. As new information is made available about the state of the economy, the economy's structure, and about households' and markets' reactions to monetary policy decisions, central banks might be forced to revise their previous communication output to remain effective and accountable. In doing so, however, they face serious reputational costs. Indeed, when a central bank changes its announced policy path, the public may see this change as a reneging on previous commitments or as an indication that the previous policy path was mistaken. In other words, 'the act of reversal … will likely call the attention of different audiences to the agency's error' (Carpenter 2010b, p. 68), even though the central banks' decisions are by definition inherently conditional on the state of the economy. In other words, 'even when the central bank is conducting its policy in an optimal manner, deviations from its projected policy path may be viewed as a central bank failure and could hurt the central bank's credibility' (Mishkin 2004, p. 11). As another central banker put it, uncertainty forces central banks to face the 'dilemma' of disappointing expectations and thus the risk of impairing the transmission mechanism of monetary policy, 'even though they may have convincing arguments to justify their reassessment of the circumstances' (Issing 2005, p. 70).

Based on the above observations, the argument here advanced is that how a central bank talks is significantly influenced by reputational calculations. Specifically, the reputational costs of future policy reversals are expected to shape central banks' communication. Central banks are likely to focus their communication on issues that imply lower reputational costs when facing the prospect of future policy reversals. The costs of reversibility are higher in areas of established reputation because these areas are directly related to the agency's claim for uniqueness (Carpenter 2001, p. 5; Carpenter 2010b, p. 33) and are areas where past investments in reputation-cultivation have been the most intense—indeed, agencies nurture their distinctive reputation by demonstrating their organizational capacity to 'provide benefits, plans, and solutions to national problems found nowhere else' in the system in which they operate (Carpenter 2001, p. 14). Based on these premises, we expect a central bank to de-emphasize issues related to its unique reputation under conditions of uncertainty because of the high costs that would stem from reversing earlier announcements in terms of jeopardizing the agency's distinctive reputation and past investments in nurturing such a reputation. In contrast, since the costs of reversibility are comparatively lower in areas where its reputation is not yet established,[4] we expect that a central bank will be more likely to emphasize issues related to these evolving competences when facing uncertain conditions. This leads to the following expectation:

> H1: The higher the uncertainty is, the higher the relative salience of issues related to weak and evolving competences compared to issues related to the agency's unique reputation.

Next, we expect Fed communication to be differentiated across audiences. Indeed, another tenet of a reputation-based explanation is that different threats to reputation may emerge from different audiences (Carpenter 2010b). This suggests that '[a]gency officials may carefully calibrate their communicative actions in order to construct the way in which their audiences judge their success or failure' (Maor et al. 2013, p. 585). In the case under investigation, reputational costs are higher when central banks talk to political audiences. In this case, the agency's reputational threats are magnified by threats to the agency's autonomy, since political audiences hold the key to revoking central bank independence (Keefer and Stasavage 2003). Hence, the empirical expectation can be articulated as follows:

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[4]Maor et al. (2013) also explain communication outputs based on the distinction between strong versus weak reputations. However, our argument differs from theirs because of the causal mechanism through which different reputations shape communicative behaviour. In particular, Maor et al. (2013, p. 586) postulate that strong reputations are less tarnished by negative criticisms than weak reputations because 'what is at stake is … the standard against which its future performance will be assessed'. In contrast, we argue that strong reputations are more vulnerable to the prospect of policy reversals because they are linked to unique reputation and past investment in reputation cultivation.

H2: The relative salience of issues related to weak and evolving competences is higher when political audiences are addressed compared to other audiences.

3 | THE FEDERAL RESERVE AND ITS REPUTATION

Created in 1913 in response to the periodic episodes of financial instability that had afflicted the US economy during the nineteenth and early twentieth centuries, the Fed independently determines the monetary policy of the US. In this capacity, the Fed's unique reputation is based on the three core tasks assigned to the agency as well as on the historical successes achieved by the Fed in performing these tasks.

Starting with the two most well-known tasks assigned to the Fed, the US central bank is assigned the dual responsibility 'to promote effectively the goals of maximum employment [and] stable prices' (Federal Reserve Act, Section 2a). The dual mandate requires trading off between inflation and employment variability. However, although a trade-off between inflation and unemployment exists in the short term, the consensus in monetary policy circles is that anchoring longer-term inflation expectations is ultimately instrumental to stabilizing output and employment (see Johnson 2016).

The Fed's reputation for macroeconomic stability—assuring both price stability and stable growth—emerged in the 1970s under the tenure of Paul Volcker. Under Volcker's chairmanship, the Fed successfully tamed inflationary pressures, kept them under control, 'and thereby restore[d] the Fed's badly damaged credibility' (Axilrod 2011, p. 89). After Volcker's disinflation, the Federal Open Market Committee (FOMC) began to take full responsibility for keeping inflation under control (Hetzel 2008). The Fed's reputation as an agent of macroeconomic stabilization was cemented during the long tenure of Alan Greenspan, who presided over what is known as the Great Moderation, namely, the concomitant achievement of low inflation and low unemployment. Nowhere is the recognition of reputation more visible than in the aura that surrounded the Fed chairmanship during this period, as attested, among others, by the status of 'maestro' ascribed to Greenspan (Woodward 2000).

In addition to its macroeconomic functions, the third major organizational mission assigned to the Fed is that of stabilizing financial markets by preventing or ameliorating panics. Specifically, similar to most modern central banks, the Fed has unique powers to provide liquidity to the financial system through instruments such as open-market purchases and discount-window loans—which is known as the lender of last resort function. It is therefore not surprising that restoring confidence stands at the core of the Fed's perceived identity. As Bernanke (2013) stated in a retrospective on the Fed's actions during the recent financial crisis, 'We did what central banks have done for many years and what they were designed to do: We served as a source of liquidity and stability in financial markets, and, in the broader economy, we worked to foster economic recovery and price stability.'

It is important to note that the Fed also enjoys a considerable reputation in international monetary and financial regulatory circles. The role of the Fed in shaping regulatory standards is widely acknowledged (Singer 2004), as is its leadership in international crisis management activities (Broz 2015). Thus, if we take into consideration not just domestic but also international audiences, the Fed enjoys a strong reputation among international economic policy-makers since, as the central bank of the world's reserve currency, the Fed's decisions influence other countries' policies.

In contrast to its reputation for maintaining macroeconomic stability and restoring confidence in the financial sector, the Fed's reputation in its other areas of responsibility are far less established. For instance, although one of the Fed's key tasks is to promote the stability of the financial system and minimize systemic risk that may arise in financial markets, the Fed has lacked authority over systemic markets and actors until recently, namely, until the reforms enshrined in the 2010 Dodd-Frank Act and the establishment of the Financial Stability Oversight Council as the macroprudential authority in the US (Lombardi and Moschella 2017).

In addition to the objective of enhancing the stability of the financial system as a whole, the Fed also promotes the safety and soundness of the banking industry and helps to ensure consumer protection. Specifically, the Fed

shares the responsibility for regulating and supervising the US financial and banking system with a number of federal and state government regulators, including other banking agencies. In spite of these responsibilities, the Fed's involvement in consumer protection is much more recent, with the agency making jurisdictional claims in this area only during the reform process of 2009–11 when, following the mortgage market debacle, it faced the prospect of the creation of a rival agency (Carpenter 2010a).

The crisis also revealed other areas where the Fed had to establish its reputation. Specifically, once nominal interest rates reached the zero-lower bound at the end of 2008, the Fed began implementing credit easing policies, either in the form of buying assets of long duration on a large scale or of the Fed operating as the market maker of last resort in markets that had stopped working because of the financial panic. While these policies are, in principle, part of the policy toolkit that central banks can use in the conduct of their monetary policy function, their application was largely untested before the start of the crisis.[5] Given their novelty and the lack of clear evidence about their effectiveness, it is not surprising that the Fed's unconventional monetary policies attracted significant criticism from across the political spectrum, as attested by the historically narrow margin for Bernanke's reconfirmation as Fed Chairman in 2010 and the flurry of accusations levelled at the Fed, even from conservative circles.

Based on this overview of the Fed's reputation, and if our above-mentioned hypotheses are correct, we should find that the Fed orients its communication toward topics related to areas of weak and evolving reputation when the likelihood of policy reversals is highest. Doing otherwise would raise the costs of reputation management by impacting areas of unique, hard-won reputation.

4 | DATA AND METHODS

To test our propositions, we constructed a dataset consisting of speeches delivered by the seven members of the Fed Board of Governors.[6] Speeches were retrieved from the Fed's official website.[7] To guarantee sufficient variation in the degree of uncertainty facing central bankers, our analysis covers a relatively long period of time. It begins in February 2006—when Ben Bernanke commenced his eight-year mandate as Fed Chairman, two years before the beginning of the Great Recession in December 2007—and ends in December 2016—when the US economic recovery had gathered momentum. As will be clarified below, the speech corpus includes both political speeches—that is, speeches delivered before Congress either in the form of hearings or testimony—and speeches directed at various audiences, including speeches delivered at academic and economic conferences and before business and consumer associations or professional groups. The speech corpus consists of a total of 689 documents. Online appendix A provides details on the documents included in the analysis.

4.1 | Structural topic model

We used a structural topic model (STM) (Roberts et al. 2014; Roberts et al. 2016) to inductively identify the issues central banks focus on in their communication. STM is part of the class of unsupervised learning methods that use modelling assumptions and the properties of texts to estimate general semantic themes (e.g., topics) within a corpus of documents and to simultaneously organize texts based on the co-occurrence of words. These methods are very

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[5]Japan is an exception, having experimented with a quantitative easing policy in the early 2000s.

[6]Our speech selection includes only a subset of monetary policy-makers who sit on the FOMC. Specifically, we selected only the permanent members of the FOMC—namely, Board members—and not members who sit on the Committee on a rotating basis—namely, the presidents of the 12 regional Federal Reserve Banks. This decision is motivated by both theoretical and practical considerations. First, within the US Federal Reserve System, the Board of Governors is the government agency that reports to and is directly accountable to Congress and oversees the regional Reserve Banks. Second, rotating members also serve as presidents of regional Federal Reserve Banks and their policy preferences are often affected by economic conditions in their home region (see Chappell et al. 2008). Excluding their speeches from the analysis thus allows us to eliminate potential bias.

[7]Only files that could not be properly converted into text format were dropped from the analysis.

appealing because they offer a powerful complement to supervised (i.e., hand-coded) learning methods and human reading of texts by organizing a large corpus of documents (Grimmer and Stewart 2013). Given its potential, STM has been increasingly used in social and political science research (Roberts et al. 2014; Lucas et al. 2015; Gilardi et al. 2018).[8]

Similar to other topic model techniques (for a review see Grimmer and Stewart 2013), STM is a Bayesian generative model that assumes a hierarchical structure to estimate meaningful patterns within collections of documents. Concretely, starting from raw textual data, such as Fed Board members' speeches, STM uses the patterns of word co-occurrences across documents to infer semantic relationships. An automated iterative process assigns words to topics on the basis of a clustering algorithm. Then, at each iteration, the model is refined to obtain more consistent results until it converges when it reaches an equilibrium. At the end of this process, STM provides an estimate of each word's probability of appearing in each topic, and based on the words contained in each speech, it also provides an estimate of topic prevalence for each document analysed. STM assumes mixed membership, which means that each speech can be represented as a mixture of a series of topics that always add up to one. This assumption implies that more attention on one topic in a speech necessarily reduces the attention on other topics (see Roberts et al. 2016).

The key innovation of STM is that it allows researchers to estimate a topic model that includes covariates. The inclusion of covariates helps to improve the interpretation of topics as well as providing inferences about topic prevalence. Indeed, the inclusion of covariates allows testing the correlation patterns of a set of independent variables with topic prevalence in a regression-like framework, while simultaneously estimating the topics. Furthermore, STM allows controlling for the impact of factors other than the main hypothesized independent variables. For instance, as applied to the case under investigation, we can estimate the main topics in Fed Board members' speeches and, at the same time, we can test the relationship between reputational threats and topic prevalence in the Fed's communication, while controlling for other factors—as discussed below.

4.2 | Covariates

To test our hypotheses, we include two key variables in the STM. In line with existing scholarship (Maor et al. 2013), we measure the reputational threats of policy reversals using media coverage intensity. Specifically, we use the index of overall economic uncertainty (EU), which relies on ten leading US newspapers and is based on monthly counts of articles that contain terms related to both uncertainty and the economy (for more details, see Baker et al. 2016).[9] We matched each speech in our corpus with data on the level of EU in the month preceding the speech to gauge how Fed communication varies as a function of levels of uncertainty. The index value varies from a minimum of 37 to a maximum of 217 points, with a mean of 96.

The second main variable is related to the type of audience to which speeches are addressed. We distinguish between two types of audience: political and public. Specifically, we coded speeches as 'political' when they were delivered to political principals in the form of Congressional testimonies and hearings. Speeches were also coded as 'political' if they were delivered as part of regularly scheduled interactions between the Fed and Congress or if they were delivered as part of ad hoc investigations. Distinguishing between audiences helps determine whether issues related to functions in which the Fed has an evolving reputation become more salient when political audiences are

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[8]To use STM, texts need to be pre-processed. Following standard practices in text analysis (Grimmer and Stewart 2013; Lucas et al. 2015), we encoded speeches in a common format, discarding numbers, punctuation, capitalization, and 'stop words'. We removed the endings of verbs and nouns, keeping only the 'stem' of each word. To reduce sparsity, we kept only the words that appear at least ten times across all documents. The original vocabulary was therefore reduced to a total of 3,973 terms.

[9]The EU is a variant of the economic policy uncertainty (EPU) measure developed by Baker et al. (2016). The EPU index is based on articles that contain terms related to three categories: uncertainty, the economy, and policy. Our results do not substantially change using EPU instead of EU. Data are available upon request.

addressed compared to other audiences. Approximately 18 per cent of our corpus consists of testimony and hearings.

Our model also includes a number of control variables that can influence issue salience in the Fed's communication. In particular, we control for the day on which the speech was delivered in order to capture the general tendency of issue attention over time and sudden shifts in proximity to prominent events. To this end, we allow the time variable to have a non-linear relationship in the topic estimation stage using a flexible basis function to model non-linearity. We also include a dummy variable to check for whether communication varies according to whether the speaker is the Fed's Chairman or a Governor.

5 | RESULTS

We estimate an STM using the covariates just discussed as predictors.[10] That is, we run an STM in which topic prevalence is modelled as a function of an indicator of economic uncertainty, a binary indicator for the type of audience, a time trend variable, and a binary indicator for the role of the speaker.[11] We run a model with 12 topics after conducting several tests with different numbers of topics that produce less easily interpretable results (see online appendix B for details). The presentation of the results proceeds in two steps: first, we identify, interpret and validate the topics that emerged from the application of the STM; second, we show the relationship between the Fed's communication and the reputational threat of policy reversal.

5.1 | Topic identification, interpretation and validation

Figure 1 shows the top topics discussed by members of the Board of Governors together with the labels we assigned them based on our examination of the top 30 words that characterize each topic and our reading of the most exemplar documents, for example, the speeches that have the highest proportion of words associated with each topic (online appendix C provides the lists of these documents). To further validate our interpretation, the variation in issue attention over time was examined (Figure 2).

The topics identified by the STM closely reflect those routinely discussed in the scholarship on central bank communication (see Schonhardt-Bailey 2013) and include topics clearly related to the main functions assigned to the central bank.[12] To begin, the most prevalent topic in our corpus is 'Economic activity', which is defined by labour-related words such as labour, market, growth, and unemployment. The second and third most prevalent topics in our corpus are related to the smooth functioning of financial markets, namely, 'Systemic financial regulation' and 'Financial stability'. Based on our readings of exemplar speeches, whereas the former topic addresses issues of regulating and supervising large financial institutions with the aim of ensuring systemic stability, the latter is related to the issues of market liquidity and robustness to shocks that could destabilize the financial system. The average prevalence of these two topics in the period under investigation confirms the conclusions reached in a number of studies regarding the increased attention devoted to financial stability policy among monetary authorities since the start of the crisis (Baker 2013). 'Fiscal policy' is the fourth most prevalent topic, in a reflection of the importance of fiscal decisions for the conduct of monetary policy.

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[10]We estimate topic models using the *stm* package in R (Roberts et al. 2018).

[11]We also run different model specifications including a larger set of covariates. Specifically, we included an interaction between economic uncertainty and a dummy variable distinguishing the speeches given during the Great Recession from those delivered at a different time in order to control whether our findings were particularly sensitive to the economic conditions of the period under investigation. We also checked for the impact of Governors' expertise and partisanship. Since the results do not change significantly across the different specifications, and since the maximum of the lower bound on the marginal likelihood of the observed data occurs with our original model (Grimmer 2011), the latter is the one that we present here. Data are available upon request.

[12]The results of the STM analysis provide a measure of topic salience and should not be mistaken for policy positions by Fed Governors.
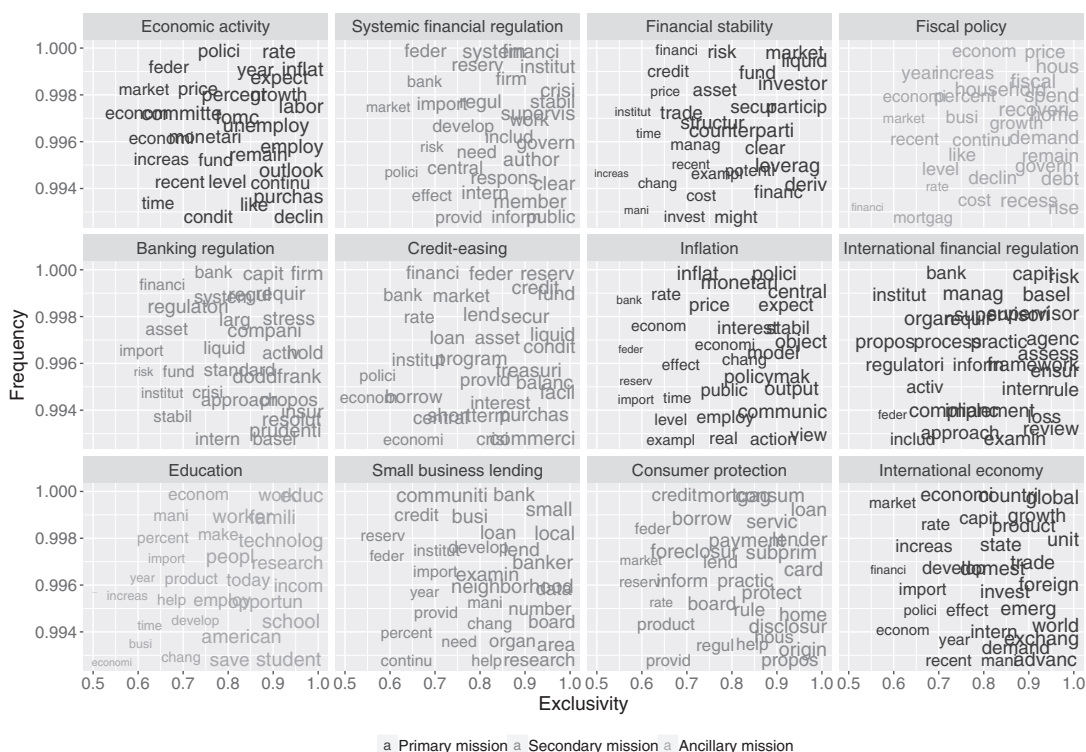
FIGURE 1 Top topics in Fed's communication with top words

Note: Topics are ordered based on their average prevalence. Frequency refers to the most frequently occurring words in each topic (e.g., high-probability or top words). Exclusivity refers to the top words associated with a topic that are unlikely to appear among the top words of another topic. Words' labels are weighted by joint frequency and exclusivity based on the FREX metric developed by Bischof and Airoldi (2012). Words are in their stemmed form

The other most prevalent topics include 'Banking regulation' and 'Credit easing', whose relevance in the Fed's policy has been magnified by both legislative reforms and crisis-management activities (see Figure 2). Indeed, the prevalence of 'Banking regulation' picks up on the heels of the reforms associated with the Dodd-Frank Act, through which the Fed's regulatory and supervisory powers over credit institutions were expanded. In contrast, the peak in the salience of 'Credit easing' follows the collapse of Lehman Brothers in September 2008, with a peak in 2009 when almost 24 per cent of the speeches delivered by Fed Governors addressed this subject. Interestingly, 'Inflation' figures only as the seventh most prevalent topic, which reflects the fact that concerns about weak economic activity overshadowed those regarding price stability in the crisis years. However, the prevalence of the topic 'Inflation' is relatively stable over time (Figure 2), which indicates the centrality of this function in the Fed's organizational identity.

The least discussed topics in the Fed corpus include topics related to international policy developments, namely, 'International financial regulation' and the 'International economy'. As the central bank of the world's reserve currency, the Fed is in a position to set the pace for the international economy rather than to suffer from negative international policy spillovers. Hence, international factors are not necessarily central to its decision-making and thus to its communication. The other least discussed topics include two topics related to the functioning of specific markets, namely, 'Small business lending' and 'Consumer protection'. For the latter, its variation over time shows the salience attached to this topic at the beginning of the crisis, when disruptions in the markets for subprime loans revealed large unfair or predatory lending practices.

FIGURE 2 Topic prevalence in Fed's communication over time
Note: Topics are ordered based on their average prevalence. The black horizontal lines refer to the average topic prevalence over the period of analysis (2006–16). 95 per cent confidence intervals are reported

Based on our readings of the most prevalent topics in the Fed's communication, we grouped topics into three categories that vary according to the level of 'uniqueness' of the organizational mission and that thus reflect different reputational costs in the event of a future policy reversal (as per Section 3). Specifically, we clustered topics according to whether they pertain to primary, secondary and ancillary missions. Under primary missions, we grouped topics pertaining to issues where the Fed's reputation is strong and established. Topics grouped under the label 'secondary missions' are instead related to issues where the Fed's reputation is weak or not yet established. Finally, 'ancillary missions' refer to topics addressing policy issues that lie outside the Fed's distinct jurisdiction.

5.2 | Topic prevalence and reputational threats

According to our main expectation, under conditions of uncertainty, Fed Board members should focus their communication on issues related to weak or evolving competences and comparatively less so on issues related to the agency's established reputation as a way to protect the Fed's distinctive reputation from the costs of future policy reversals. Figure 3 provides evidence of this relationship.

In particular, our findings show a strong and positive relationship between economic uncertainty and the prevalence of the topics 'Credit easing' and 'Systemic financial regulation', which were new areas of activity for the Fed because of the crisis and the regulatory overhaul that followed it (see online appendix D for regression coefficients). This indicates that Fed Governors speak more about issues related to the agency's evolving functions as uncertainty increases. This effect is particularly clear for the topic of 'Credit easing': when the level of

uncertainty is quite low (approximately 50 points), Governors devote less than 5 per cent of their speeches to credit easing-related issues. Conversely, when uncertainty exceeds 200 points, we find that more than 20 per cent of the speeches address issues related to unconventional monetary policy. Although the effect is not statistically significant at standard levels, we can still observe an upward-sloping line for the other two topics categorized as secondary, for example, 'Small business lending' and 'Consumer protection'. 'Banking regulation', in contrast, is largely insensitive to variations in uncertainty. Even if we do not have clear predictions for this result, it might be interpreted in conjunction with the Fed's communication output in similar policy areas. Specifically, the fact that the Fed speaks more about systemic financial regulation than banking regulation under conditions of uncertainty might signal the agency's attempt to establish its 'turf' or reputation in the former policy area and not in the latter. In other words, the result might be read as an act of jurisdictional claim-making (Maor 2010).

Whereas uncertainty increases the salience of issues pertaining to weak or evolving reputation, it simultaneously significantly decreases communication in areas of distinctive reputation where the reputational losses would be greater in the event of policy reversals. Specifically, uncertainty is negatively correlated with 'Economic activity' and 'Inflation', two topics related to the Fed's established reputation. This means that the prevalence of these topics decreases as a function of higher levels of economic uncertainty, thus signalling the Fed's reticence to make predictions or commit in areas that are likely to be proved wrong as new information is amassed. Interestingly, communication pertaining to issues of international reputation displays a similar pattern, with the emphasis on topics such as 'International financial regulation' and the 'International economy' decreasing under conditions of growing uncertainty. These findings connect directly with the conclusion reached in monetary policy circles that 'a central bank should perhaps be wary of communicating about issues on which it receives noisy signals itself—such as the evolution of the economy' (Blinder et al. 2008a). Although the negative impact of uncertainty holds for most of the topics classified into core functions, there are exceptions. Specifically, 'Financial stability' is not significantly related to economic uncertainty. However, this result might be influenced by the characteristics of the issues discussed under this topic. In particular, since central banks do not have full information when assessing liquidity and credit risks that might destabilize financial markets, and their interventions to stem panics mostly occur in the dark, uncertainty might already be discounted by central bankers, thereby reducing its impact on the emphasis on this topic.

In addition to supporting our main hypothesis, our findings also provide some insights into the Fed's communication in areas not directly related to its organizational missions. Specifically, among the topics categorized as 'ancillary', 'Fiscal policy' is significantly and positively correlated with uncertainty. This finding is consistent with the expectation previously tested in the literature that public agencies are inclined to engage in blame-shifting when faced with the prospect of reputational or autonomy threats (Gilad et al. 2015, p. 456). This reading is further supported by the observation that 'Fiscal policy' is one of the most prevalent topics in the Fed's communication to political audiences (Figure 4). Hence, this result also indirectly supports our overall theoretical argument.

Moving from the assessment of the impact of uncertainty when averaging its effect across different audiences (Hypothesis 1) to the evaluation of the impact of the type of audience on issue salience (Hypothesis 2), we find that Board members devote relatively more attention to issues on which the Fed has not yet established a reputation when they talk to a political audience. Figure 4 provides evidence of this difference in issue attention across audiences, holding constant the value of uncertainty to the median (81 points).[13]

Our findings show that two topics related to evolving functions—'Credit easing' and 'Systemic financial regulation'—are the most debated during hearings and testimony. On average, Board members devoted approximately 5 per cent of their speeches to unconventional policy-related issues when addressing a public audience, but the salience of

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[13]See online appendix D for regression coefficients; appendix E provides additional supporting evidence by showing variations in issue attention according to the officials' role on the Board.
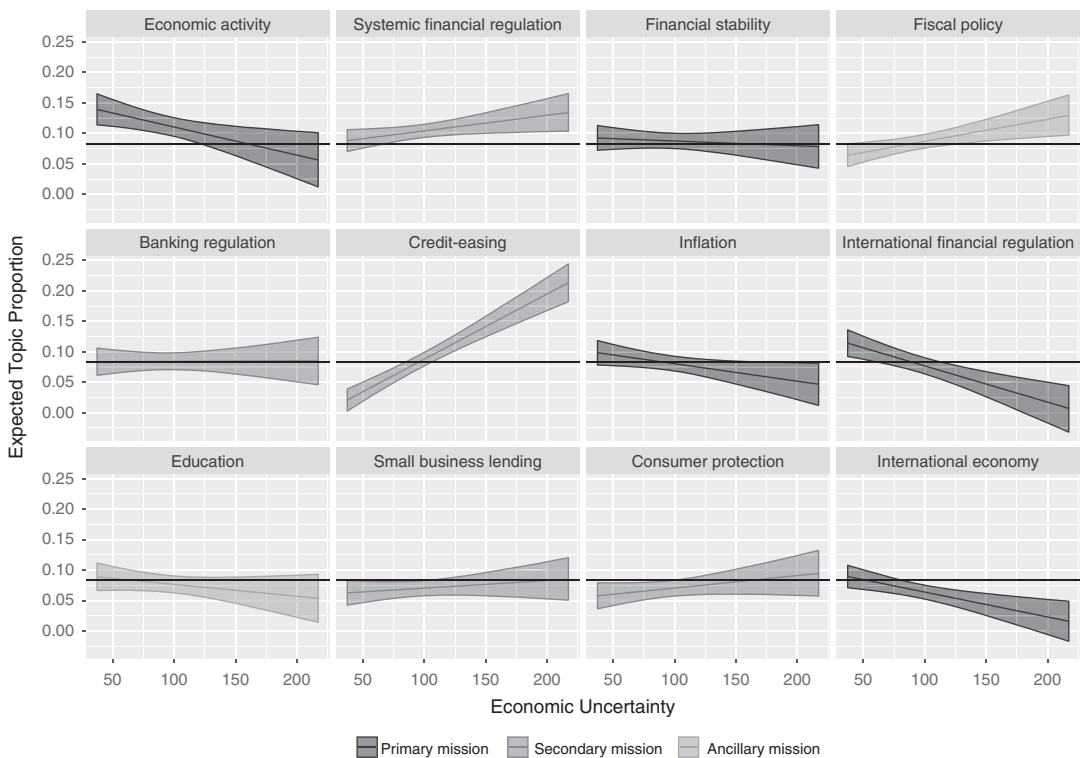
FIGURE 3 Topic prevalence in Fed's communication and economic uncertainty
Note: Topics are ordered based on their average prevalence. The black horizontal lines refer to the baseline topic prevalence across the 12 topics. 95 per cent confidence intervals are reported

these issues rises to 13 per cent when Fed Board members speak before Congressional committees. The difference in topic prevalence across the two audiences is statistically significant given that confidence intervals do not cross the zero line. It should be noted that central bankers are not completely free to choose their subjects when they address their political principals. Rather, they are required to report on specific issues mostly related to the Fed's legislated mandate to ensure macroeconomic stability (Schonhardt-Bailey 2013). Hence, issues related to the state of the real economy also figure prominently in Board members' speeches before political audiences. Interestingly, however, even in the presence of political constraints on the Fed's communication, our results show that central bankers can nonetheless calibrate their communication output by emphasizing issues where the reputational threats are potentially lower.

6 | CONCLUSIONS

This article advances the scholarly debate on public agencies' communication by developing a reputation-based account to explain the relative salience that different issues assume in central banks' communication. Our theoretical framework suggests—and our empirical findings show—that the variation in central banks' communication is a function of the reputational risks stemming from future policy reversals. Since higher reputational costs are attached to the central bank's distinctive reputation, it is likely to redirect its communication to issues related to non-unique competences under conditions of uncertainty. The relative salience of issues related to weak and evolving competences is also expected to be stronger when political audiences are addressed compared to other audiences. We tested these propositions through an examination of the Fed's communication between 2006 and
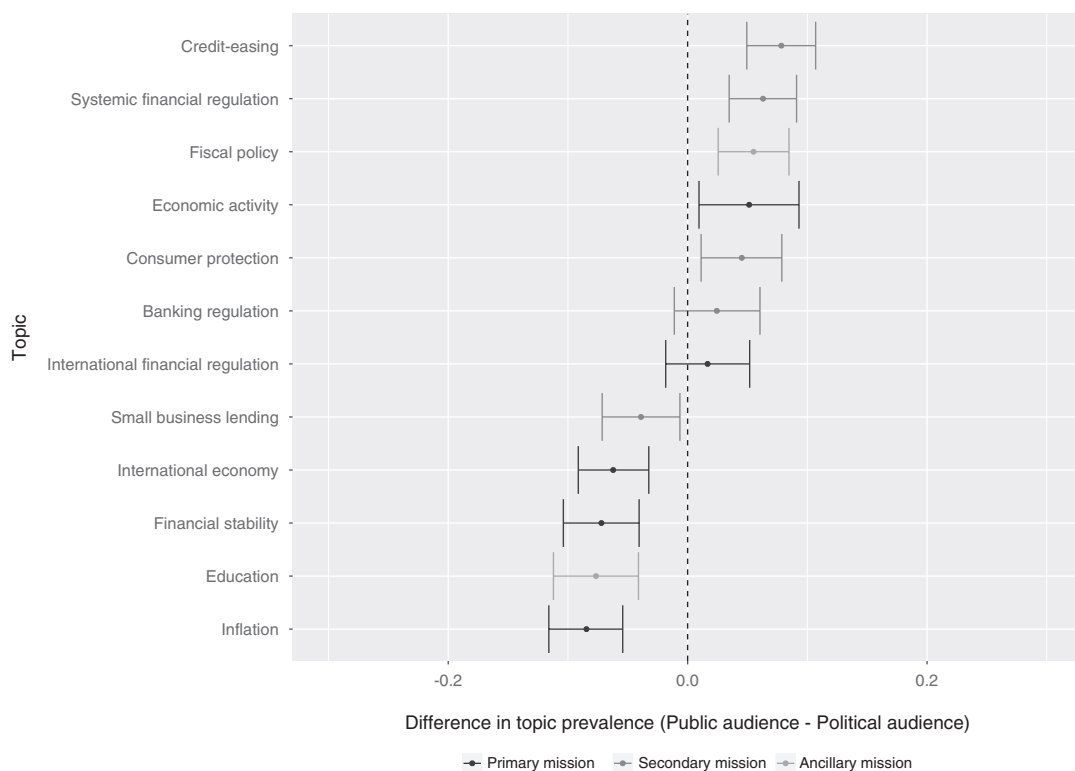
FIGURE 4   Topic prevalence in Fed's communication and audiences

Note: Topics are sorted in descending order, from the most discussed in front of political audiences to the least discussed. 95 per cent confidence intervals are reported

2016 by applying a promising method to study public agencies' communication. Specifically, our analysis relied on the application of STM, which is a methodology that allows researchers to identify the major issues discussed in a substantial number of documents and measure how their prevalence is influenced by some set of covariates.

This study offers several contributions to the research agenda on organizational reputation. In particular, our findings support the insight that public agencies craft their communication to cope with reputational challenges. At the same time, however, we also extend existing scholarship by investigating the consequences of reputational challenges on organizational behaviour when these challenges are not explicitly addressed to specific organizational (mis)behaviour but instead stem from uncertainty in the organization's operating environment. Furthermore, although other studies have linked the strength of reputation to communication outputs (Maor et al. 2013), our argument refines the understanding of the causal mechanisms through which different reputations shape communicative behaviour by drawing attention to the costs of policy reversals that stem from disrupting past investments in cultivation of unique reputations. Finally, by providing a comprehensive analysis of hundreds of speeches over a relatively long period of time, our study offers evidence that public agencies do not simply choose among different types of communication strategies; they also balance multiple issues, thereby emphasizing some issues at the expense of others. In other words, communication is as much about type as degree.

Beyond the contribution to reputation-based approaches, our study offers insights into the study of agencies' communication and especially central banks' communication. In particular, our analysis shows that the topics that preoccupy central bankers are broader than the traditional scholarly focus on inflation-related variables to ascertain

different levels of dovishness versus hawkishness preferences (Schonardt-Bailey 2013). An important direction for future research, therefore, is to investigate whether central banks' attention to topics spanning from financial regulation to fiscal policy (in addition to traditional monetary policy issues) represents a permanent feature of central banks' communication or whether this outcome is more of a temporary deviation from standard communication practices brought about by the global financial crisis.

Likewise, future research could investigate the communicative behaviour of other central banks to ascertain whether and to what extent the reputation-informed perspective is a promising avenue for research on the behaviour of other highly independent agencies. Moreover, the method used in this analysis is not only easily replicable but also flexible enough to open up new research avenues. For instance, automated content analysis methods such as that used in this analysis can be applied to study topic prevalence in combination with topical content, which means focusing on the words used to frame a topic in addition to the frequency with which the topic is discussed. This approach offers the possibility of investigating variations in public agencies' communication across different issues and audiences or over time. More generally, the opportunities provided by recent automated content analysis techniques expand the potential for future comparative studies on the communication practices of central banks and public agencies at large.

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