The Evolving Scope and Content of Central Bank Speeches

Pierre L. Siklos, Samantha St. Amand
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Table of Contents

About the Authors

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He has a particular interest in central bank independence, the governance models of central banks and the challenges that arise in an interdependent world. To that end, he has compared and contrasted how European models of integration differ from those in Asia. His work in applied time series analysis and monetary policy focuses on inflation and financial markets.

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About the Global Economy Program

Addressing limitations in the ways nations tackle shared economic challenges, the Global Economy Program at CIGI strives to inform and guide policy debates through world-leading research and sustained stakeholder engagement.

With experts from academia, national agencies, international institutions and the private sector, the Global Economy Program supports research in the following areas: management of severe sovereign debt crises; central banking and international financial regulation; China's role in the global economy; governance and policies of the Bretton Woods institutions; the Group of Twenty; global, plurilateral and regional trade agreements; and financing sustainable development. Each year, the Global Economy Program hosts, co-hosts and participates in many events worldwide, working with trusted international partners, which allows the program to disseminate policy recommendations to an international audience of policy makers.

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Executive Summary

Central banking has undergone significant changes in the past few decades. Central banks reinvented their policy communications strategies, while also championing economic and financial system stability in the aftermath of the 2007–2009 international financial crisis (IFC). These institutions are increasingly focused on improving public engagement to strengthen accountability and institutional reputations. Alongside these efforts is an important debate about what central bankers, as unelected technocrats, should be offering their views on in public fora. So far, discussions about the scope and content of central bankers' speeches has remained largely anecdotal. This paper compares the speeches of the US Federal Reserve (the Fed) and the Bank of Canada (BoC) over the last two decades. Using a machine-learning algorithm, this paper provides empirical data upon which elected policy makers, central bank watchers and the public can assess the appropriate reach of central bankers' public speaking engagements. The analysis suggests that the topics of central bankers' speeches have not significantly widened in scope relative to their mandate documents. There are, however, noticeable increases over time in the discussion of some topics that may cause contention, such as education and inequality, by US Fed officials. Finally, despite a push to make central bank communication more accessible to a general audience, only six percent of BoC officials' speeches and one percent of Fed officials' speeches are accessible to individuals with high-school-level reading comprehension. There is no evidence that the linguistic complexity of central bankers' speeches has simplified over time.

Introduction

Central bank communication strategies have changed dramatically over the past few decades. Less than a century ago the governor of the Bank of England, Montagu Norman, famously followed the motto "never explain, never excuse." Central bankers now favour clear communication of policy decisions, embracing transparency in monetary policy as best practice.[1] While there are several compelling reasons for policy makers to improve transparency, the main argument by early proponents of the transition (scholars and central bankers alike) hinged on improving the transmission of monetary policy.

Since the 2007–2009 IFC, the role of central banks in economic policy making has evolved in both scope and complexity. As technological change, structural economic shifts and geopolitical circumstances continue to affect economic and financial systems, central banks are increasingly looked to as a voice of authority in ensuring these systems remain strong and resilient. At the same time, there have been several instances of central bankers being criticized for discussing issues that have become politicized, such as Mark Carney speaking about Brexit (Farrell 2016), Janet Yellen's speech on inequality (Irwin 2014) and Raghuram Rajan's numerous criticisms of the Indian government's economic policies, which may have led to his "decision" to step down (Saha 2016).

Scholars, central bank watchers and central bankers themselves have been debating the appropriate role of central bank officials in issues of public interest. Some critics argue that central banks should "stick to their knitting" and only discuss matters that are directly related to their mandates, arguing that central banks' "extra-curricular" activities are inappropriate, a misuse of an official public position and a threat to the central bank's operational independence (Gros 2017; Buiter 2014). In a recent book on the accountability of unelected technocrats, Paul Tucker (2018) argues that as trustees for monetary-system stability, central bankers forfeit their right to participate in public dialogue on broader issues that affect society.

Others argue that "benign neglect" of issues that central bank policy can affect either directly or indirectly, such as inequality, can reduce the effectiveness of monetary policy (see, for example, Abu Bakar and Sui-Jade 2017); these critics suggest a broader perspective on the implications of central banks' policies is warranted (see, for example, Stiglitz 2015). These views are not necessarily mutually exclusive because identifying the line between what is and is not directly related to a central bank's mandate is not clear cut.

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1   While there has been a general shift toward improving transparency, there remain differences in opinion over what constitutes transparency.

Information on the topics of public speeches by central bankers and how they have changed over time remains largely anecdotal. A comprehensive analysis of speeches is needed to inform debates among governments, scholars and the public about the appropriate role and reach of influence of central bankers. This paper is the first, to our knowledge, that examines how the content of central bankers' speeches has changed over time and whether the scope — measured in comparison to the central banks' mandate documents — is expanding.[2]

Trends in the use of speeches by the BoC and the Fed over the past two decades are compared and topic modelling is used to capture speech content. These two central banks have very different communication strategies and institutional frameworks; therefore, comparative analysis of the BoC and the Fed can help illuminate the role of speeches under different policy-making contexts. For the communication departments of central banks, this type of analysis could provide a macro perspective on an important facet of central banks' communication strategies.

The paper addresses three questions. First, what factors relate to the topics of central bankers' speeches? For example, are speech topics associated with key speakers, economic circumstances or the venues where the speeches are delivered, and do these associations differ by central bank? Second, has the scope of central bank speech topics changed relative to their mandate documents? This is measured by counting the number of words in the top of the topic distribution that appear in the central bank's mandate documents. Third, have the public speeches of central bankers become more accessible (as measured by linguistic complexity) to a general audience?

The topics of speeches by BoC and Fed officials have clear links to their respective economic circumstances, communications strategies and institutional structures. For example, speeches by BoC officials are more likely to discuss international issues, reflecting Canada's position as a small open economy that is vulnerable to international pressures. Fed officials, however,

more frequently discuss the financial system, banking and financial supervision and regulation, reflecting the Fed's additional responsibilities as a key financial regulatory agency (responsibilities not held by the BoC). The results indicate that the topics of speeches by BoC officials tend to cluster more around time periods than those of Fed officials. This reflects the BoC's centralized communications strategy that ensures that Governing Council members stay on message. In contrast, speeches by Fed officials tend to cluster more around individual speakers, reflecting the individualistic dissemination of information. These results imply that the choice of topics of central bankers' speeches are driven both by economic circumstances and individual preferences of central bankers, but the relative influence of these factors depends on the institutional structure and communications strategy of the central bank.

This paper also finds evidence that BoC officials' speeches have spanned a wider range of topics over the past decade. However, the topics introduced in the later part of the sample, such as the oil price shock and economic modelling, would doubtfully be considered "outside" of the scope of the central bank's purview by most commentators. For the Fed, there is no general trend of speech content deviating relative to the central bank's mandate documents; however, discussion of two issues that might be more contentious, specifically education and inequality, has been trending upward. For both central banks, there is also evidence that fiscal policy issues are discussed more frequently during key fiscal policy events, namely fiscal stimulus in Canada in 2016 and the Bush tax cut expiry in 2011. This is to be expected because fiscal policy and monetary policy need to work together to be effective. However, scrutiny of these public addresses is still warranted to ensure that central banks are not using their authority to influence the public dialogue on fiscal policy.

Finally, while central bankers are attempting to improve their dialogue with the public, the paper shows that the linguistic complexity of central bankers' speeches has not decreased over time. More effort may therefore be needed to increase the accessibility of this form of communication. However, the speeches of the BoC's current governor, Stephen Poloz — which are much less complex than those of other central bankers in the sample — are an exception.

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2   Given the structured nature of a central bank's mandate documents, the text does not account for changes in how a central bank assesses economic activity, for example, in light of new technologies, structural economic shifts and changing geopolitical circumstances. This is important to keep in mind when interpreting the results.

Revolution and Continuing Evolution in Central Bank Communication

The past two decades have seen a revolution in central bank communication (Yellen 2012). Central banks have historically conducted monetary policy under a veil of secrecy. This secrecy was rationalized by a concern that disclosure of policy decisions would distort financial markets, harm the government's commercial interest and make the central bank more susceptible to outside political and social pressures (Goodfriend 1986). It was not until the mid-1990s that the Federal Open Market Committee (FOMC) announced changes in the stance of monetary policy. Before this time, financial markets had to infer policy decisions from the Fed's market activity. Regularly scheduled press releases came at the turn of the millennium; regular post-meeting press conferences did not begin until after the IFC. While this brief timeline only provides an account of recent changes in communication by the US Fed, a similar trend can be observed for central banks around the world.

Early steps to improve communications by central bankers emphasized the utility of transparency for managing financial market expectations and reducing financial market volatility (see Blinder et al. 2008 for an overview of the relevant literature). After interest rates in advanced economies reached record lows, communication of the expected future path of interest rates — i.e., forward guidance — became a monetary policy tool in and of itself (see Charbonneau and Rennison [2015] and Filardo and Hofmann [2014] for an overview of the relevant literature).

While financial markets remain a key target of central bank messages, communications strategists are now placing more emphasis on public accountability and building trust with the general public.[3] The loss of trust from the IFC, changes in the way media is consumed and increasing political fragmentation could pose a threat to central bank independence. There is also a concern about inattention to central bank actions by the general public, which can result in more volatile inflation expectations (Coibion et al. 2018). These trends are driving the need to improve dialogue with the public (see also Donnery 2017).

As central bank communication continues to evolve, new approaches to dialogue will emerge. This includes engaging with stakeholders through new platforms, including social media, newly renovated central bank museums, central bank sponsorship of public events, currency design competitions and public speeches in more inclusive venues (see, for example, Araujo 2016; Haldane 2016; Poloz 2018). It may also require changing the content of communication and emphasizing simplicity and relevance to ensure the message being delivered is more accessible and appeals to a wider audience (Haldane and McMahon 2018).

The delivery of public speeches is a versatile communication tool that can be used to connect with all central banks' stakeholders. Speeches are used to communicate central bank activities and research, discuss key developments in the economy and financial system, clarify the views of the monetary policy committee before or after policy deliberation, elaborate on policy shifts or revisions (such as the renewal of the inflation-control target at the BoC or the use of forward guidance at the Bank of England) and express the diversity of perspectives of individual central bankers (see, for example, Bernanke 2004; Kozicki and Vardy 2017; Vallès and Schonhardt-Bailey 2015). But the relevant literature only scratches the surface of understanding the role of speeches within central bank communications strategies. This paper assesses how the scope and content of speeches have changed during this communication revolution.

Communications Strategies of the BoC and the Fed

While a consensus has emerged on the importance of transparency, communications strategies vary significantly among jurisdictions depending on several factors, such as the organizational structure, institutional mandate and preferences of individual central bankers. Table 1 shows

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3   This was one of the main themes that emerged out of the European Central Bank's communications conference in November 2017. See www.ecb.europa.eu/pub/conferences/html/20171114_communications_challenges_policy_effectiveness.en.html.

Table 1: Factors that Influence the Communication Strategies of the BoC and the Fed

Factors	Bank of Canada	US Federal Reserve
Organization	Centralized	Decentralized
Dissemination	Consensus-oriented	Individualistic
Monetary policy decision making	Consensus	Majority vote (collegial)
Monetary policy operational guide	Inflation targeting	Full employment and inflation target
Other responsibilities	→ Financial market infrastructures oversight → Lender of last resort → Assessing financial stability → Participates in national and international bodies on matters related to financial system stability → Currency design, issuance and distribution → Funds management	→ Financial market infrastructures oversight → Lender of last resort → Assessing financial stability → Participates in national and international bodies on matters related to financial system stability → Currency design, issuance and distribution → Funds management → Macroprudential supervision and regulation → Consumer protection and community economic development
Blackout period (purdah)	Yes	Yes
Accountability of monetary policy committee members	The governor and senior deputy governor are members of the board of directors; they are appointed by the independent board members with approval of the Governor in Council (Cabinet). Board members are appointed by the minister of finance, with the approval of the Governor in Council. The other deputy governors are appointed by the board.	Members of the board of governors are nominated by the US president and confirmed by the US Senate.

Source: Authors.

key factors that affect the communications strategies of the BoC and the Fed.

Monetary policy decisions at the BoC are made by consensus of the Governing Council — a six-member committee that includes the governor, senior deputy governor and four deputy governors. The Governing Council is a creation of former Governor Gordon Thiessen who, in the early 1990s, made substantial changes to the transparency of the BoC (see Thiessen 2001). The governor and senior deputy governor are appointed by the independent members of the BoC board, with approval of the governor in council (Cabinet), and the other deputy governors are appointed by the board, creating a layer of separation between the government and the appointment of central bankers. Although the governor alone remains statutorily responsible for policy decisions, the effective roles in public outreach of the other five council members have been increasing over the last few decades.

At the Fed, policy decisions are made by majority vote of the 11 voting members of the FOMC. Voting members include the seven-member Board of Governors of the Federal Reserve System, the president of the New York Fed and four of the remaining 12 regional reserve bank presidents who serve one-year rotating terms. The board members are nominated by the US president and approved by the Senate. The direct relationship to the political process is one reason why the Fed chair's congressional testimonies attract more attention and are more consequential than the BoC governor's appearances before the parliamentary committees. Note that the regional bank presidents are accountable to a different set of stakeholders, including the regional bank's board of directors, private sector shareholders and the regional constituency.

There are key differences in how the BoC and the Fed organize and disseminate information. The BoC has a centralized communications strategy to align with its consensus-oriented policy approach. According to the BoC's "Principles for External Communication by Members of the Governing Council" (BoC 2017), individual members cannot publicly share personal views; instead, any external communications on monetary policy or the economic outlook must reflect the consensus view of the Governing Council (also see Kozicki and Vardy 2017).[4]

The US Fed's communication strategy, on the other hand, can be categorized as decentralized with individualistic dissemination of information (Ehrmann and Fratzscher 2007). Members of the FOMC are free to express their personal views on the economic outlook as well as their judgments about the policy path. As Ben Bernanke (2004) put it, "the willingness of FOMC members to present their individual perspectives in speeches and other public forums provides the public with useful information about the diversity of views and the balance of opinion on the Committee." Guidelines adopted by the Fed in 2011 suggest that in expressing their individual views, FOMC members should also be clear about the committee's rationale for policy decisions (US Federal Reserve Board of Governors 2017a).

The central bank's policy responsibilities and its monetary policy operational guide will define the set of topics that are likely to be discussed. Due to the BoC's inflation control target, it is likely that Governing Council members devote less attention to the employment situation than Fed officials would under their dual objective — which includes stable prices and full employment. Similarly, the Fed has a wider scope of responsibilities than the BoC, including microprudential supervision and regulation, some macroprudential authority, and consumer protection and economic development, creating additional topics of discussion.

These central banks also have different guidelines for discussing topics that are matters of "public interest." The BoC's guidelines state that when discussing matters of public interest, "Governing Council members consider any potential risk to integrity and impartiality of the Bank." The Fed's guidelines appear more flexible; the "Voluntary Guide to Conduct for Senior Officials" states that members "should feel free to express their personal views concerning questions of System or public interest, but they should carefully consider whether their remarks may create public misunderstanding of the System's actions, or impair the effectiveness formulation and implementation of System

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4   The policy does not specifically indicate that external communication on financial risks must also reflect the consensus viewpoint; however, it does note that the communication of new information on "the evolution of risks" can only be through venues that are widely accessible to the public.
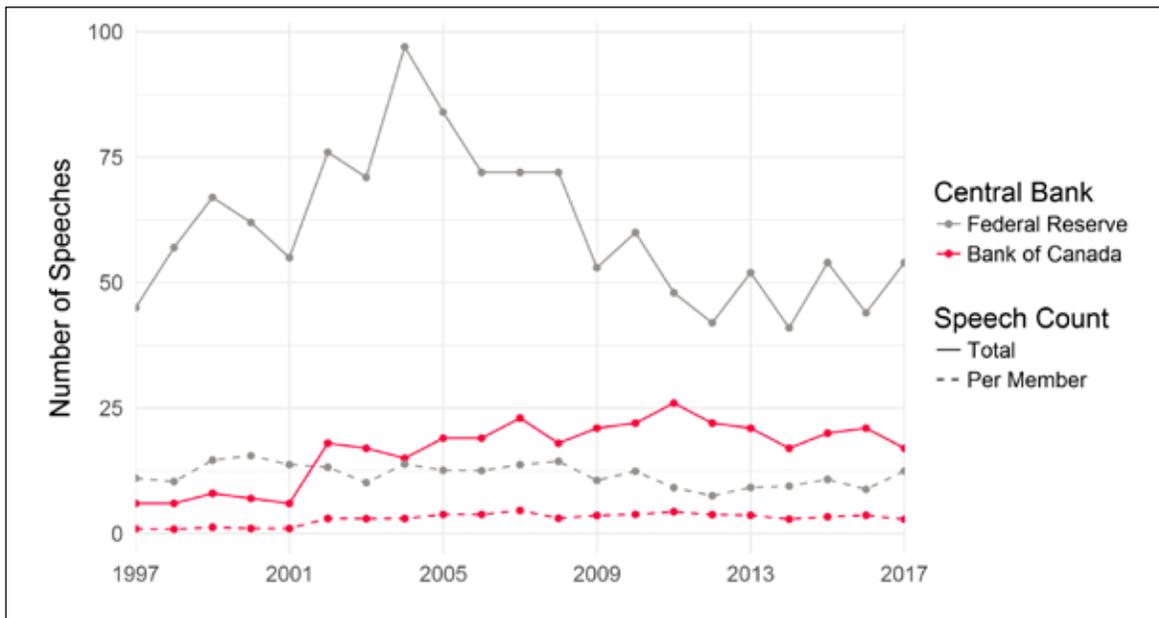
Data source: Central banks' online speech archives.

policies or lessen the prestige of the System" (US Federal Reserve Board of Governors 2017b).

Some central banks also adopt a blackout period to limit communication about monetary policy ahead of interest rate decisions. The Governing Council is restricted from delivering speeches or speaking to media about the economic outlook, direction of monetary policy or anything else relevant to the interest rate decision seven days prior to and on the date of an interest rate decision.[5] The FOMC is restricted from discussing matters related to monetary policy approximately 10 days before a meeting and the day after a meeting (US Federal Reserve Board of Governors 2017a).

Despite significant differences in communications strategies, one approach is not necessarily more effective than the other. The institutional and economic context within which the central bank operates affects the role and influence of communications. Michael Ehrmann and Marcel Fratzscher (2007) show that communications by the Fed and the European Central Bank, which has consensus-oriented decision making and

communications, are both effective at aligning financial market expectations. In addition, as Alan Blinder et al. (2008, 934) put it, "Markets, of course, adapt to a central bank's communication style." As central bank communications continue to evolve, with emphasis being placed on improving accountability and creating a dialogue with the general public, best practices will certainly change but will likely still vary depending on the institution's relationship with the public.

General Trends in Central Bankers' Speeches

The sample consists of all speeches by members of the BoC's Governing Council and the Fed's Board of Governors from 1997 to 2017. Only the members of the Fed Board of Governors were selected because these are permanent voting members of the FOMC and they are directly accountable to the US Congress and responsible for overseeing the Federal Reserve System as a whole. Their speeches

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5   See www.bankofcanada.ca/core-functions/monetary-policy/key-interest-rate/blackout-guidelines/. When the decision is accompanied by a Monetary Policy Report, the blackout period spans eight days prior to a rate decision and ends when the press conference associated with the report begins.

Table 2: Speeches by Central Bank Leader

a. BoC

Governor	Applicable tenure	Average number of speeches by the governor per year	Share of speeches in total speeches by members of the Governing Council
Gordon Thiessen	Jan. 1, 1997–Jan. 31, 2001	6.6	96%
David Dodge	Feb. 1, 2001–Jan. 31, 2008	13.4	80%
Mark Carney	Feb. 1, 2008–June 1, 2013	9.8	47%
Stephen Poloz	June 3, 2013–Dec. 31, 2017	6.8	34%
Full Sample	Jan. 1, 1997–Dec. 31, 2017	9.8	59%

b. US Federal Reserve

Chair	Applicable tenure	Average number of speeches by the chair per year	Share of speeches in total speeches by members of the Board of Governors
Alan Greenspan	Jan. 1, 1997–Jan. 31, 2006	19.4	29%
Ben Bernanke	Feb. 1, 2006–Jan. 31, 2014	21.1	36%
Janet Yellen	Feb. 3, 2014–Dec. 31, 2017	11.2	23%
Full Sample	Jan. 1, 1997–Dec. 31, 2017	18.5	30%

Data source: Central banks' online speech archives.

would therefore be a stronger representation of a unified communication strategy.[6]

Figure 1 shows the number of speeches delivered by BoC and Fed officials per year. This figure already reveals a significant difference in the use of speeches by these two central banks; namely, that Fed officials deliver far more speeches than BoC officials. Governing Council members delivered a total of 349 speeches in the last 21 years, while the US Fed Board of Governors delivered 1,278. This amounts to an average number of speeches per member per year of around three at the BoC and 12 at the Fed. There are a few trends worth highlighting. The number of speeches delivered

by Fed officials increased from 11 per member in 1997 to a peak of more than 15 per member in 2000. Some of this can likely be explained by efforts to increase transparency at the Fed during this period. After the 2007–2009 IFC, the number of speeches delivered per year fluctuated around 50. The decline from the pre-crisis period may relate to there being a less pressing need to deliver timely information to financial markets.

Officials at the BoC have delivered fewer than 30 speeches per year. Part of the gap in the volume of public addresses by these two central banks can be explained by differences in the role of the head versus the other committee members; specifically, the governor of the BoC delivers a larger share of the total speeches than does the Fed chair (see Table 2a). This is because the governor was the only council member to deliver public

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6   The Fed's regional bank presidents are accountable to a different set of stakeholders (see discussion in previous section); therefore, their speeches are likely to be more targeted to these communities.

Figure 2: Portion of Speeches by Venue Type, across Central Bank Leader Tenures

a. Bank of Canada
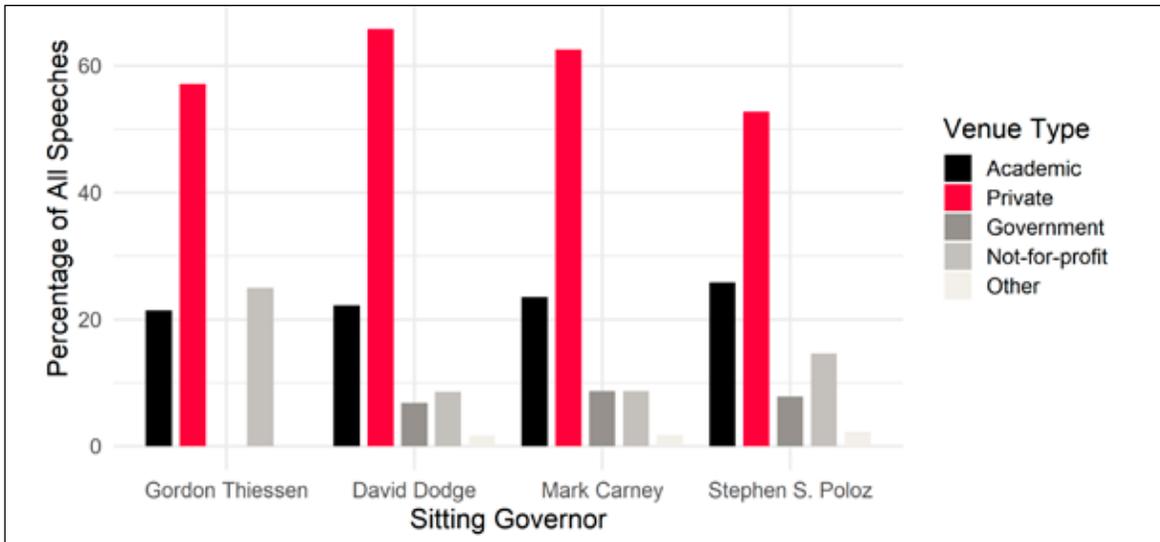
b. US Federal Reserve
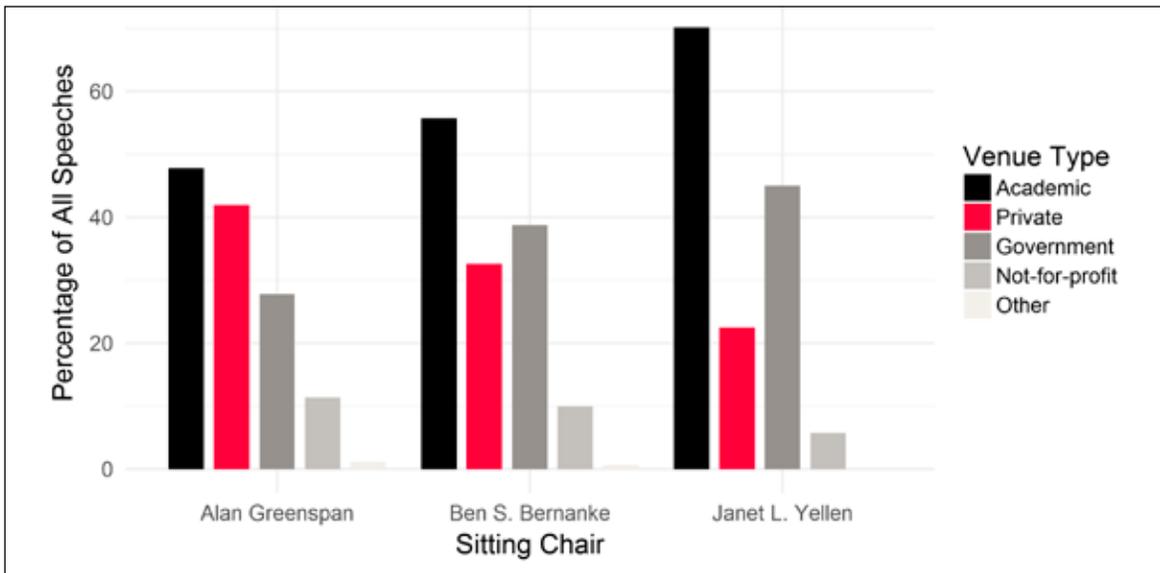
Data source: Authors' elaboration on speeches from central banks' online archives.

Note: Academic includes universities, think tanks, academic conferences and central bank conferences. Private includes professional associations (including markets, builders, and workers), chambers of commerce and boards of trade. Government includes government forums and government-sponsored events (including international organizations and central banks). Not-for-profit includes non-profit organizations with a public good mission. Other includes media, museums and public forums. The sum of the proportions of speeches by venue need not add up to 100 percent, see footnote 8.

addresses until 2006 and has continued to be the key figure in public engagements after this time.[7] There is a sharp increase in the number of speeches by BoC officials in 2002 when David Dodge assumed leadership, and a slight increase in 2007 when other members began giving speeches.

In contrast, Fed chairs have delivered around one-third of all speeches, showing the prominent role of other members of the Fed Board of Governors in public engagements (Table 2b). In particular, Janet Yellen delivered less than one-quarter of speeches during her tenure (despite having a smaller-sized board) as she championed a more democratic representation of FOMC officials (see Yellen 2017). This difference relative to the BoC can be linked to the structure of monetary policy decision making. Decisions by the FOMC are taken by majority vote, so, in theory, each member's opinion has equal weight.[8] As noted above, the BoC Governing Council is a relatively new creation. The role of the other Council members in public outreach has slowly been increasing since its creation, and this is reflected in their increased share of speeches over time.

The choice of venue reveals additional differences in communications strategy (see Figure 2). More than 50 percent of all speeches by BoC Governing Council members are delivered at private sector venues, such as professional associations, chambers of commerce and boards of trade.[9] Fed officials have historically had a more balanced set of venues; however, the share of speeches delivered at academic venues (including conferences, universities and think tanks) increased to 70 percent under Chair Yellen's tenure, with many of these being central bank conferences. Several factors could explain a larger share of speeches delivered at government venues versus private sector venues. One explanation is that the Federal Reserve System hosts many events featuring FOMC

members as speakers. Congressional scrutiny may also play a role, as the Fed officials do not want to appear to have a cozy relationship with the private sector. The perception of the Fed's relationship with the private sector is particularly important given the Fed's additional responsibilities as a financial regulator. For the BoC, private sector associations are distributed across the country and have the capacity to host speakers, creating a natural venue for their officials to deliver speeches.

The fraction of speeches delivered to a foreign audience is also larger for the BoC (21 percent) than for Fed officials (10 percent). The fact that Canada is a small open economy is no doubt one factor. It may also relate to the fact that members of the Fed Board of Governors are directly accountable to Congress, and that speeches delivered abroad could risk signalling a diminished commitment to domestic economic objectives.

The trends highlighted above already show how the use of speeches as a communication tool differs at central banks with dissimilar communications strategies and institutional frameworks. Of key interest to this paper, however, is how the *content* of central bankers' speeches has changed over time.

Text Preprocessing and Topic Modelling

To evaluate the content of central bankers' speeches, Latent Dirichlet Allocation (LDA) was used. LDA is an unsupervised machine-learning algorithm developed by David M. Blei, Andrew Y. Ng and Michael I. Jordan (2003) that estimates a probabilistic distribution of words over topics and topics over documents. It provides a rich and intuitive classification of topics within a corpus of text and has been used to evaluate topics in central bank meeting minutes and transcripts (see, for example, Hansen, McMahon and Prat 2018; Jegadeesh and Wu 2017; Oshima and Matsubyashi 2018). For a technical description of this methodology, see Appendix A.

The texts require preprocessing before being fed through the LDA algorithm. The corpus of speeches was cleaned by removing stop-words (for example, it, the, a, and), stemming words (i.e., removing affixes such as -ing, -y and -ies) using Martin F. Porter's (1980) algorithm, removing punctuation and numbers, and converting text to lower case. Words that are used infrequently or very frequently are unlikely to provide useful

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7   There are two exceptions: Senior Deputy Governor Bernard Bonin delivered one speech in 1998 and Senior Deputy Governor Paul Jenkins delivered one speech in 2004.

8   In practice, it has generally been observed that the opinion of the chair matters more (see, for example, Blinder 2006; Thornton and Wheelock 2014). Nevertheless, the FOMC more closely follows a democratic decision-making process than the Governing Council.

9   The sum of the proportions of speeches by venue need not add up to 100 percent. Many speeches are delivered at venues that span multiple categories, for example, central bank conferences are categorized as both academic and government venues, and speeches to industry associations may include government representation or participation. See note to Figure 2 for a definition of each venue category.

Table 3: Speech Corpus Properties

	BoC	US Federal Reserve
Sample size	349	1,278
Raw text unique words	33,370	77,962
Processed text unique words	2,480	2,748

Source: Authors.

information content.[10] Terms that occur in less than 2.5 percent of speeches or more than 90 percent of speeches are therefore removed. Table 3 details the properties of the BoC and Fed speech corpuses.

Since the focus of this paper is on comparing the topics discussed by officials at the BoC versus the Fed, topics are estimated separately for these central banks. The number of topics must be pre-specified for the LDA algorithm. The optimal number of topics was chosen by implementing the algorithm over a range of values (between five and 100 at intervals of five) and selecting the one that maximizes the log-likelihood function. For the BoC, 45 topics were selected, which roughly corresponds to the number of topics listed on the BoC website, and 65 topics were selected for the Fed.[11] One would indeed expect that a larger number of topics is needed to explain the Fed data given its additional responsibilities and a more decentralized communication strategy, as discussed above.

The Evolving Scope and Content of Central Bankers' Speeches

The set of topics estimated from the speech corpuses of the two central banks and some properties of each topic are presented in Table 4. The topic labels were manually identified based

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on the words and documents with the highest probabilities in the topic (see Appendixes A and B).[12] The table shows the percent of the corpus explained by each topic and the similarity of the topic to the central bank's mandate documents (methodology discussed in more detail below and in the note to Table 4).

Overview of the Topics of Central Bankers' Speeches

Despite emphasizing some of the differences in the two central banks being analyzed, specifically with regard to the institutional structure and communications strategies, there are generally more similarities than differences among these institutions, and this is clearly observed in the topics generated. Some topics are sufficiently similar that they are labelled identically, including speeches on the economic outlook, liquidity facilities, global imbalances, the housing market, the labour market, corporate accounting and disclosure, and the payments system. Others have strong similarities but differ in the specifics of their focus. This is partly owing to the larger number of topics specified for the Fed; for example, the Fed topics labelled housing market and household debt are both similar to the BoC housing market topic. Slight differences in the focus on topics can also be attributed to the different policy objectives of these central banks; for example, discussion of monetary policy objectives at the Fed is similar to discussion of the inflation targeting framework at the BoC.

The substantive differences in the corpuses can be attributed to the relative position of these countries globally and the different roles of the central bank. The BoC has more topics related to international activities, with issues directly related to global economy and international finance comprising around 20 percent of topics (for example, international financial architecture, global financial integration and global trade integration). This reflects Canada's position as a small open economy that may be influenced by international events. Over half of the Fed's topics, on the other hand, are related to the financial system, and financial supervision and regulation. This is owing to the Fed's additional responsibilities as a key US financial regulatory

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Table 4: Topic Distributions and Similarity to the Central Bank's Mandate

a. Bank of Canada

	Topic Labels	Percent of Corpus in Topic	Similarity to Mandate Documents
1	Economic outlook	6.4%	65%
2	Inflation targeting framework	5.6%	95%
3	Adjusting to globalization	3.8%	75%
4	Productivity and innovation	3.6%	60%
5	Global economic recovery	3.6%	60%
6	Inflation outlook	3.5%	60%
7	Role of the BoC	3.5%	85%
8	Principles for good economic policy (Washington consensus)	2.9%	75%
9	Financial system regulation and reform	2.9%	55%
10	Understanding low economic growth	2.8%	55%
11	Systemic risk and financial stability policy	2.8%	50%
12	Export competitiveness	2.8%	60%
13	Liquidity facilities	2.3%	90%
14	Global imbalances	2.3%	60%
15	International financial regulatory reform	2.2%	50%
16	Exchange rate regime	2.2%	70%
17	Financial system regulation and efficiency	2.2%	75%
18	Credit markets	2.1%	70%
19	Oil price shock	2.1%	60%
20	Measuring inflation	2.0%	55%
21	Monetary policy decision making	2.0%	75%
22	International financial architecture	1.9%	90%
23	Global financial system turbulence	1.9%	65%
24	Education and public engagement	1.8%	60%
25	Financial market developments	1.8%	80%
26	Canada in the global economy	1.8%	65%
27	Lessons from the past and from other countries	1.8%	60%
28	Financial market infrastructure	1.8%	70%
29	Unconventional monetary policies	1.7%	65%
30	Potential output	1.7%	60%
31	Commodity markets	1.7%	70%
32	Re-evaluating the monetary policy framework	1.6%	80%
33	Global economic governance	1.6%	65%
34	Housing market	1.6%	80%
35	Currency issuance	1.6%	70%
36	Labour market	1.4%	45%
37	Economic modelling and uncertainty	1.4%	50%
38	Global trade integration	1.3%	65%
39	Corporate accounting and disclosure	1.3%	75%

	Topic Labels	Percent of Corpus in Topic	Similarity to Mandate Documents
40	Fiscal policy	1.2%	65%
41	Global financial integration	1.2%	65%
42	Wage setting	1.1%	70%
43	Macroeconomic stabilization policy	1.1%	85%
44	Payments system	1.0%	60%
45	Pensions	0.8%	70%

b. US Federal Reserve

	Topic Labels	Percent of Corpus in Topic	Similarity to Mandate Documents
1	Economic growth	2.9%	95%
2	Financial regulatory and supervisory framework	2.9%	100%
3	Challenges for monetary policy	2.8%	85%
4	Challenges of macroeconomic policy	2.7%	70%
5	Community economic development	2.5%	95%
6	Economic flexibility and adaptation	2.5%	85%
7	Technology and innovation	2.4%	80%
8	Liquidity facilities	2.2%	100%
9	Monetary policy outlook	2.1%	100%
10	Balance sheet policies	2.1%	90%
11	Basel II	2.1%	90%
12	Bank supervision	2.1%	85%
13	Credit risk	2.0%	80%
14	Evaluating circumstances	2.0%	95%
15	Education	2.0%	50%
16	Modernizing financial services regulation	1.9%	100%
17	Corporate risk management	1.9%	95%
18	Bank lending	1.9%	95%
19	Role and governance of the Fed	1.9%	95%
20	Productivity	1.8%	95%
21	Economic recession and recovery	1.8%	75%
22	Inflation dynamics and outlook	1.8%	70%
23	Global capital flows and economic integration	1.7%	70%
24	Housing market	1.7%	75%
25	Monetary policy objectives	1.7%	95%
26	Monetary policy communication	1.7%	95%
27	Community banks regulation and supervision	1.6%	100%
28	Economic research and modelling	1.6%	65%
29	Prudential regulation	1.6%	95%
30	Too big to fail	1.5%	80%
31	Financial literacy	1.5%	95%

	Topic Labels	Percent of Corpus in Topic	Similarity to Mandate Documents
32	Financial stability policy	1.5%	60%
33	Managing international financial crises	1.5%	70%
34	Economic outlook	1.4%	75%
35	Rule of law and market capitalism	1.4%	80%
36	Data collection and measuring economic activity	1.3%	95%
37	Payments system	1.3%	75%
38	Small business financing	1.2%	90%
39	Household debt	1.2%	85%
40	Global imbalances	1.2%	95%
41	Financial market clearing and settlements	1.2%	90%
42	Preparing for financial services disruptions	1.2%	80%
43	Consumer protection	1.2%	90%
44	Financial market liquidity	1.2%	90%
45	Business investment	1.2%	80%
46	Subprime mortgage lending	1.1%	80%
47	Fiscal budgets	1.1%	95%
48	Labor market	1.1%	65%
49	Corporate governance	1.1%	100%
50	Monetary policy rules	1.1%	80%
51	Bank stress tests	1.0%	80%
52	Asset bubbles	1.0%	75%
53	International trade	1.0%	75%
54	Corporate accounting and disclosure	1.0%	90%
55	Bond yields	1.0%	90%
56	Income and wealth inequality	1.0%	70%
57	Consolidation of banking industry	1.0%	90%
58	Currency and exchange rates	0.9%	75%
59	Social security	0.9%	85%
60	Energy markets	0.9%	65%
61	US Treasury and government-sponsored enterprise debt	0.8%	90%
62	Consumer credit	0.8%	90%
63	Monetary system	0.7%	75%
64	Foreign banks	0.7%	80%
65	Community Reinvestment Act	0.6%	85%

Source: Authors.

Notes: See Appendix A for an explanation of how probability distributions over words for each topic and over topics for each speech are estimated. Topic labels were manually identified based on the probability distribution over words and documents for each topic (see Appendix B for a list of the top 10 words in each topic). The percent of the corpus in the topic is the sum over all speeches of the probability of the topic in each speech. The similarity to the central bank's mandate documents is the percentage of the top 20 words in the probability distribution over words for each topic that appear in the central bank's mandate document (for the BoC, these include the Bank of Canada Act, and the joint statement of the Government of Canada and the BoC on the renewal of the inflation-control target. For the Fed, this includes the Federal Reserve Act, and the FOMC's statement on longer-run goals and monetary policy strategy).

agency. Specifically, speeches concerning community banks, reinvestment and economic development, as well as speeches concerning asset bubbles and subprime mortgage lending, appear in the Fed corpus but not the BoC corpus.

Almost one-tenth of the content of speeches by BoC officials concerns the role of the central bank and its inflation-targeting framework. This reflects two ways the BoC uses speeches within its centralized communication strategy. First, in the two years approaching the renewal of the BoC's operational guide, there is a clear concentration on discussing key issues related to the renewal process (including the inflation-targeting framework in 2006, re-evaluating the monetary policy framework in 2011 and financial stability policy in 2016). Second, the central bank made a deliberate effort starting in 2006 to use speeches by deputy governors to discuss the role of the BoC at various venues around Canada. Given a more individualistic approach to communication, similar concerted efforts are not observed by the Fed Board of Governors.

Interestingly, while the Fed has a dual monetary policy objective of price stability and full employment, the term "employment" only shows up in the top 15 words of three topics — labour market, monetary policy outlook, and recession and recovery — while "inflation" shows up in six topics. What is notable is that all three topics that feature employment as a key word increased sharply as a share of the corpus after the IFC. The share of speeches concerning the inflation outlook, on the other hand, decreased significantly in 2009. This provides evidence that Fed officials were more focussed on the inflation objective prior to, as well as at the height of, the crisis and switched attention to full employment in the aftermath of the crisis. A similar trend is not observed for the BoC where "employment" only shows up in two topics — labour market and inflation outlook — which do not follow an upward trend after the IFC.

What Factors Are Associated with Speech Topics?

There appear to be both supply and demand factors that explain topic selection, whereby topics cluster around time periods and individual speakers, and to some degree around venue types. The economic and policy-making context naturally creates a demand for speeches by the central bank's stakeholders and speeches on such topics are important for improving the

institution's accountability. From a supply side, individual speakers may have preferences for speaking on certain topics of expertise or interest, and the central bank's research output might also inspire a speech. As one would expect, there is often a natural fit between the central bank's research and the policy-making context, as well as with an individual's areas of interest and responsibilities at the central bank, blurring the divide between supply and demand drivers.

In some cases, clusters around time periods relate to economic events. For example, economic recovery was prominent in the aftermath of the 2008-2009 global financial crisis, while discussion of corporate accountability and disclosure was significantly larger between 2002 and 2004, coinciding with the accounting scandals of Enron and World Comm. Topics also cluster around time periods because of policy context. For example, a higher share of speeches between 2007 and 2010 discussed liquidity facilities, while speech content related to unconventional monetary policies was most dominant between 2009 and 2013. Finally, topics cluster around time periods to reflect evolving institutional structure or policy making by central banks. For example, most of the discussion surrounding financial regulatory reform occurred between 2011 and 2015.

Topics at the BoC are generally more concentrated around time periods than they are at the Fed. This is likely owing to the more centralized and consensus-oriented communication strategy. Clustering of topics around individual speakers can be attributed to their role at the central bank or the individual's background and interests. This appears to be more prominent at the Fed than the BoC, likely owing to the decentralized communications strategy that allows individualistic dissemination of information. A few examples of this trend are: Susan Bies, who had come from a risk management and auditing background, delivered the majority of Fed speeches on corporate accountability and corporate governance; Ben Bernanke, who is an academic monetary economist, delivered half of the speeches on the monetary system; and Daniel Tarullo, who oversaw supervision and regulation at the Fed, covered the majority of discussion on prudential regulation.

Proportional clustering of certain speech topics according to venue types also occurs for both central banks. Topics that are more likely to be presented in academic venues concern

macroeconomic policy, the monetary system and economic modelling. For private venues, more speeches centre around the economy and specific markets, as well as Basel II and corporate governance and risk management in the case of the Fed. The topics that are most likely to be presented in government venues are related to economic policy making and governance.

Has the Scope of Central Bankers' Speeches Expanded?

A key question this paper aims to address is whether the topics being discussed by central bankers are expanding relative to the central bank's legal mandate. This "scope" factor is measured as the percentage of the top 20 words in a topic distribution that appear in the text of the central bank's mandate documents. For the BoC, the mandate documents include the Bank of Canada Act and the joint statement of the Government of Canada and the BoC on the renewal of the inflation-control target. For the Fed, these include the Federal Reserve Act and the FOMC's statement on longer-run goals and monetary policy strategy. This measure is provided in the final column of Table 4.

Figure 3 plots the measure of the similarity to the mandate documents for each speech in the sample.[13] The speech topics of BoC officials have become less closely matched to the central bank's mandate documents since the IFC, although certain caveats apply, as discussed below. The similarity of Fed officials' speeches to its mandate documents, on the other hand, has remained largely stable over time.

A closer investigation of the topics driving these trends is warranted to identify whether they can be deemed an increase in discussing matters of public interest. It is important to note that the mandate documents do not capture much of the nuance that goes into interpreting information relevant to the central bank's objectives. Indeed, several terms used to describe or assess economic activity may not appear in the legal text — for example, "crisis," "recession," "pressure," "oil" and "recovery" do not appear in any of the mandate documents that were evaluated. Given the legal or official nature of the mandate documents, colloquial terms are also unlikely to appear — for

example, "people" and "worker" are not in any of the documents. Generally, the relation of Fed topics to the mandate documents is much higher than the relation of BoC topics. This is simply owing to the Fed Act being a significantly longer and more detailed piece of legislation than the BoC Act. In addition, because the Fed has additional responsibilities, the text likely covers a wider range of terms related to finance and economics.

The decline in the relation of BoC officials' speeches to the mandate documents from 2007 to 2010 was caused by a shift away from talking about the inflation-targeting framework toward discussing topics related to financial system stability, regulation and reform, as well as crisis, recession and recovery. In the aftermath of the crisis, this measure has remained lower than the pre-crisis levels. This is because Canadian central bankers are talking about a wider set of issues related to how they assess economic activity, such as understanding low economic growth, economic modelling and uncertainty, oil price shock, and productivity and innovation, which have several words (for example, uncertainty, model, oil, innovation) that do not appear in the mandate documents. A sharp increase in discussing global trade integration can also be observed in 2016-2017. This may be related to research the central bank has been conducting into better incorporating trade into its economic analysis, partially motivated by the renegotiations of the North American Free Trade Agreement, as well as Governor Poloz's background with Export Development Canada. Given this context, commentators would be hard pressed to claim that the wider scope of topics being discussed by BoC officials falls outside of the central bank's authority.

Unlike at the BoC, where the topics of speeches have expanded, the Fed's speeches have become more closely matched with its mandate documents. This may be a response to increased criticism of the role of the Fed, through movements such as Fed Up, Occupy Wall Street and Audit the Fed. Similar pushback against the central bank has not been observed in Canada. However, a few topics of discussion that are not directly related to the Fed's mandate have been rising, namely, income and wealth inequality and education. Interestingly, topics that would be more relatable to the public, such as education, the labour market, and income and wealth inequality are 72, 51 and 38 percent, respectively, attributed to

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13   The similarity of a given speech to the mandate documents is calculated as the probability distribution of topics over each speech multiplied by the similarity of each topic to the mandate documents.

Figure 3: Similarity of Central Bankers' Speeches to the Central Bank's Mandate (1997–2017)

a. Bank of Canada
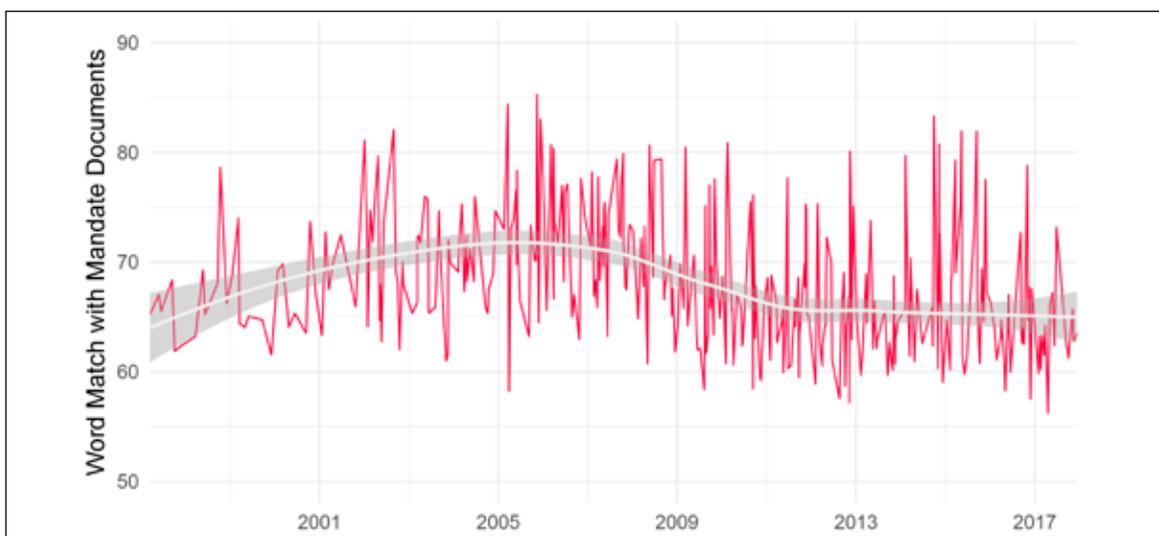
b. US Federal Reserve
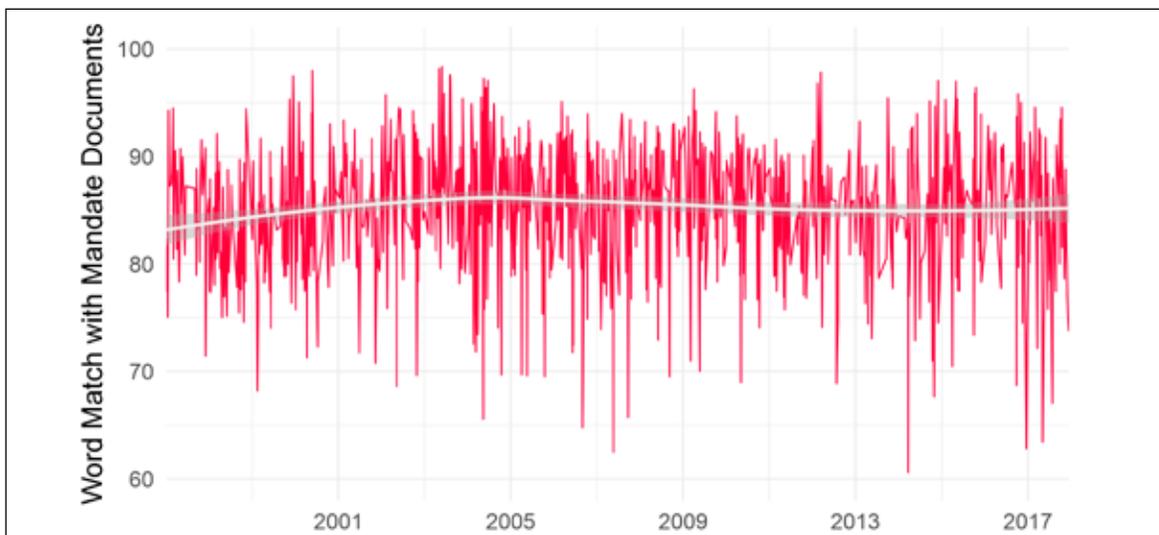
Source: Authors.

Note: The similarity of each speech is equal to the sum over the probability of the topic in a speech multiplied by the similarity of the topic to the mandate (see discussion in text and the note to Table 4). The estimate is standardized to a mean of zero and standard deviation of one, and the average of the standardized values is plotted for each speech in the sample. The smoothing function is local quadratic regression with the smoothing parameter equal to 0.75 and a 95 percent confidence interval.

the speeches of Fed chairs. The central bank's leaders may be using speeches on these subjects to connect with a more general audience, potentially aiming to reinforce accountability to the public.

One topic where public discussion by central bankers can, in some circumstances, be contentious is fiscal policy. At the BoC, this topic is most often discussed by the governor and discussion of this issue peaked sharply in 2016 when the then-new Liberal government was implementing fiscal

Figure 4: Average Text Complexity Score (1997–2017)

a. Bank of Canada
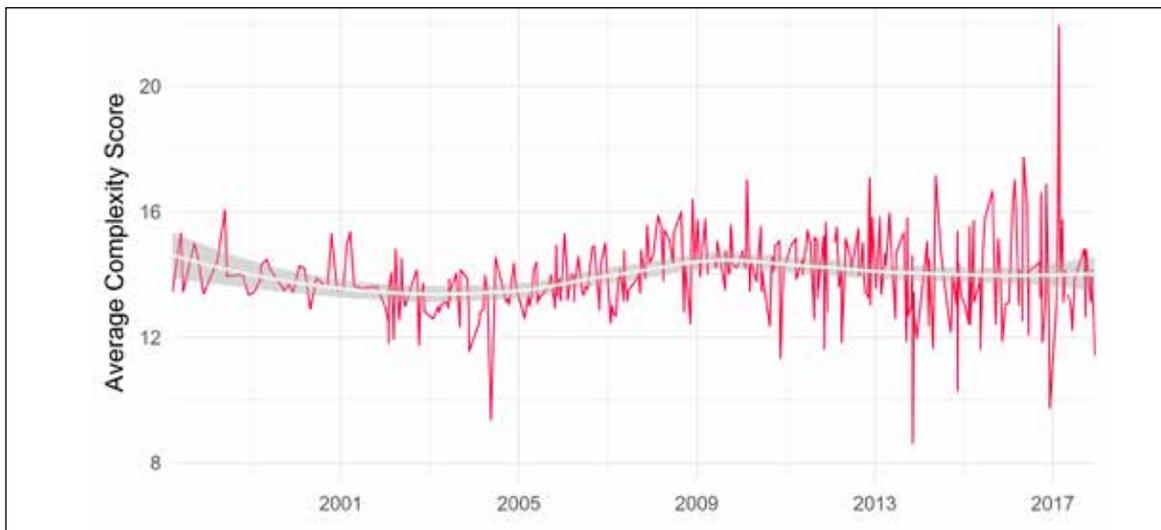
b. US Federal Reserve
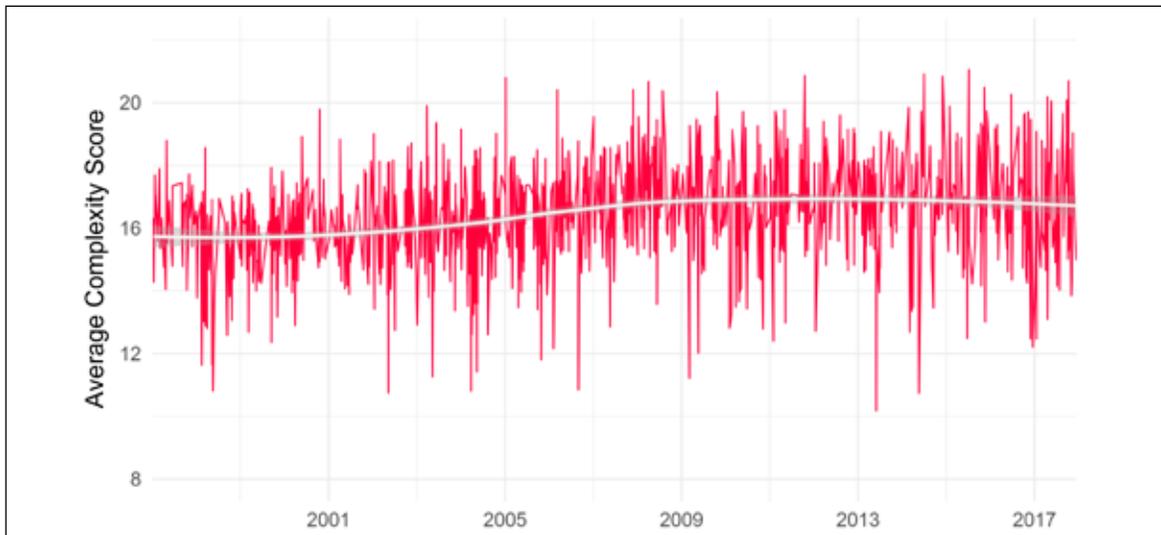
Source: Authors.

Note: The linguistic complexity score is an average of Flesch-Kincaid, Gunning Fog, Coleman-Liau, SMOG and Automated Readability indices. The smoothing function is local quadratic regression with the smoothing parameter equal to 0.75, with 95 percent confidence interval.

stimulus. A similar trend is observed at the Fed, whereby officials' speeches on the fiscal budget increased sharply in 2010 and 2011, when the Bush tax cuts were set to expire and US federal debt was approaching the ceiling imposed by Congress.

This result is to be expected because monetary and fiscal policy must work together to be effective. Indeed, the fiscal policy of the government has

significant implications for the economy and therefore the policy actions of the central bank in pursuing its objective. As Sharon Kozicki and Jill Vardy (2017) indicate, "The goal of the [BoC's] communications is to offer a comprehensive assessment of the events and issues that are influencing monetary policy decisions, while acknowledging the uncertainty inherent in all

policy-making. This requires as much transparency as can be achieved without resorting to false precision about its outlook and the future path for the policy interest rate." If a discussion of fiscal policy was omitted, then we would not get a comprehensive assessment of the issues that influence monetary policy decisions. At the same time, it is undesirable for central banks to influence public debate or opinion surrounding fiscal policy. Scrutiny of central bankers' public statements on the issue therefore remains warranted.

Have Central Bankers' Speeches Become More Accessible?

As discussed at the beginning of this paper, the new phase of the revolution in communications emphasizes making central bank talk digestible to a wider audience (see, for example, Haldane 2016, 2017; Poloz 2018). To identify whether efforts are being made to make speeches more accessible, Figure 4 plots the linguistic complexity score of each speech.[14] In general, the complexity score appears to have increased slightly over time, showing that, on average, central bankers' speeches have become less accessible to a general audience (see also Deslongchamps 2018). However, the variance of complexity scores for individual texts has been increasing, perhaps reflecting the complexity of the text becoming more tailored to the topic or audience.

It should also be noted that, in some cases, the delivery of the speech may deviate from the text of the speech published online, with the public delivery typically being less complex than the written text. This is done to make the speech more accessible to the public audience, while ensuring that the text provides the appropriate nuance for a more technical audience, such as financial market participants. The accessibility of the speech will therefore depend on whether you observe the public address — either in person or through a webcast — or read the text of the speech.

The lowest complexity scores for the Fed are, somewhat ironically, often commencement addresses to university graduates. The least complex speeches at the BoC are typically about currency issuance. The average complexity of Fed speeches (16.4) is higher than that of speeches by BoC officials (13.9), potentially reflecting the larger portion of Fed speeches delivered at events hosted by central banks

and delivered in academic fora. In total, six percent of BoC officials' speeches and only one percent of Fed officials' speeches are accessible to individuals with high-school-level reading comprehension. Interestingly, one of the speakers with the lowest complexity score overall is Stephen Poloz at 12.9. Poloz is known for discussing economics in an accessible way, including through analogies; perhaps, this style of speaking is captured by the lower complexity of the text. The BoC has indeed been making deliberate efforts to improve the accessibility of central bank communications under his leadership (Poloz 2018).

Conclusion

This paper provides empirical evidence of how the content of BoC and Fed officials speeches has changed over the past two decades. The revolution in central bank communication is continuing full speed as strategists focus on improving dialogue with the general public in an effort to boost accountability and bolster central banks' reputations. This paper shows, however, that as of 2017, the general accessibility of central bankers' speeches has not improved. A significant challenge in these efforts will be to make the central bank's message more relatable, while also clearly communicating its policy actions.

In general, the analysis reveals no clear deviation in the scope of central bankers' speeches from their mandate over the past two decades. While the speeches by officials at the BoC have expanded in scope relative to the text of its mandate documents, the outlying topics are clearly related to how central bankers interpret incoming information about the economy. In general, much of the variation in speech content at these central banks can be explained by individual central bankers and key economic events. One exception is the discussion of education and inequality by Fed officials, which has increased over the past decade, potentially related to efforts to improve public engagement. Whether or not central banks should be discussing these issues in public fora is an important debate for governments, central bank watchers and the general public. The results of this paper inform this debate by identifying which topics of discussion are prominent in central bankers' speeches and measuring the weight of these topics among all their public addresses. In future work, it may be fruitful to explore whether

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14 The linguistic complexity score is an average of Flesch-Kincaid, Gunning Fog, Coleman-Liau, SMOG and Automated Readability indices.

the topics discussed by central bankers can affect
the credibility of and trust in these institutions.

Authors' Note

Appendix A: Latent Dirichlet Allocation

Distribution of topics over documents (Θ) and words over topics (z) are the latent variables in the model.

$$\Theta \sim Dirichlet\ (\alpha)$$

A Dirichlet distribution is a distribution over distributions; specifically, it is a conjugate prior for the multinomial distribution. For each of the N words in a document d, w_{dn}, the assignment of a word to a topic (z_{dn}) is chosen from the multinomial distribution of the topics in that document (Θ_d):

$$z_n \sim Multinomial\ (\Theta)$$

LDA follows a three-layer process (Figure 3). The first layer are parameters that are fixed at the corpus level, meaning they are assumed to be sampled once in the process of generating a corpus. The first of these hyperparameters is α, which defines the Dirichlet distribution from which the distribution of topics over documents (Θ) are sampled from. The second hyperparameter is δ, which defines another Dirichlet distribution from which the distribution of words over topics are sampled from (ß). More specifically, ß is the distribution of words over topics, a $k\ x\ V$ matrix where the elements represent the probability of a word ($w_i \in \{1, ..., V\}$) belonging to a given topic z_n.

The second layer are parameters that are unique to each document: Θ_d is the distribution of topics over documents, sampled once per document d_i ($d_i \in \{1, ..., M\}$). The third layer are parameters unique to each word: z_{dn} and w_{dn} are sampled once for each word in each document w_d ($w_d \in \{1, ..., N_d\}$).

The posterior distribution of the latent variable $p\ (\Theta, z|w, \alpha, ß)$ cannot be tractably computed.[15] There are a few methods to derive this distribution from the observed data, w_{dn} (Blei et al. 2003; Griffiths and Steyvers 2004; Hoffman et al. 2013; Grün and Hornik 2011). For this paper, the method used by Hansen et al. (2017) and developed by Griffiths and Steyvers (2004) that uses a Markov chain Monte Carlo and Gibbs sampling to estimate the posterior distribution is followed.

Figure 3: Model Representation of Latent Dirichlet Allocation Estimation
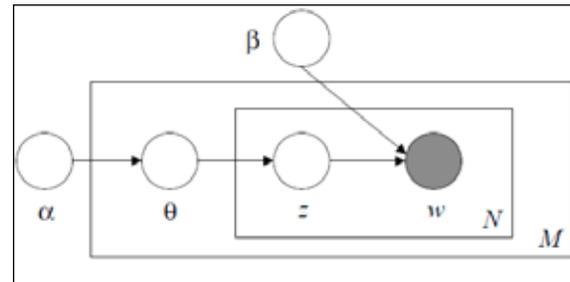
Source: Blei et al. (2003).

Using this approach, the hyperparameters α and δ are fixed *a priori*. α is set equal to 10/k, where k is the number of topics, and δ equal to 0.1 following the examples of Griffiths and Steyvers (2004).[16] The Dirichlet distributions are integrated out of the joint distribution $p\ (w, z)$ and the remaining hidden variables — the topic assignments for each word in each document (z_{dn}) — are assigned initial values. The values of the hidden variables are iteratively sampled from their distribution conditioned on the current state of all other variables. The stationary distribution of the Markov chain is assumed to be the posterior distribution of interest. Therefore, after an initial number of iterations for the chain to become stationary, also called the "burn-in," every 200th iteration up to 4,000 is stored, and the iteration that maximizes log-likelihood function is selected.[17] Refer to Griffiths and Steyvers (2004) and the appendix in Hansen et al. (2017) for more details about this methodology.

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15 It is intractable because it would take an exponential amount of time to estimate.

16 Griffiths and Steyvers (2004) set equal to 50/k. Given that their range of estimates for k go from 50 to 1,000, the value of ranges between 1 and 0.05. The log-likelihood function is maximized at k at 300, and therefore equal to 0.17. Given that a smaller range of topics was examined for this paper, with k set around 50, equal to 10/k creates a similar value as that used by Griffiths and Steyvers (2004).

17 Following Hansen et al. (2017), the burn-in number of iterations was initially set to 4,000 and an additional 4,000 iteration was run. However, it was found that a burn-in of 2,000 and total iterations of 4,000 was sufficient to stabilize the estimated loglikelihood and is less computationally expensive.

Appendix B: Topic Heat Map (Top 10 Words)

a. Bank of Canada

Topic									
Economic Modelling and Uncertainty	model	uncertainti	expect	real	risk	decis	shock	chang	behaviour	totem
Currency Issuance	money	note	bank	issu	new	cash	currenc	card	valu	counterfeit
Macroeconomic Stabilization Policy	fiscal	run	stabil	object	exchanger	oper	govern	credibl	interest	long
Commodity Markets	commod	price	demand	resourc	suppli	oil	trade	product	cost	high
Global Economic Recovery	global	crisi	recoveri	major	sector	privat	domest	capit	sustain	challeng
Wage Setting	inflat	wage	rate	target	work	nomin	price	impact	low	chang
Financial System Regulation & Efficiency	effici	system	regul	promot	issu	institut	firm	regulatori	improv	framework
Global Financial Integration	capit	flow	open	countri	america	nation	invest	foreign	border	control
Financial Market Infrastructure	risk	system	deriv	ccp	clear	repo	counterpart	new	otc	global
Role of the Bank of Canada	system	bank	note	inflat	respons	key	provid	govern	feder	gdp
Export Competitiveness	export	invest	recess	busi	product	recoveri	competit	household	improv	firm
Financial System Regulation & Reform	bank	capit	system	risk	institut	requir	regul	liquid	leverag	resili
Potential Output	labour	potenti	output	product	rate	trend	age	popul	work	demograph
Lessons from the Past and from Other Countries	mani	countri	experi	pressur	measur	sever	activ	earli	forc	higher
Adjusting to Globalization	adjust	demand	exchanger	price	movement	good	chang	help	flexibl	servic
Fiscal Policy	debt	fiscal	govern	gdp	sector	interest	feder	balanc	rate	spend
Global Imbalances	global	countri	imbal	save	domest	adjust	world	risk	invest	order
Canada in the Global Economy	global	china	world	export	emerg	countri	develop	grow	india	trade
Inflation Targeting Framework	inflat	target	framework	rate	anchor	price	shock	bank	control	stabl
Systemic Risk & Financial Stability Policy	risk	system	financial	crisi	vulner	household	debt	imbal	assess	macroprudent
Pensions	pension	plan	risk	benefit	defin	fund	contribut	sponsor	invest	individu
Economic Outlook	inflat	demand	expect	rate	outlook	target	remain	project	busi	develop
Monetary Policy Decision-Making	inform	rate	decis	govern	transpar	help	bank	data	chang	central
Corporate Accounting & Disclosure	confid	trust	investor	account	disclosur	corpor	compani	public	standard	effort
Housing Market	hous	household	mortgag	price	rate	demand	home	incom	countri	borrow
Global Financial System Turbulence	intern	global	crisi	countri	shock	sound	system	work	world	develop
Productivity & Innovation	product	technolog	new	chang	invest	innov	busi	industri	challeng	sector
Exchange Rate Regime	exchanger	currenc	countri	float	price	dollar	rate	domest	fix	adjust
Oil Price Shock	oil	export	price	sector	lower	invest	adjust	shock	energi	servic
Global Economic Governance	countri	system	adjust	global	exchanger	reserv	intern	crisi	deficit	imbal
Credit Markets	risk	credit	rate	bank	product	investor	asset	structur	mani	transpar
International Financial Architecture	imf	intern	global	countri	trade	system	base	promot	rule	institut
Financial Market Developments	volatil	asset	price	declin	long	develop	bond	low	investor	fund
Inflation Outlook	inflat	rate	low	interest	high	perform	capac	improv	pressur	employ
Principles for Good Economic Policy (Washington Consensus)	adjust	govern	fiscal	trade	structur	debt	help	feder	reduc	public
Labour Market	labour	worker	employ	job	skill	across	unemploy	flexibl	incom	high
International Financial Regulatory Reform	bank	reform	system	global	shadow	implement	fsb	activ	regul	risk
Measuring Inflation	inflat	price	measur	cpi	core	movement	trend	chang	under	compon
Payments System	payment	system	risk	chang	innov	transact	cost	new	particip	servic
Global Trade Integration	trade	integr	export	global	countri	domest	product	mexico	share	good
Understanding Low Economic Growth	compani	new	global	peopl	job	busi	crisi	work	around	natur
Re-Evaluating the Monetary Policy Framework	price	target	flexibl	expect	pricest	financial	framework	object	central	consequ
Unconventional Monetary Policies	rate	interest	bank	central	condit	credit	lower	crisi	low	stimul
Education & Public Engagement	public	work	peopl	world	learn	sector	right	busi	develop	research
Liquidity Facilities	liquid	fund	bank	institut	facil	system	particip	asset	secur	central

Percent Explained

0.125
0.100
0.075
0.050
0.025
0.000

b. Federal Reserve

Topic									
Monetary Policy Rules	polici	rate	rule	monetari	output	interest	inflat	real	taylor	policymak
Financial Regulatory & Supervisory Framework	institut	work	regul	supervase	inform	supervisor	frb	issu	system	supervis
Managing International Financial Crises	system	bank	crisi	crise	institut	govern	intern	problem	sector	privat
Role & Governance of the Fed	frb	fed	polici	board	member	bank	presid	reserv	monetari	meet
Payments System	payment	system	check	electron	bank	frb	provid	servic	retail	process
Consolidation of Banking Industry	bank	consolid	servic	institut	merger	competit	industri	firm	local	effici
Foreign Banks	bank	countri	foreign	intern	oper	home	host	global	requir	cross
Business Investment	invest	capit	busi	high	firm	equip	product	tech	spend	cost
Prudential Regulation	regul	regulatori	capit	requir	risk	asset	measur	activ	prudenti	consider
Income & Wealth Inequality	incom	household	wealth	famili	rate	gain	asset	distribut	lower	inequ
Bond Yields	term	rate	yield	bond	long	premium	low	risk	expect	interest
Bank Supervision	bank	risk	manag	capit	system	disciplin	supervisor	credit	requir	intern
Data Collection & Measuring Economic Activity	data	measur	inform	price	analysi	statist	improv	econom	uncertaint	valu
Economic Flexibility & Adaptation	economi	econom	evid	rise	capit	process	consequ	larg	appear	product
Inflation Dynamics & Outlook	inflat	price	inflation expectation(s)	monetari	rate	chang	core	expect	cost	energi
Corporate Accounting & Disclosure	account	corpor	valu	firm	disclosur	investor	fair	compani	sharehold	fund
Corporate Governance	intern	control	audit	manag	corpor	govern	process	board	account	auditor
Basel II	basel	capit	bank	risk	propos	requir	implement	framework	rule	regulatori
Financial Market Liquidity	fund	bank	liquid	asset	term	secur	dealer	short	deposit	run
Monetary Policy Communication	fomc	polici	committe	communic	econom	expect	public	particip	meet	rate
Bank Lending	bank	loan	credit	lend	asset	commerci	banker	busi	institut	continu
Monetary Policy Objectives	inflat	target	centralbank	polici	central	object	bank	monetari	rate	pricest
Consumer Protection	consum	mortgag	loan	practic	borrow	propos	payment	disclosur	protect	inform
Preparing for Financial Services Disruptions	system	plan	problem	sector	public	prepar	readi	servic	disrupt	inform
International Trade	trade	econom	competit	product	servic	intern	good	industri	produc	economi
Housing Market	mortgag	hous	home	foreclosur	loan	borrow	servic	price	properti	rate
Financial Market Clearing & Settlements	clear	deriv	trade	particip	regul	counterpart	liquid	risk	member	central
Balance Sheet Policies	rate	interest	term	polici	purchas	monetari	asset	frb	secur	short
Challenges for Monetary Policy	polici	monetari	economi	econom	policymak	central	macroeconom	action	frb	activ
Challenges of Macroeconomic Policy	work	world	problem	peopl	tri	new	fed	hard	call	right
Community Reinvestment Act	cra	incom	institut	low	communiti	moder	lend	loan	rate	lower
Education	educ	econom	school	skill	colleg	student	work	high	women	graduat
Labour Market	job	worker	employ	labor	unemploy	work	rate	wage	skill	forc
Global Capital Flows & Economic Integration	model	research	expect	work	polici	structur	econom	economi	role	policymak
Economic Research & Modelling	global	countri	economi	domest	capit	eme	polici	growth	foreign	world
Global Imbalances	save	account	deficit	invest	foreign	rate	domest	nation	dollar	asset
Consumer Credit	consum	credit	card	servic	product	provid	bank	access	account	data
Financial Stability Policy	system	crisi	risk	financialst	bank	regul	institut	macroprudent	sector	vulner
Monetary Policy Outlook	rate	inflat	polici	feder	fund	economi	labor	fomc	run	unemploy
Rule of Law & Market Capitalism	govern	law	economi	econom	protect	centuri	free	system	right	state
Technology & Innovation	technolog	new	product	innov	chang	busi	industri	servic	comput	improv
Economic Recession & Recovery	recoveri	econom	recess	crisi	economi	improv	polici	continu	declin	unemploy
Fiscal Budgets	fiscal	budget	govern	spend	deficit	feder	tax	polici	state	debt
Subprime Mortgage Lending	loan	lend	mortgag	lender	credit	borrow	subprim	data	home	hmda
Potential Output & Productivity	growth	product	rate	labor	economi	output	potenti	invest	econom	gain
Evaluating Circumstances	chang	declin	factor	less	evid	indic	larg	show	account	appear
Asset Bubbles	price	asset	bubbl	equiti	stock	hous	valu	rate	risk	monetari
GDP Growth	econom	rate	price	spend	growth	busi	hous	consum	remain	household
Financial Literacy	educ	consum	save	literaci	help	econom	program	frb	inform	decis
Corporate Risk Management	risk	manag	organ	busi	complianc	institut	control	activ	line	oper
Community Economic Development	communiti	local	program	neighborhood	econom	organ	provid	citi	help	new
Economic Outlook	rate	growth	inflat	polici	forecast	trend	monetari	chang	economi	demand
Energy Markets	price	oil	energi	gas	demand	product	suppli	natur	crude	term
Social Security	social	save	secur	retir	benefit	tax	fund	age	futur	worker
Credit Risk	risk	credit	manag	investor	liquid	instrument	particip	hedg	deriv	structur
Household Debt	debt	household	rate	mortgag	corpor	interest	incom	rise	ratio	home
Currency & Exchange Rates	currenc	exchange	countri	dollar	intern	euro	monetari	european	fix	note
Too Big To Fail	firm	system	larg	failur	crisi	reform	institut	resolut	tbtf	govern
Community Banks Regulation & Supervision	bank	communiti	examin	banker	frb	institut	regulatori	regul	supervis	local
Liquidity Facilities	credit	bank	frb	liquid	fund	institut	lend	provid	loan	condit
Modernizing Financial Services Regulation	bank	regul	compani	insur	hold	activ	act	organ	state	supervis
Small Business Financing	busi	small	credit	loan	firm	financ	lend	own	minor	survey
Bank Stress Tests	capit	firm	stress	bank	test	loss	scenario	supervisor	risk	model
Monetary System	money	monetari	bank	gold	fed	standard	friedman	polici	depress	price
US Treasury & Government-Sponsored Enterprise Debt	debt	treasuri	cost	privat	benefit	govern	guarante	asset	portfolio	loan

Percent Explained
0.16
0.12
0.08
0.04
0.00

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