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An Overview of Inflation-Targeting Frameworks: Institutional Arrangements, Decision-making, & the Communication of Monetary Policy

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An Overview of Inflation-Targeting Frameworks: Institutional Arrangements, Decision-making, & the Communication of Monetary Policy *

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Abstract

The main objective of this study is to contribute to the public understanding of the inflation-targeting (IT) framework currently being implemented in several leading central banks. We do so by discussing differences in the institutional set up, the decision-making process, and the communication of monetary policy. We analyze these aspects from a conceptual perspective and review them in practice by referring to a set of eleven "small, open" OECD economies as well as four major central banks of the world (Bank of England, Bank of Japan, European Central Bank, & the Federal Reserve). We pay specific attention to recent changes along the multiple dimensions that have, on balance, aimed at further strengthening the IT framework.

Resumen

El presente estudio pretende contribuir a la comprensión pública del funcionamiento de bancos centrales que conducen su política monetaria sobre la base de un esquema de metas de inflación. Desde una perspectiva conceptual y práctica, se analizan diferencias en los marcos institucionales, aspectos del proceso de toma de decisiones, y la comunicación de política monetaria en once bancos centrales de economías "pequeñas y abiertas" miembros de la OCDE y los principales bancos centrales del mundo (el Banco Central Europeo, el Banco de Inglaterra, el Banco de Japón, y la Reserva Federal de EE.UU). Al discutir las dimensiones de los marcos de política monetaria se destacan ajustes recientes realizados por los bancos centrales que, en su conjunto, han apuntado a fortalecer el funcionamiento del esquema de metas de inflación.

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* The views expressed in this paper are exclusively those of the authors and do not necessarily reflect the position of the Central Bank of Chile or its Board members. Any errors or omissions are the responsibility of the authors. We thank the anonymous referee for helpful comments. Emails: anaudon@bcentral.cl and aperezm@bcentral.cl.

I. Introduction

Close to a century ago, central banking was to a certain extent a black box epitomized by the "never explain, never excuse" mantra of Montagu Norman, the Bank of England's longest serving Governor (1920-1944). Only a few decades ago, the Chairman of the Federal Reserve Alan Greenspan was characterized by his ambiguous and confusing statements on monetary policy, informally coined "Fed-speak." Since then, the central banking world has experienced a major revolution, with many explicitly adopting an inflation-targeting (IT) regime, and adjusting their frameworks to become more transparent, better understood, and more predictable.

More recently, several central banks have conducted important internal and external reviews encompassing different internal processes within the central bank (decision-making, forecasting, and supervision among others) as well as communications and transparency, which on balance, have tended to further strengthen and improve the IT framework rather than move away from it.[1]

The main objective of this study is to contribute to the public understanding of the IT framework currently being implemented by several leading central banks by discussing institutional differences, crucial aspects of the decision-making process, and dimensions of the communication of monetary policy and accountability. More specifically, we focus on fifteen central banks of eleven "small open" OECD economies including Australia, Canada, Chile, Czech Republic, Iceland, Israel, Korea, New Zealand, Norway, Poland, and Sweden, and four major central banks (Bank of England, Bank of Japan, European Central Bank, & the Federal Reserve). For a visual perspective, these economies are mapped out along with other IT regimes in Figure 1; for additional perspective, these central banks account for almost 60% of global GDP measured at current market exchange rates.[2]

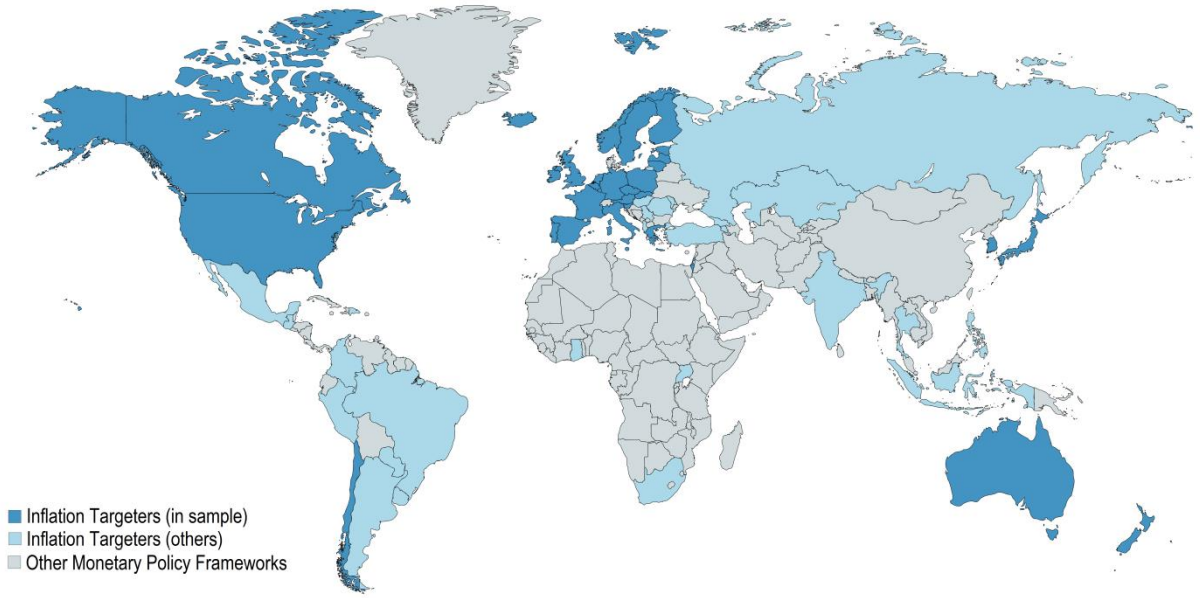
It is important to note that the descriptive nature of this document does not intend to provide an overview of "best practices" in the practical conduct of monetary policy in IT frameworks. In fact, characterizing a "best practice" is rather difficult since the selected central banks are generally well respected for their overall performance, despite the differences herein discussed. In this context, we describe these differences and discuss the potential implications these may generate.

While most information was obtained from publicly available central bank documentation, we also build on previous efforts from the Central Bank of Chile (Schmidt-Hebbel & Tapia, 2002) and peer institutions, notably the Centre for Central Banking Studies at the Bank of England (2012), related international organizations (BIS & IMF), as well as academic research.

This paper is outlined as follows. In the following section we provide an overview of the different institutional aspects of the IT frameworks included in the study. In the second section, we review the decision-making process focusing on the design of the decision-making bodies, formalities of the decision-making process, and the role of staff and the decision-makers. We then move on to describe key aspects of the communication of monetary policy, including a review of the different formal channels used by central banks to communicate the rationale sustaining their decisions, and summarize steps that have been taken by central banks to strengthen their accountability to elected officials and civil society at large. In the final section we conclude.

[1] Simply to name a few these include the Warsh Review of the Bank of England, Goodfriend & King's review of the Riksbank (2016), and Turner's review of the RBNZ (2017).
[2] These economies accounted for 58.8% of 2016 global GDP at current prices (IMF WEO). In purchasing-power-parity terms, this number drops to 40.3% of global GDP.

Figure 1: Inflation Targeting Central Banks



Source: IMF´s Annual Report on Exchange Arrangements & Exchange Restrictions 2016. In IMF (2016), Argentina, the European Monetary Union, and the U.S are not considered ITs due to the apparent absence of an explicit nominal anchor. However we consider them ITs for the purpose of this study. The complete list is in the Appendix.

II. An Overview of the Institutional Frameworks

Before we dive in to the discussion of the decision-making process, communication, and accountability across central banks today, an important starting point is a brief overview of the main characteristics of the institutional frameworks of the inflation targeting regimes in the study. It is important to note that the central banks in this study have not experienced significant institutional changes recently, thus we summarize the most relevant concepts and point the interested reader to BIS (2009) for a more comprehensive overview as well as the IMF's recently updated Central Banking Legislation Database for more detailed information.

In summary, while the economies in the sample share a common monetary policy framework, there are certain institutional differences regarding the quantity and priorities of their objectives, as well as the degree of autonomy central banks have in setting their operational target. Separately, while practically all central banks in the study use the annual variation of the headline consumer price index as the inflation target, central banks tend to have slightly different levels and types of targets (point, tolerance bands, and ranges) as well as policy horizons. Table 2 summarizes the information discussed in this section.

Statutory Objectives

A review of the legislation of these central banks points to the existence of three objectives: price stability, financial stability, and the support of other government economic objectives. Price stability is the main objective of the central banks in the sample (Table 1), which should be of no surprise considering that the surveyed institutions have credible IT frameworks.

However, the price stability objective tends to be accompanied with at least one additional objective that is related to supporting the proper functioning of the payments and settlements system. Since this payment systems objective may be interpreted as being more in line with the historical "lender-of-last-resort" role played by central banks in episodes of financial panic, it may also be interpreted as a financial stability objective. However, it must be noted that financial stability objectives tend to be quite heterogeneous across central bank legislation in general, given their multidimensional nature, scope (banks, payment system, and financial system), wide range of tools, and difficulty to objectively quantify.[3] The central banks of Chile, Japan, Norway, New Zealand, and Sweden, specify both a price stability and financial stability objective, without explicitly

[3] Jeanneau (2011) and BIS (2014) provide a more exhaustive discussion on the scope and tradeoffs inherent in financial stability objectives in theory and in practice.

prioritizing one objective over the other.[4] In slight contrast, some central banks such as the Bank of Korea explicitly support a price stability objective over a financial stability objective. Importantly, as highlighted in IMF (2017), a general trend throughout central banks in the world since the Global Financial Crisis has been a clearer mandate for central banks regarding financial stability, either partly or entirely taking on supervisory responsibility of financial institutions, addressing uncertainties on resolution arrangements, and/or formalizing the participation of the central bank in multi-agency coordinating arrangements such as Financial Stability Councils.[5]

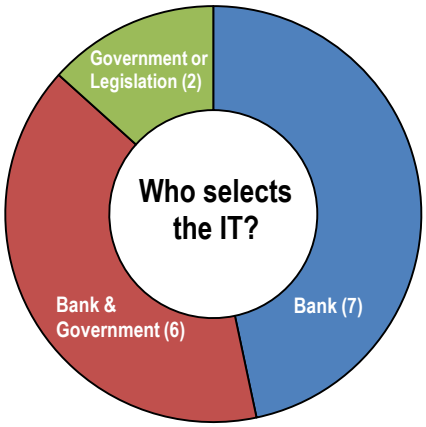
In addition to price and financial stability objectives, a large group of central banks in the sample are also mandated to support the economic policies of the government, although this support is subordinated to the price stability objective. Finally, three central banks have mandates that differ somewhat from the rest. The Federal Reserve has a dual mandate regarding stable prices and maximum employment (and moderate long-term interests), which since 2012 has been reaffirmed annually more explicitly in the FOMC's "Statement on Longer-Run Goals and Monetary Policy Strategy." The Reserve Bank of Australia also has a dual mandate on price stability and full employment, but in addition has a wider objective of contributing to the "economic prosperity and welfare of the people of Australia." Along these lines, the central bank of Canada's mandate is to "conduct monetary policy in a way that promotes the economic and financial well-being of Canadians."

Table 1: Central Bank Objectives

	Price Stability	Financial Stability	Support Government Objectives	Economic Prosperity	Maximum Employment
Australia	✓			✓	✓
Canada	✓			✓	
Chile	✓	✓			
Czech Republic	✓	✓	✓		
Iceland	✓		✓		
Israel	✓	✓	✓		
Korea	✓	✓			
Norway	✓	✓			
New Zealand	✓	✓			
Poland	✓		✓		
Sweden	✓	✓			
Euro Area	✓	✓	✓		
Japan	✓	✓			
U.K.	✓	✓	✓		
U.S	✓				✓

Source: IMF Central Bank Legislation Database.

Figure 2: Goal Independence



Source: Central bank websites.Number of central banks in parentheses.

Goal Independence

Having described their objectives, do central banks have "goal independence"? In other words, do they have the ability to independently decide on the framework to achieve these objectives? We identify three different arrangements with respect to goal independence (Figure 2), where about half of the reviewed central banks independently set the target, operational objective, and policy horizon. Another set, including Australia, Canada, Iceland, Israel, and New Zealand, periodically review and renew an agreement on the policy framework with the executive branch in a sort of public contract. In the case of the Reserve Bank of New Zealand, the policy framework is reviewed and renewed in a Policy Target Agreement every time a new Governor is appointed or their term renewed; in the case of the Bank of Canada, the inflation-control target is reviewed every five years. Conceptually, the main benefit of jointly agreeing on the inflation target with the government presumably is greater public accountability and a common understanding of the inflation target by the central bank and democratically elected authorities. Finally, a small minority of central banks in the sample have a mandated inflation target established by the Government (UK) or outlined in central bank legislation (Norway). In the UK's case, price stability is defined by the inflation target announced by the Chancellor of the Exchequer's annual Budget statement. In Norway, the legislation explicitly defines the target of monetary policy as "the annual consumer price inflation of approximately 2.5 percent over time."

[4] In this note we do not discuss the use of monetary policy for financial stability purposes debated among academics and practitioners. In sum, the IMF tends to support the view that monetary policy should generally not be altered to contain financial stability risks (IMF, 2015), the BIS has promoted "financial stability-oriented monetary policy," supported in several speeches (Caruana, 2016), presentations (Borio, 2016), and working papers.
[5] See BIS (2011) for a discussion on changes to central bank governance to account for financial stability objectives.

Table 2: A Review of the Institutional Framework

	Objectives	Operational Objective defined by:	Target indicator	Target	Type of Target	Time Horizon of the IT	Actual Inflation (2007-2016)[1]	
							Average	Standard Deviation
Australia	Stability of the currency Maintenance of full employment Economic prosperity and welfare of the people of Australia	Bank & Government	CPI	2-3%	Thick Point	On average, over time	2.4%	1.0%
Canada	Conduct monetary policy to promote the economic and financial well-being of Canadians.	Bank & Government	CPI	2% ± 1%	Point & Tolerance Band	Over the medium term	1.6%	0.9%
Chile	Stability of the currency Normal functioning of the internal and external payment systems	Bank	CPI	3% ± 1%	Point & Tolerance Band	About two years	3.7%	2.4%
Czech Republic	Price stability Financial stability Support the economic policies of the Government without prejudice of price stability	Bank	CPI	2% ± 1%	Point & Tolerance Band	Medium term	2.0%	1.9%
Iceland	Price stability Promote the implementation of the government's economic policy, provided this is not, inconsistent with its main objective (price stability)	Bank & Government	CPI	2.5%	Point	On average	5.4%	4.2%
Israel	Price stability Support objectives of the Government's economic policy, provided they shall not prejudice price stability Stability and orderly activity of the financial system	Bank & Government	CPI	1-3%	Thick Point	Not longer than two years	1.7%	1.8%
Korea	Price stability Financial stability conditional on price stability	Bank & Government	CPI	2%	Point	Medium term	2.3%	1.3%
Norway	Price stability Financial stability	Government	CPI	2.5%	Point	Over time	2.1%	1.1%
New Zealand	Price stability Promote sound and efficient financial system	Bank & Government	CPI	1-3%	Thick Point	On average over the medium term	1.9%	1.4%
Poland	Price stability Support the economic policy of the Government, insofar as this does not constrain price stability	Bank	CPI	2.5% ± 1%	Point & Tolerance Band	In the medium term	2.0%	2.0%
Sweden	Price stability Promote a safe and efficient payments system	Bank	CPI-F	2%	Point	Two years' time	1.1%	1.4%
Euro Zone	Price stability Financial stability	Bank	HICP	2%[2]	Point	Over the medium term	1.5%	1.2%
Japan	Price stability Ensure the smooth and stable operations of payment and settlement systems	Bank	CPI	2%	Point	About two years	0.3%	1.3%
U.K.	Price stability Subject to price stability, support the Government's economic objectives Financial stability	Government	CPI	2%	Point	At all times	2.4%	1.4%
U.S.	Stable prices Maximum employment Moderate long-term interests	Bank[1]	PCE	2%	Point	Longer-run	1.6%	1.1%

Source: Central bank websites and IMF Central Bank Legislation Database.

1\ By inflation, we refer to the annual variation in the target indicator specified in the fourth column.

2\ Since 2012, FOMC participants agree annually to the "Statement on Longer-Run Goals and Monetary Policy Strategy."

3\ To be precise, the ECB "aims at inflation rates of below, but close to, 2% over the medium term."

While central banks tend to monitor a wide range of price indices, practically all use the annual 12-month change of the consumer price index (CPI) as the target. There are several reasons to use CPI as the target, including the fact that it tends to have the highest awareness among price indices, and should also be the most relevant for the average citizen since the basket presumably reflects the population's spending patterns. Of note, some central banks targeted core-CPI in the past, an index that excludes certain items that tend to exhibit high volatility. Although core-CPI is still a very important measure used to monitor underlying price pressures and inflation trends in the economy, central banks have overwhelmingly turned to headline CPI as the IT objective.[6] It is important to also note that the Federal Reserve's preferred measure of price inflation is the price index for personal consumption expenditures (PCE), since it tends to cover a wider range of household spending.

[6] See Mishkin (2007) for a more detailed description of the pros and cons of using core inflation for the conduct of monetary policy.

Inflation Target Level & Type

Intuitively, one may think price stability is synonymous with an environment in which prices do not increase nor decrease, that is an inflation target of 0%. While it is out of the scope of this document to review models on the optimal level of inflation, we first highlight the main arguments that may justify why a central bank may wish to target a low, but positive level of inflation.

First, there are certain measurement issues with conventional price indices, which tend to slightly overstate actual increases in the cost of living; the upward bias is inherent in Laspeyres-type indices such as the CPI that by construction does not capture potential substitution of goods as relative prices change. Second, a small but positive level of inflation allows for relative price adjustments to exist in the context of downward nominal price rigidities. Finally, a positive inflation target increases the central bank's policy space to potentially reach negative real interest rates, which may be necessary in extraordinary cases of a severe economic downturn in order to support aggregate demand.

Along these lines, in recent years policy-makers and academics, led mostly by IMF's former Chief Economist Olivier Blanchard, have debated on the costs and benefits of slightly raising inflation targets in order to lower the probability of reaching the zero-lower bound on nominal interest rates, thereby giving central banks more policy space to accommodate to shocks in the future.[7] Importantly, this debate also occurs in the context of a discussion on a gradual decline in the real equilibrium interest rate, especially in advanced economies, which exerts downward pressure on the nominal interest rate over time. Although some central banks appear to have discussed the option of raising the inflation target (See Bank of Canada, 2016), none have actually followed through.

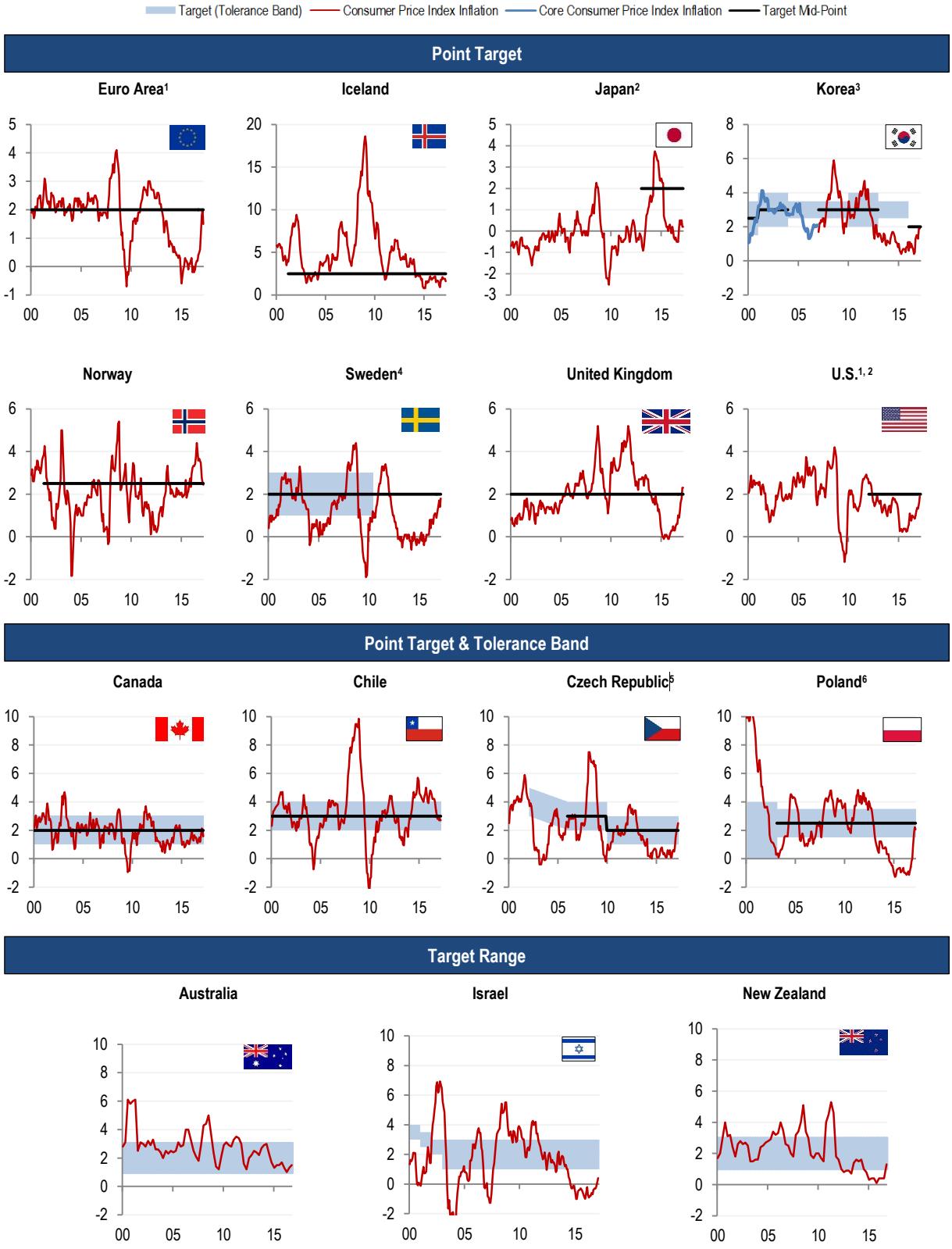
Conceptually, the level of the inflation target is synonymous with the central bank or government's interpretation of price stability. In practice, although practically all central banks of the sample use annual change in the CPI as the inflation target variable, it is important to highlight subtle differences in the types and levels of the inflation target across central banks.[8] In the sample, we identify three different types of targets (Table 2): point targets, point targets with tolerance bands, and target ranges (also commonly described as intervals or "thick points"). Despite the differences in the target type, we do not observe material differences in the *levels* of the inflation target. About half of the sample has a point inflation target, with the most common quantitative target being 2%. The main advantage of having a point inflation target is that it is easy to communicate to the public, and if credible, facilitates the anchoring of inflation expectations at the point target.[9] However, point targets may pose significant challenges, starting from the fact that they implicitly fail to recognize that there is a considerable degree of uncertainty in the short-run behavior of inflation, and thereby may inappropriately convey the notion that the central bank can perfectly control inflation in the short-term. Along these lines, Sweden's Riksbank recently announced it would add a variation band between 1 and 3% to its formal 2% target, "*to illustrate in a simple way that monetary policy's ability to steer inflation in detail is very limited and that inflation normally varies around the inflation target*" (Sveriges Riksbank, 2017). Several central banks already have a symmetrical tolerance band of ±1% to the mid-point target, which to a certain extent reflects the institution's assessment on inflation variability and the difficulties in fine-tuning the "long and variable lags" of monetary policy, as highlighted by the Riksbank. Additionally, the tolerance band may also grant the central bank a certain degree of flexibility in accommodating transitory shocks. Separately, symmetry in the tolerance band signals the same degree of aversion to deviations above and below the mid-point target; this symmetric concern with inflation above or below the target is also present in point-targets.[10] Finally, three central banks (Australia, Israel, and New Zealand) have a range target for inflation, without explicitly specifying a mid-point target, which may pose a challenge in anchoring inflation expectations, since agents do not have a specific quantitative nominal anchor, rather a set of possible outcomes, which in turn may amplify output variability.[11]

For a visual perspective we show the different target types and the behavior of inflation since 2000 in Figure 3. At a high level, the differences in inflation across economies may reflect differences in the distribution of shocks as well as differences in monetary policy responses (timing, magnitude) to these shocks, differences in the persistence of inflation, as well as specific transitory factors (Japan – consumption tax increase).

[7] Blanchard et al (2010) formally proposed evaluating the need to raise the inflation target in the context of reassessing the macroeconomic policy toolkit. Several other renowned economists, including former Fed Chairman Ben Bernanke (2016), have weighed in on the issue in less technical forums.
[8] Sweden's Riksbank recently announced it has formally changed the target variable from headline CPI to the CPIF (CPI plus fixed interest rate). The change is primarily due to a counter-intuitive short-term relationship between CPI and the policy rate. In practice, downward adjustments to the policy rate geared towards increasing inflation towards the target in the medium-term, would actually reduce inflation in the short-term mainly reflecting the impact of reductions in mortgage rates, posing a communications challenge. Importantly, the adjustment in the target instrument does not entail a change in the conduct of monetary policy. See Sveriges Riksbank (2016) for a more exhaustive discussion on this issue.
[9] See Castelnuovo et al (2003), Meyer (2004), & Mishkin (2000).
[10] The Federal Reserve clarified their inflation objective as symmetric in 2016 (see press release). Separately, the Bank of Canada (2016) explicitly states "The inflation target is symmetric—the Bank is equally concerned about inflation rising above or falling below the 2 per cent target."
[11] For more information on differences between interval targets and tolerance bands see Apel & Claussen (2017).

Figure 3: Inflation & Inflation Targets by Type

All figures are expressed in percentage terms. Consumer price index inflation and core consumer price index inflation refer to annual variation.
Monthly data for January-2000 to March-2017 except for Australia & New Zealand (quarterly data).



Source: Central bank websites. [1]Annual growth in the HICP and PCE indices were used for the Euro Area and U.S. respectively. [2] Targets for Japan and the U.S. were announced in Jan 2013 and Jan-2012 respectively. [3] The Bank of Korea targeted core-CPI (CPI exc. agricultural products & oils) between 2000-2007. [4] As of Sept-2017 the Riksbank formally targets CPI-F. [5] The Czech National Bank initially targeted "net inflation;" we plot the headline IT band announced in Jan-2002 and adjustments since. [6] The Narodowy Bank of Poland's "Medium-Term Monetary Policy Strategy for Years 1999-2003" stated a medium term inflation target of lower than 4% by 2003 (interpreted in the chart as between 0-4%); the IT has been 2.5%±1% since.

Figure 4: Average Inflation by Target Type

Expressed in Percentage terms (year-on-year)

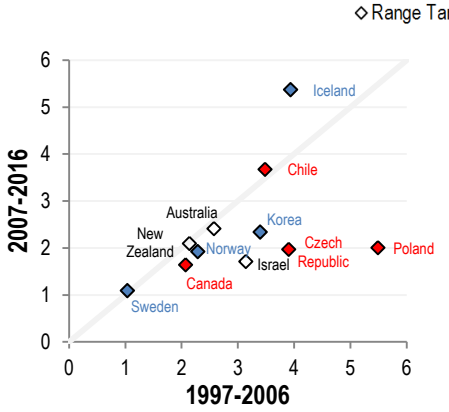
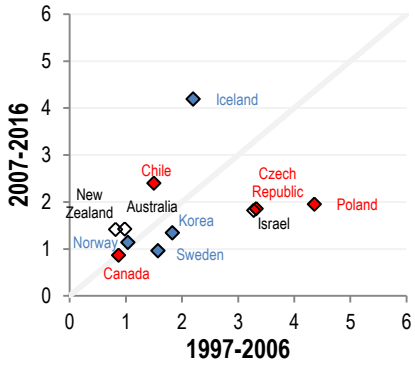


Figure 5: Inflation Standard Deviation by Target Type

Expressed in Percentage terms (year-on-year)



Source: Central bank websites. Sample: Monthly data between Jan-1997 & Dec-2016. Quarterly data during the same time period for Australia & New Zealand.

At a high level, average annual headline inflation over the last ten years has fallen across all economies (except Iceland) relative to the 1997-2006 period, and we do not observe material differences in average inflation over the last ten years across central banks with different types of target (Figure 4). Inflation volatility has also generally decreased across all economies (Figure 5). Finally, the time horizon of the inflation target does not vary much across the reviewed central banks, with most of the central banks pledging to meet the target "on average," "over time," or "in the medium term."

III. A Review of the Decision-Making Process in Inflation Targeters

During recent decades, monetary policy decision-making in inflation targeting central banks has transitioned from a model of a single decision-maker (Governor) towards decisions made by a group of experts in the form of a Monetary Policy Committee (MPC). Relatively recent changes in this direction include the central banks of Israel (2011), New Zealand (2013)[12], and India (2016, not in sample)[13].

The transition to group decision-making has been mainly driven by the notion that groups make better decisions than individuals, on average. This notion has received some empirical support (Hendry & Clements, 2004), and has also been supported in experimental settings (Blinder & Morgan, 2005, 2008a, 2008b; Lombardelli et al, 2005), and theoretical studies (Gerlach-Kristen, 2006). Better decision-making by groups reflects apparent advantages in the ability of committees to collect and process different information, perspectives, and experiences. In addition, the deliberation process presumably reduces the likelihood of extreme positions.

In this section we summarize key elements of the decision-making process. First, we review the structure of the decision-making body (MPCs) with a focus on the size and composition of policy committees, and briefly describe the role of the staff in the decision making process. We then focus on formal aspects of the actual process, including the frequency of policy meetings and the role of the government in decision-making. Table 3 summarizes the information presented in this section.

The Monetary Policy Committee: Types of Committees

As we begin to characterize the MPC, following Blinder (2007) we believe it is convenient to first clarify that committees can be broadly separated into two types – *individualistic* or *collegial* – which in turn are largely determined by the underlying accountability of the MPC members. Differences in the degree of accountability across members have implications on the actual decision-making process and the way monetary policy is communicated by MPC members. In this section we describe differences in these types of committees related to the decision-making process; communication is described in the next section.

[12] Until 2013, although the Governor received close counsel from the central bank staff, monetary policy decision-making at the Reserve Bank of New Zealand (RBNZ) was concentrated exclusively in the Governor. However, considering the benefits associated to group decision-making, in 2013 the RBNZ announced that the existing single-decision maker model would be replaced by a Governing Committee, including the Governor (chair), two Deputy Governors (Head of Financial Stability, & Head of Operations), and the Assistant Governor (Head of Economics). Additionally, the Governing Committee would be advised by a Monetary Policy Committee composed of both bank staff as well as external members. It is worth noting that in spite of the *de facto* change in the decision-making process, the Governor is still legally responsible for the policy decisions, and retains veto power.

[13] For additional background information on India's monetary policy framework see the Patel Report (2014).

Table 3: Main Characteristics of Monetary Policy Committees & Monetary Policy Meetings

	Monetary Policy Committees						Monetary Policy Meetings (MPM)			
	Number of Voting Members			Term (Years)		Reappointments Permitted?	MPM per year	Duration of MPM (days)	Decision Process	Government Presence in MPM
	Total	Internal	External	Internal	External					
Australia	9	3	6	7	5	Yes	11	1	Vote	Yes, voting member
Canada	6	6	0	7	-	Yes	8	4	Consensus	No
Chile[1]	5	5	0	10	-	Yes	8	1.5	Vote	Yes, non-voting
Czech Republic	7	7	0	6	-	Yes	8	1	Vote	Yes, non-voting
Iceland	5	3	2	5	5	Yes	8	3	Vote	No
Israel	6	3	3	5	4	Yes	8	2	Vote	No
Korea	7	2	5	Governor: 4; Senior Vice-Governor: 3	4	Internal: Yes, once; External: Yes.	8	1	Vote	Yes, non-voting
Norway	8	3	5	6	4	Internal: Yes, once; External: Yes, twice.	8 [2]	1	Vote	No
New Zealand	4	4	0	5	-	Yes	8	9 [3]	Consensus	No
Poland	10	1	9	6	6	No	11	2	Vote	No
Sweden	6	6	0	5 or 6	-	Yes	6	1	Vote	No
Euro Area	21	21	0	Executive Board: 8; National Banks: 5-8	-	Executive Board: No; National Banks: Depends.	8	2	Vote	Yes, non-voting
Japan	9	9	0	5	-	Yes	8	2	Vote	Yes, non-voting
U.K	9	5	4	Governor: 8; Others: 5	3	Yes	8	2	Vote	Yes, non-voting
U.S	12	12	0	Board: 14; Banks: 5.	-	Board: No Banks: Yes.	8	2	Vote	No

Source: Central bank websites.
1/ The Central Bank of Chile will reduce its annual MPMs from 12 to 8 and will increase the duration of each MPM from 1 to 1.5 days in 2018. See Central Bank of Chile (2017a, 2017b).
2/ The Norges Bank announced an increase in their annual MPM frequency from 6 to 8 on May 4, 2017, to be implemented in 2018.
3/ This process begins with the presentation of staff projections to the advisory MPC, and the MPC meetings with the Governing Committee as described in Figure 1 of McDermott (2016).

In individualistic committees each member is held publicly accountable for their decisions, and each member is empowered with one vote. Decisions tend to be reached by majority vote, where the Governor tends to have the deciding vote in case of a tie. The high degree of individual accountability results in regular reservations, dissents, or minority votes against the final policy decision. Two regularly cited examples of this type of committee are those of the UK and Sweden. Importantly, when a certain degree of public disagreement among committee members occurs, market participants are generally not surprised and understand the differences as part of the policy process.

In contrast, as described by Blinder (2007), responsibility of monetary policy decisions in collegial committees tends to be attributed to the committee as a whole rather than to each individual member, and therefore decisions occur in the context of an ex-ante implicit agreement among members in which individual preferences are of second order with respect to the consensus collective view. Although decisions in collegial committees may be in the form of a formal voting process or a consensus building approach, in the end members generally stand by the consensus decision and communicate as if they were one single voice. Having all members of the committee communicating the same view on monetary policy facilitates communication efforts and accountability of the committee as a whole. As a result, divided decisions are considerably less common in collegial committees than in individualistic committees (See Box 1).

Box 1

Characterizing MPCs by Voting Patterns

One simple and straightforward way in which one may identify types of MPC is by reviewing voting patterns over time. As is described by Blinder (2007), high individual accountability in individualistic committees generates a low bar for voting against the majority decision, while the opposite is the case in collegial committees.

MPC voting data for six central banks (Chile, Czech Republic, Iceland, Israel, Sweden, & the UK) since 2007 confirms that committees generally characterized as individualistic (Iceland[14], Sweden, UK) have considerably fewer unanimous MPMs than in collegial, represented in this case by the Central Bank of Chile. We define a unanimous decision as an MPM in which no votes were formally included against the majority decision.[15] These central banks were selected simply due to readily accessible public data, and had at least five years' worth of policy decisions to review. Results are summarized below, and are also available in the Appendix.

Figure 1: Unanimous Decisions

Percent, Share of Total MPMs

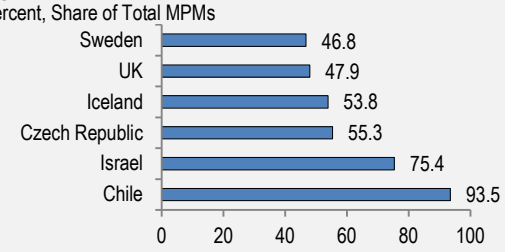
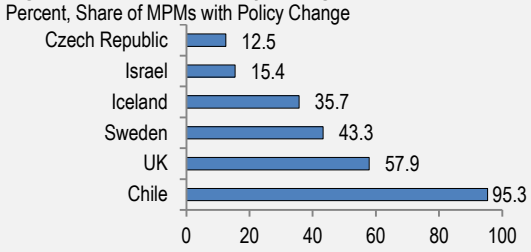


Figure 2: Unanimous Policy Changes

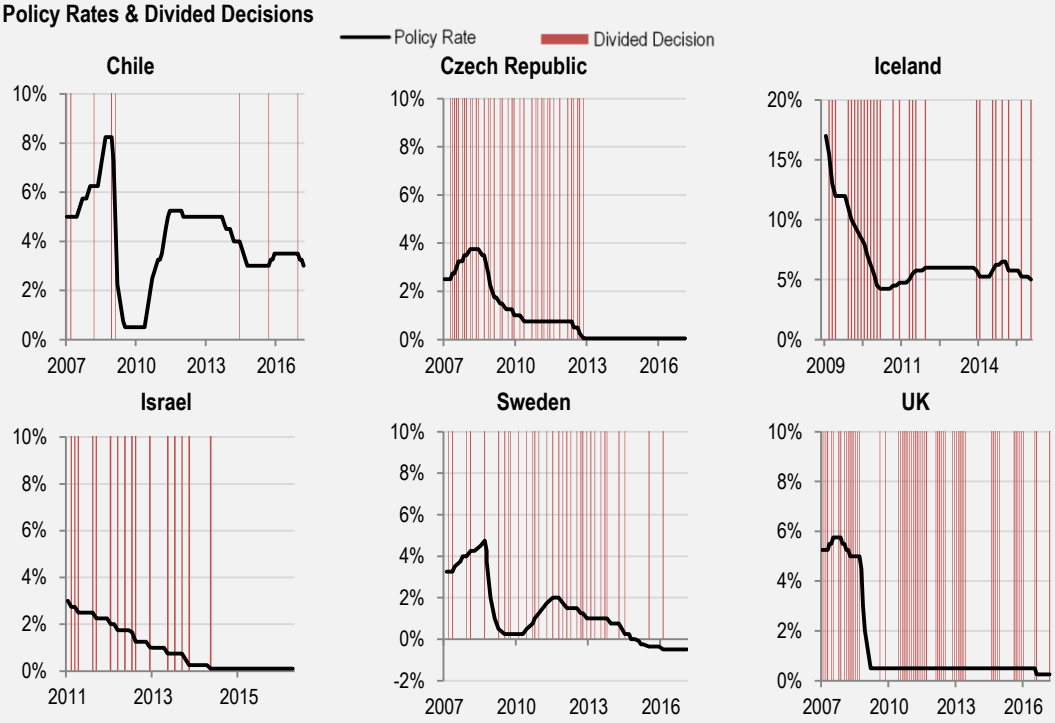
Percent, Share of MPMs with Policy Change



Source: Central bank websites, minutes, & Annual report. Sample: Chile, Sweden, & UK (Jan-2007 & Mar-2017); Iceland (Mar-2009 & Dec-2016); Israel (Nov-2011 & Feb-2017).

A few caveats worth mentioning. A first note on the overall macroeconomic context, the sampled period is one of unprecedented expansionary monetary policy with several central banks also resorting to unconventional monetary policies as they reached the zero-lower bound on nominal interest rates; voting patterns may not necessarily follow the same pattern during a hiking cycle. Second, when viewing the results one must consider the significant differences in MPM frequency across economies. The Central Bank of Chile had 122 MPMs, while Sweden's Riksbank had less than half (56) during the same time period, which may exaggerate the degree of unanimity in decisions in Chile's MPC since points of view among members are less likely to change in a shorter time span. Finally, we must also note that these results are unconditional on the direction and/or size of the policy move, stage of the business cycle, differences in the size and composition of the MPC, and characteristics of MPC members (previous experience, time at the central bank). On a separate note, the abrupt end to divided decisions in the Czech National Bank once the policy rate reached the zero-lower bound may be due to the additional easing associated to the euro:koruna floor adopted in late 2013 and removed in April-2017.

Figure 3: Policy Rates & Divided Decisions



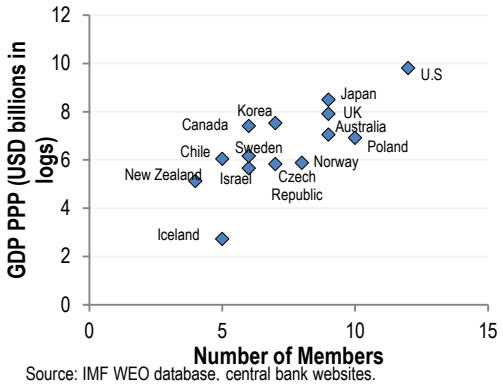
[14] See Central Bank of Iceland (2015) for a discussion on Monetary Policy Committee voting patterns in Iceland between 2009-2014.

[15] Note that when differences exist but are "small enough", MPC members in Iceland may vote in favor of the majority but include a "reservation," which for this analysis is not considered.

The Monetary Policy Committee: Structure of the MPCs

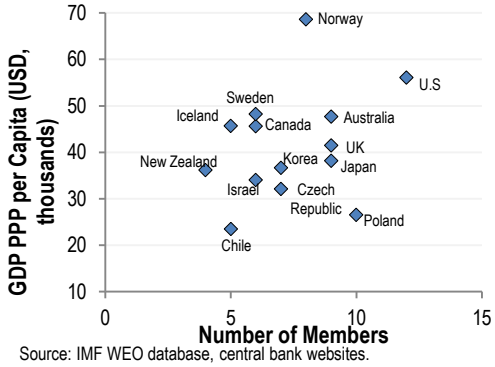
MPC's tend to differ in terms of size and composition. In this section we briefly describe differences in both dimensions across the reviewed central banks. First, on the size dimension of the decision-making bodies, one could conceptually argue that more participants in the MPC are desirable since they may potentially add perspectives and experience to the policy deliberation. However, an infinitely large committee is not necessarily desirable since the marginal contribution of each additional member to the discussion is likely to be decreasing; more members make for lengthier meetings; and more members increases the probability of free-riding in meetings. In practice, there appears to be a positive relationship between the size of the committees and the size of the economies, expressed in terms of log GDP in purchasing power parity (PPP) terms (Figure 6), although the positive relationship is less clear when expressed in per capita terms (Figure 7). The smallest decision-making bodies are those of the Reserve Bank of New Zealand (4), the Central Bank of Chile (5), and the Central Bank of Iceland (5). In contrast, the largest decision-making bodies are the FOMC of the Federal Reserve in the U.S, and the Governing Council of the ECB, which size is also a function of the multiple constituents they represent (Reserve Banks & Board in the former, while the latter includes governors of the national central banks of the Euro Area economies and members of the Executive Board).

Figure 6: Number of MPC Members & GDP PPP



Source: IMF WEO database, central bank websites.

Figure 7: Number of MPC Members & GDP per Capita



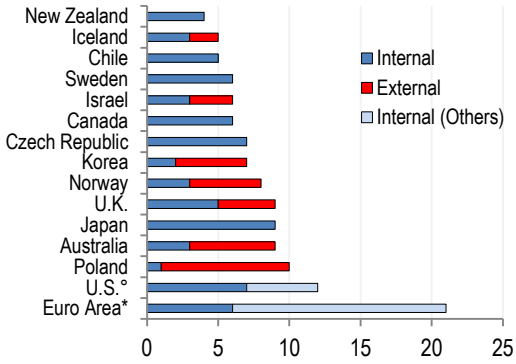
Source: IMF WEO database, central bank websites.

MPCs differ not only in terms of their size, but also in their composition (Figure 8). In some cases, such as in Chile, the Czech Republic, Japan, and Sweden, the decision-making body is composed exclusively of internal members of the central bank.[16] In other cases, the MPCs also include external members named by the government, the legislative branch, or the central bank itself. External members tend to be academics with expertise in monetary policy, policy practitioners with significant experience in government and the public sector, or experienced professionals from the private and/or financial sector. External members tend to take up the position at the MPC while at the same time maintaining their positions elsewhere, although there are significant restrictions on the types of employment that are contemporaneously compatible. While in a few cases there seems to be a relative balance between internal and external members (Israel, UK), others tend to have significantly more external members than internal members. The most extreme case is that of the central bank of Poland, in which the Governor is the only internal member, and the other nine members are external members named in equal shares by the Government, the Sejm (lower house of the Polish Parliament), and the Senate.

Generally speaking, the terms of internal members tend to be longer than those of external members (Figure 9). The terms of internal members tend to vary between five and seven years, although there are some cases in which the terms are particularly long (Chile: 10 years, U.S Fed Governors: 14 years[17]). In contrast, terms of external members tend to vary between three and six years, with an average close to four years. In addition, appointments of internal and external members to the MPC tend to be renewable, in some cases without limit (Australia), and in others limited to one additional term.

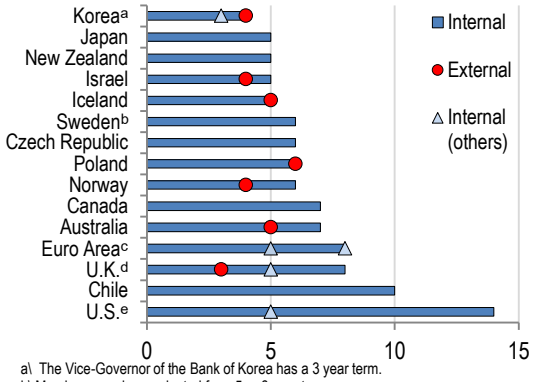
[16] Although the actual duties of the members of the MPC members vary significantly across central banks, in this study we simply refer to the monetary policy responsibilities.
[17] In practice, terms at the Federal Reserve Board of Governors are currently rarely served for the full 14 years; find more information here.

Figure 8: Number of Voting MPC Members by Type



°\ Voting members of the FOMC include 7 Governors, the President of the NY Fed, and four (rotating) Reserve Bank Presidents.
*\ Voting members of the ECB include 6 members of the Executive Board, and 15 of the 19 governors of the National Central Banks, each with rotating voting rights.

Figure 9: Voting MPC Members by Terms (Years)



a\ The Vice-Governor of the Bank of Korea has a 3 year term.
b\ Members may be nominated for a 5 or 6 year term.
c\ Term of the Executive Directors; central bank Governors' terms range between 5-8..
d\ Governor has an 8 year term, other internal members have a 5 year term.
e\ Reserve Bank Presidents have 5 year renewable terms.

The Role of the Staff

While the press tends to focus on voting dynamics within the MPC with respect to preferences across members (typically characterizing members more (less) averse to inflation as "hawks" ("doves")), relatively little attention is paid to the often critical role central bank staff plays throughout the decision-making process. This also seems to be the case in the literature, where the focus on decision making has overwhelmingly focused on dynamics within the committee. However, recent research highlights the importance of the staff. In their survey analysis of decision-making at the Norges bank and Riksbank, Apel et al. (2015) confirm that staff plays a fundamental role in shaping MPC members' views prior to the actual policy meeting, with MPC members even stating that staff's views tend to be more important than the points of views of other MPC members.

While in all reviewed central banks the staff sets the stage for the policy discussion by generating the briefing material and updating forecasts, in some cases the staff's influence in the process stretches far beyond supplying the macroeconomic backdrop and outlook. For example, in some cases, such as in Chile, the staff presents the MPC with several (usually two or three) policy options, outlining the costs and benefits of each policy option. In Canada, the staff goes a step further and explicitly recommends a policy option to the Governing Council (MPC).[18] In other cases, such as in Iceland, Israel, and the UK, the staff has voting power as the Head of the Economics Department sits on the MPC as an internal member.

The Role of Rules in Decision-making

Although optimal monetary policy rules have been discussed exhaustively in academic circles in the past[19], in recent years several academics, notably led by Stanford economist John Taylor[20], have increased public pressure on the Federal Reserve for the use of an explicit monetary policy rule to automatically guide changes in central bank actions, more specifically adjustments in the short-term interest rate. In doing so, these proponents claim, central bank actions should not only become more predictable and accountable, but may also lead to a more effective performance relative to the central bank's mandate.

As we have highlighted, decision-making in IT regimes has largely transitioned towards a committee-based system, which to a certain extent seems at odds with the use of an explicit rule since one could argue that following a rule, in essence, may not be materially different to that of a single decision maker. In this context, what role do monetary policy rules play in decision-making by committees? In sum, as noted by recent speeches by Fed Vice-Chairman Fischer (2017a, 2017b), rules are an essential input in the policy process and play a fundamental role in serving as a benchmark for policy action, yet are not followed explicitly for several reasons.[21] Monetary policy rules, by design, may not capture underlying changes in the economy nor elements outside of the statistical model that may be of critical importance to the policy decision; this view is summarized by former Fed Chairman Bernanke: "*monetary policy should be systematic, not automatic.*"[22]

[18] See Murray (2013) for more information on decision-making at the Bank of Canada.
[19] Different monetary policy rules regarding the interest rate include the Taylor rule (1993), and Friedman's rule on zero nominal interest rate; rules on regulating the money supply include Friedman's *k*% growth rate of money supply, and McCallum's rule (1981).
[20] Taylor's point of view appears to be driven, in part, by his claim (Taylor, 2007) that Fed monetary policy was too loose between 2003 & 2005 with respect to historical patterns.
[21] See the Box titled "Monetary Policy Rules and Their Role in the Federal Reserve's Policy Process" in Board of Governors (2017) for an in-depth discussion on the different monetary policy rules used in the decision-making process at the Federal Reserve.
[22] See Bernanke's blog post (2015) for a discussion on potential drawbacks of abiding to the use of the Taylor rule for monetary policy.

Formal Aspects of the Decision-making Process

In this section we summarize formal aspects of the decision-making process, focusing specifically on the frequency of formal monetary policy meetings and the role of the government, if any, in the decision-making process. While central banks have significantly expanded the monetary policy toolkit in recent years, resorting to non-conventional measures such as forward guidance, large scale asset purchase programs, and yield curve control (Japan), the main monetary policy instrument used by inflation targeting regimes is the short-term interest rate (monetary policy rate, MPR) and providing a forward-looking view of the interest-rate trajectory throughout the policy horizon.[23] Changes to the MPR are formally reviewed by the MPC periodically in monetary policy meetings (MPM), held in dates known well in advance by the public.

In practice, although there is some heterogeneity in MPM frequency across central banks, there seems to be a growing consensus towards meeting eight times a year (Figure 10). In fact, three quarters of the reviewed central banks, including the four major central banks of the world, currently hold or have announced their intention to transition to eight MPMs per year, that is, on average twice a quarter. The Central Bank of Chile currently holds monthly MPMs but has recently announced it will transition to eight meetings in 2018. The central banks of Australia and Poland meet every month with the exception of one month in the summer quarter.[24] Sweden's Riksbank is the only central bank in the sample that meets less than eight times a year, meeting only six times per year.

On meeting frequency, monthly MPMs have several benefits. First, they provide decision-makers with a high degree of flexibility to adjust policy at preannounced dates with more gradual adjustments. Second, policy makers are frequently updated with analysis at a high frequency, generally in sync with the release of monthly activity and inflation indicators. Third, the monthly calendar is intuitive and easy to communicate.

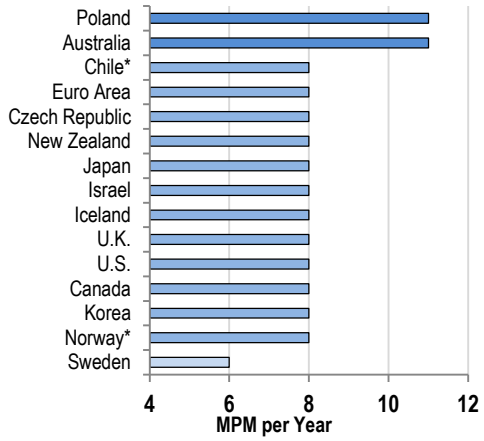
However, monthly MPMs may also be inefficient and costly in terms of central bank resources. Reassessing the state of the economy and updating the central bank's view on the expected inflation trajectory at a monthly frequency may not be an efficient exercise in the sense that decision-makers generally only have one additional data point of a wide set of indicators in each meeting. Monthly data tends to be noisy, and extracting an actual signal from the noise becomes quite difficult. Moreover as highlighted in the Warsh Review (2014), decision-makers generally require more information gathered over a longer period of time to properly assess changes in their view of the economy. In this context, high frequency analysis is labor-intensive in staff resources that could have been used instead assessing medium-term economic trends or examining specific issues of concern for policy-makers. In addition, significant time and resources tend to be used in the preparation of presentations, and briefing material for each monetary policy meeting, with little added value in the absence of periods of economic crises, simply due to the limited amount of new information.

On balance, the overall costs of monthly MPMs appear to have outweighed the benefits, as several central banks in the past years have reduced their annual MPM frequency to eight (Figure 11).[25] In addition to the factors mentioned above, central banks have also suggested the reduced frequency has allowed them to improve their communications strategy, by giving them the opportunity to synchronize the publication of the monetary policy report with the MPM statement once a quarter, thereby giving the decision-makers the necessary space to further elaborate, if needed, on the issues mentioned in the brief monetary policy statement. Moreover, one MPM tends to be scheduled halfway through each monetary policy report, which acts as an exhaustive interim assessment of the state of the economy and the expected inflation trajectory.

Separately, Norway's Norges Bank recently announced an *increase* in its MPM frequency from six currently, to eight effective in 2018, lending credence to the notion that meeting twice per quarter on average appropriately balances the multiple tradeoffs involved.

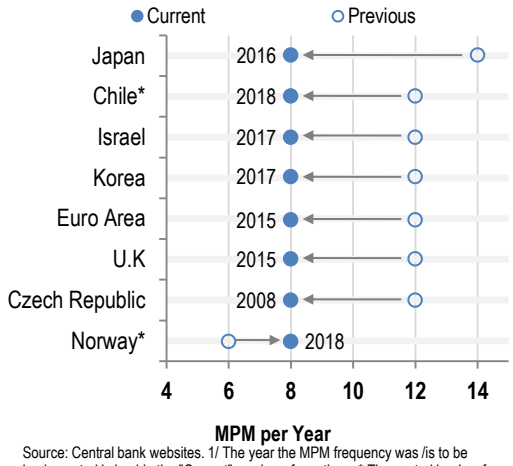
[23] By "short-term" interest rate we refer to the interest rate on short-term loans from the central banks to financial institutions.
[24] The Reserve Bank of Australia typically does not meet in January; the Central Bank of Poland generally does not meet in August.
[25] Although not included in this review, the Central Bank of the Republic of Turkey also reduced their annual MPM frequency from 12 to eight in 2017.

Figure 10: Monetary Policy Meetings per Year



Source: Central bank websites. *The Norges Bank and the Central Bank of Chile will meet 8 times a year in 2018. The Norges Bank currently meets 6 times a year, while the Central Bank of Chile currently meets monthly..

Figure 11: Recent Changes in MPM Frequency[1]



Source: Central bank websites. 1/ The year the MPM frequency was /is to be implemented is beside the "Current" number of meetings. * The central banks of Chile & Norway will adjust their MPM frequency in 2018.

A second element we believe deserves attention among the formal aspects of the decision-making process in inflation targeters is the role played by the government, if any. Generally speaking, central bank independence tends to be identified as one of the necessary conditions to be considered an inflation targeter, as this would tend to avoid the presence of an inflationary bias in the decision-making process and allow the decision-makers to focus on achieving the inflation target. This in turn, strengthens the credibility of the institution's commitment with the inflation target, and supports the anchoring of inflation expectations at the corresponding policy horizon. However, some degree of participation of the executive branch in the policy process may be desired since it may facilitate the coordination of fiscal and monetary policies, and importantly, may act as an accountability mechanism. On the outset, it must be noted that the government is responsible for appointing members to the MPC as terms expire, and as a result indirectly influences the decision-making process.

Focusing exclusively in direct government participation in MPMs, at a high level we can divide the central banks considered in this review in two groups. On one side, a group of five institutions including the central banks of Canada, Iceland, Israel, Sweden, and the U.S., do not have direct government participation in MPMs. In a second large group of central banks, an important authority of the administration, such as the Minister of Finance or his delegate, is invited to attend and speak in the MPMs, but does not have the right to vote on the monetary policy decision. Within this second group, the degree of potential government involvement differs. In Japan for example, the representatives of the government (Minister of Finance, Minister of State for Economic & Fiscal Policy) may propose issues to be discussed in the MPMs, and may even formally ask the MPC to postpone a vote on monetary policy until the following meeting.[26] In the case of the Bank of Korea, the representative of the government (Minister of Strategy & Finance) may publicly request the MPC to reconsider a monetary policy decision if it perceives that the decision conflicts with the government's economic policy.[27] Finally, one notable exception in the sample is the case of the Reserve Bank of Australia, in which the Secretary to the Treasury is a voting member of the MPC, granting the government direct influence in the decision-making process. Another notable case of direct government influence via voting power in the monetary policy decision-making in an inflation targeting central bank is in Colombia, in which the Minister of Finance sits on the policy board and has voting power.

[26] The Bank of Japan's Policy Board still reserves the right to accept the vote postponement if requested.
[27] Article 92 of the Bank of Korea Act.

IV. A Review of Central Bank Communication & Accountability Mechanisms

Monetary policy affects the real economy through several channels, one of which is the expectations channel. Insofar as the central bank is able to effectively convey its view on the economy, risks, and the most likely MPR trajectory, economic agents are more likely to adjust their consumption and investment decisions accordingly. As a result, inflation-targeting regimes carefully tailor their communication efforts so as to ensure their actions are expected and understood. As the rationale sustaining the central bank's actions is better understood over time, credibility on the institution's commitment with the inflation target at the policy horizon is further strengthened. Moreover, effectively communicating and improving transparency in central bank actions is crucial from an accountability perspective as public trust and credibility in the central bank's actions rely fundamentally on stakeholders' understanding the rationale sustaining monetary policy decisions. The need to enhance transparency and communication has become even more apparent in the aftermath of the Global Financial Crisis (GFC), as increased public scrutiny on the extraordinary steps taken by several central banks during and after the peak of the GFC have questioned their independence.

In this section first we describe the different publications used by central banks to communicate their rationale to economic agents. While it may seem obvious, it is important to emphasize that more communication is not necessarily better; rather what is optimal from a central bank's perspective is making sure economic agents effectively understand the institution's message. We then move on to briefly discuss recent changes in accountability mechanisms used by central banks to justify their actions. The characteristics of central bank communication and accountability herein described are summarized in Table 4.

Documents that Regularly Provide the Rationale to Policy Decisions[28]

Overall, there seems to be a consensus across central banks on the types of publications that are used to communicate with the public. Policy decisions are communicated in brief statements in the immediate aftermath of the MPM, with several also holding a press conference that provides further details on the rationale of the policy decision. The baseline scenario, forecasts, risks, and most likely course of monetary policy are described in detail in a Monetary Policy Report or "inflation report." Most central banks also complement the decisions taken during MPMs with the publication of meeting minutes that take into account the different views of policy-makers. Only a few central banks also separately publish the material presented by the staff in the MPM, although this material tends to be included in the MPM minutes.

First, not surprisingly, central banks tend to communicate their policy decisions in a brief statement issued shortly after the MPM that in addition to the policy decision, also contains the main arguments supporting the decision, a summary of recent domestic economic performance, inflation, inflation expectations, international economic and financial conditions, and importantly the most likely course of action of monetary policy in the short-term. In a few cases the statement also includes the vote tally (U.K., U.S.). While the statement is generally released the same day as the policy meeting, in a few cases (Sweden, UK) the statement is released the day after. It is worth noting that the slight delay in these two cases is due to the fact that the release of the statement is part of the simultaneous publication of a larger set of documentation that includes the meeting minutes and/or the inflation report.

The "Inflation Report" is the main publication used by central banks to periodically explain the rationale underpinning their policy decisions and provide a forward-looking view of the most likely trajectory of monetary policy. These reports tend to be released quarterly generally closely in sync with (every other) MPM, thereby supplementing the brief information of the MPM statements with more comprehensive analysis that supports the decision-making. Among the reviewed central banks, the Bank of Israel publishes two reports per year, while Sweden's Riksbank publishes six. As far as content, the most important elements of the inflation report are the central bank's baseline view of the economy and inflation throughout the policy horizon, based on their assessment of domestic nominal and real variables, international economic and financial conditions, and risks to the outlook, as well as the expected trajectory of monetary policy. Within central banks, the process of creating each inflation report tends to be a labor-intensive process that includes a reassessment of the medium-term forecast based on most recent information, and a review of the main models and assumptions moving forward. Output and inflation forecasts tend to be presented in the form of "fan charts" which represent the most likely evolution of these variables in the future, but also illustrate the uncertainty surrounding these forecasts by including confidence intervals. The "ownership" of the forecasts varies considerably across the reviewed institutions, which reflects different degrees of participation of the central bank staff and

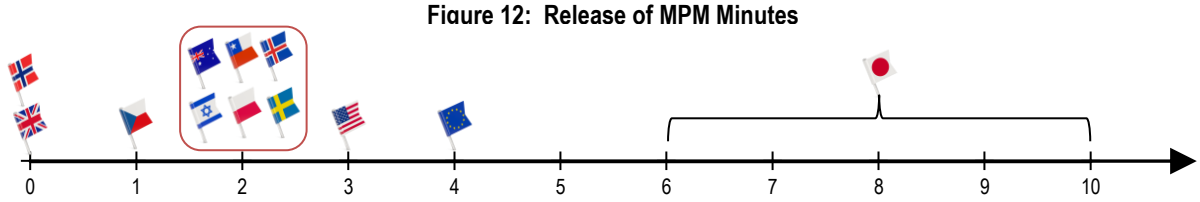
[28] Due to their occasional nature, we do not consider the publication of academic research and/or similar work that may also support monetary policy decision-making.

policy-makers in the elaboration of the inflation report. For example, in some cases such as in the central banks of Iceland, Israel, and Korea, the forecasts included in the inflation reports are generated by the staff and are responsibility of the staff. In contrast, in other cases such as in Chile and Sweden, forecasts are initially prepared by the staff, but are then adjusted with feedback by the decision-makers after several iterations with the Board, and in the end represent the policy-makers' view.[29]

Since the inflation report reflects the updated view and provides information on the most likely trajectory of monetary policy, the central bank tends to complement the publication of the report with a press conference by the institution's decision-makers, regular presentations to the legislative branch, and scheduled presentations throughout civil society.

Another major instrument used by most central banks to provide a more detailed understanding of the most important considerations surrounding monetary policy decisions are the MPM minutes. With varying degrees of detail and explicit visibility of the policy-makers' opinion across the reviewed central banks, meeting minutes contain a general account of the MPM, most importantly the potentially differing views of the policy-makers and risks being considered. With a few exceptions, meeting minutes tend to be published roughly two weeks after the MPM (Figure 12). While the Bank of England and the Norges Bank publish the meeting minutes at the same time as the interest-rate decision, the Bank of Japan publishes meeting minutes a few days after the following MPM (6-10 weeks later) and in the interim publishes a "Summary of Opinions" that summarizes the discussion from the perspective of the Governor.

Figure 12: Release of MPM Minutes



Source: Central bank websites. Note: The minutes of the MPMof the Bank of Japan are approved in the following MPM and published three working days later; regularly scheduled MPMs are every 6-10 weeks. In the ECB's case, the "minutes" refer to the "Monetary Policy Meeting Accounts" published since February-2015.

The main benefit of publishing meeting minutes is that they provide important information on the diversity of opinions and points of agreement among the decision-makers (Bernanke, 2004). In contrast, the main potential drawback of the publication of meeting minutes is that they risk increasing uncertainty on the market's understanding of the most likely trajectory of monetary policy by exposing legitimate differences that may exist within the decision-making committee. In addition, the publication of minutes (and transcripts, discussed later) risks impairing candid deliberation and discussion of policy options by decision-makers, which may lead to sub-optimal decision-making. Considering these arguments, the two central banks in our review that have consensus decision-making do not publish meeting minutes, Canada and New Zealand.

According to our analysis, the Central Bank of Chile is the only reviewed institution that currently publishes a background report the business day prior to the MPM that summarizes publicly available information to be considered by the staff and decision-makers in the MPM.[30] Although the report was initially published in chart form as early as February-2007, it was formalized in text form in March-2009, with the mere objective of providing the public with the information that is relevant for the decision-makers.[31] According to recent changes announced by the Central Bank of Chile, the material in this document will no longer be published separately, and will be merged in to the Monetary Policy Minutes as of 2018.

Separately, the central banks of Chile, the Czech Republic, and Norway are the only institutions in the review that currently publish a version of the staff MPM presentations shortly after the MPMs.[32] The Central Bank of Chile also recently announced that it will no longer publish the MPM presentation, and will integrate this material in to the MPM Minutes as of 2018.

[29] For a detailed view on the Riksbank's decision-making process see Hallsten & Tagstrom (2009). For a description on Chile's decision-making process in the context of the monetary policy framework see Banco Central de Chile (2007).
[30] Formally, this document summarizes publicly information the staff delivers to the Board two business days prior to the MPM. The document is released prior to each MPM except when the MPM is scheduled close to the Monetary Policy Report.
[31] Press release of Thursday March 5, 2009. The Central Bank of Chile announced the publication of this report at the same time that it decided to publish the staff's presentation at the MPM the business day after the MPM, and also reduced the delay in publication of the meeting minutes from close to three weeks to eleven business days.
[32] The Central Bank of Chile publishes the presentation the working day after the MPM. The Czech National Bank publishes the presentation in their website at the same time as the MPM statement. The Norges Bank publishes the MPM presentation material in meetings without joint publication of the inflation report.

Accountability Mechanisms

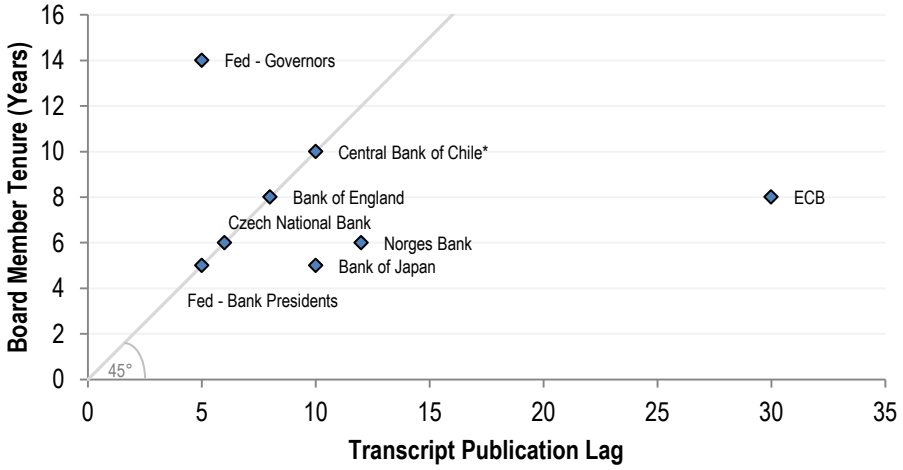
In this section we describe the main public accountability arrangements currently used by central banks to validate their performance to democratically elected officials and the wider public.

Frequently scheduled public presentations to the legislative branch are the most common accountability mechanism used by central bank decision-makers. These presentations are generally scheduled along with the publication of inflation reports, and tend to be led by the central bank Governor on his own (Federal Reserve), or by the entire MPC (Chile), along with senior staff. Presentations are formal and scripted, and often review the central bank's performance along different dimensions (price stability, financial stability, and other objectives). Generally towards the end of each presentation, members of the legislature question central bank authorities on issues of concern that might not have been entirely covered in the presentation.

Public letters addressed to the government are another mechanism used by only a few central banks to render public accountability on their performance achieving their price stability mandate. The central banks of Iceland and the UK have the legal obligation of having to write a public letter to the government if inflation persistently deviates sufficiently away from a predetermined range.[33,34] The letter must contain the reasons that explain recent inflation dynamics, how long inflation is expected to remain away from the target, as well as the measures taken / to be taken by the central bank to ensure convergence of inflation back to the target. Although these central banks have the legal obligation of writing the public letter, it is important to note that central banks generally exhaustively address these issues in their respective inflation reports.

During the past few years several central banks, including the four major central banks of the world, have decided to publish the transcripts of their MPMs after a certain amount of time, which on average tends to be greater than the terms of the decision-makers (Figure 13). The main arguments used by central banks to justify the publication of their meeting transcripts include enhanced accountability of the decision-makers; enhanced decision-making via a "discipline effect" that forces policy-makers to strengthen their preparation for MPMs; and improve record-keeping and enhance the institution's contribution to economic history of the nation. That being said, the publication of meeting transcripts poses significant challenges, which to a certain extent justify why only a select few institutions have decided to publish them. First, as highlighted by the Warsh Review (2014), the publication of meeting transcripts (and minutes) may to a certain extent impair a candid discussion of policy options among policy-makers, and lead them to limit their interventions to written statements that express their view (and vote) without the consideration of the perspectives of other members. In this context, it is possible that policy deliberations may be driven to other settings where a formal record is not being taken. Moreover, some existing evidence for the U.S (Meade and Stasavage, 2008) suggests that the publication of FOMC transcripts reduced the likelihood of dissent among committee members, and made members less willing to change their positions over time.

Figure 13: Central Banks that Publish MPM Transcripts[1]



Source: Central bank websites. 1/ For the central banks of the UK and Norway we consider the longest tenure (UK: Governor, 8 years; Norway: internal members, 6 years). For the ECB we consider the terms of the Executive Board. * The Central Bank of Chile will begin publishing MPM transcripts in 2018.

[33] The central bank of Iceland (UK) must submit a letter to the government if headline inflation has deviated from the range of 1-4% (1-3%).
[34] Although not included in the sample, the Central Bank of Turkey is also required to submit a letter to the Deputy Prime Minister if inflation deviates significantly from the target.

Table 4: Communication & Accountability Mechanisms

	Communication of Decisions		Publication of MPM Material	MPM Minutes				MPR or Forecasts per year	Accountability Mechanisms		
	Statement	Press Conference		Published after …	Vote count published?	Visibility of votes cast by members?[1]	Visibility of individual arguments?		Transcript of MPMs	Open Letters?	Regular Presentations to Parliament
Australia	Yes	No	No	2 weeks	No	-	-	4	No	No	Yes
Canada	Yes	Yes, with MPR	No	Does not publish	-	-	-	4	No	No	Yes
Chile[2]	Yes	Yes, with MPR	No	11 working days	Yes	Yes	No	4	Yes, 10 years later	No	Yes
Czech Republic	Yes	Yes	Yes, with the Statement	8 days	Yes	Yes	No	4	Yes, 6 years later	No	Yes
Iceland	Yes	No	No	2 weeks	Yes	No[3]	-	4	No	Yes	Yes
Israel	Yes	Yes, every other MPM	No	2 weeks	Yes	No	-	2	No	No	Yes
Korea	Yes	Yes	No	2 weeks	Yes	Yes	No	4	No[4]	No	Yes
Norway	Yes	Yes	Yes, with the Statement[5]	The same day[6]	Yes	Yes	-	4	Yes, 12 years later	No	Yes
New Zealand	Yes	Yes, with MPR	No	Does not publish	-	-	-	4	No	No	Yes
Poland	Yes	Yes	No	2 weeks	No[7]	-	-	3	No	No	Yes
Sweden	Yes	Yes	No	2 weeks	Yes	Yes	Yes	6	No	No	Yes
Euro Area	Yes	Yes	No	4 weeks	No	-	-	4	Yes, 30 years later	No	Yes
Japan	Yes	Yes	No	6-10 weeks[8]	Yes	Yes	Yes	4	Yes, 10 years later	No	Yes
U.K.	Yes	Yes, with MPR	Yes, 8 years later	The same day	Yes	Yes	No	4	Yes, 8 years later	Yes	Yes
U.S.	Yes	Yes, with S.E.P.[9]	Yes, 5 years later	3 weeks	Yes	Yes	Yes	4 [10]	Yes, 5 years later	No	Yes

Source: Central bank websites.

1/ We consider "Yes" for cases in which all voting member names are published, or only the names of dissenting votes are published.

2/ We refer to the Central Bank of Chile's recently announced changes to the communication of monetary policy. See Central Bank of Chile (2017a, 2017b) for more information.

3/ The Central Bank of Iceland publishes the votes for all MPMs of the year in the respective Annual Report.

4/ The Bank of Korea may publish a MPM transcript after four years with a formal request from the National Assembly (Article 24 of the Bank of Korea Act).

5/ The Norges Bank publishes the MPM presentation material in May and October, corresponding to meetings without joint publication of MPR.

6/ The Norges Bank will begin publishing MPM minutes in October - 2017. The press brief mentions voting records will be published but does not refer to the visibility of individual arguments.

7/ The vote count and individual names are reported in the MPR.

8/ The Bank of Japan publishes the MPM minutes a few days after the following MPM. Between MPMs a "Summary of Opinions" is published that summarizes the MPM discussion from the Governor's perspective.

9/ Press conferences with the publication of the Summary of Economic Projections.

10/ We refer to the Summary of Economic Projections published four times a year. Separately, the Fed publishes a MPR twice a year.

V. Concluding Remarks

In this paper we describe several dimensions that are of critical importance in improving the public understanding of monetary policy frameworks in inflation targeting central banks. We do so by reviewing public information from fifteen central banks including eleven "small open" OECD economies in addition to four major central banks (Bank of England, Bank of Japan, ECB, & the Federal Reserve). Throughout we highlight recent changes along the different dimensions that have aimed at further strengthening the IT frameworks.

First, we review several aspects of the IT institutional framework to highlight that although these central banks tend to share an overarching IT framework with price stability as the main objective, there are certain differences in the quantity and priorities of additional statutory objectives across central banks. Not surprisingly in the aftermath of the GFC, a financial stability objective has taken on an increasingly important role. About half of the reviewed central banks have complete goal independence, in the sense that they have the ability to independently set the inflation target. Although the type of inflation target varies across the sample, the levels of the inflation target are relatively similar.

We then dive in to the details of the decision making process in IT central banks, one of the aspects in central banking that has experienced most changes during the past decade, with decisions increasingly transitioning from single decision makers to committees. MPCs tend to vary considerably in terms of their size and composition. Voting dynamics appear to be related to the degree of individual accountability of MPC members. Central bank staff plays an important role in the decision making process, supplying key inputs to the MPC and in some cases even explicitly supporting a policy decision. Despite increasing calls for the use of explicit rules-based monetary policy, especially in the U.S, rules that emulate central bank actions tend to be used as an additional, yet very important, input in the decision making process. On the more formal aspects of the decision-making process, there seems to be an increasing consensus towards formally evaluating adjustments to monetary policy eight times a year, reflected by recent changes in several central banks in the review.

On the communication of monetary policy, there seems to be a widespread consensus on the mechanisms used by central banks to communicate with the public, including frequent publication of documents that provide a rationale for the MPC's decisions, including the monetary policy report and meeting minutes, as well as press conferences by the central bank leadership. On accountability, the most common mechanism used by central banks to validate their actions to democratically elected officials is frequent visits to the legislature. In a few cases, the decision makers must also publish an open letter to the government when inflation deviates significantly away from a given threshold for a certain amount of time. In line with increasing calls for transparency and accountability in recent years, several central banks have taken the initiative to publish transcripts of their monetary policy meetings after a certain amount of time, which tends to be greater than the terms of the decision-makers.

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VII. Appendix

Table 1: 2016 De Facto Classification of Exchange Rate Arrangements and Monetary Policy Frameworks[1]

Number of economies in parentheses

Exchange Rate Anchor (79)				Monetary Aggregate Anchor (24)	Inflation-Targeting Framework (38)	Other (30)
(USD)	*(Euro)*	*(Other)*	*(Composite)*			
Aruba	Benin	Bhutan	Botswana	Afghanistan	Albania	Angola
Bahrain	Bosnia & Herzegovina	Brunei Darussalam	Fiji	Algeria	Armenia	Argentina
Barbados	Bulgaria	Kiribati	Iran	Bangladesh	**Australia**	Azerbaijan
Belize	Burkina Faso	Lesotho	Kuwait	Belarus	Brazil	Costa Rica
Cambodia	Cabo Verde	Namibia	Libya	Bolivia	**Canada**	Egypt
Curacao & St. Maarten	Cameroon	Nauru	Morocco	Burundi	**Chile**	**European Monetary Union**
Djibouti	Central African Republic	Nepal	Singapore	China	Colombia	Haiti
Ecuador	Chad	Swaziland	Syria	D.R. of Congo	**Czech Republic**	Jamaica
El Salvador	Comorros	Tuvalu	Vietnam	Ethiopia	Dominican Republic	Kenya
Eritrea	Cote d Ivoire			Guinea	Georgia	Kyrgyz Republic
Guyana	Croatia			Madagascar	Ghana	Lao PDR
Honduras	Denmark			Malawi	Guatemala	Malaysia
Hong Kong SAR	Equatorial Guinea			Mozambique	Hungary	Mauritania
Iraq	FYR Macedonia			Myanmar	**Iceland**	Mauritius
Jordan	Gabon			Nigeria	India	Mongoloa
Lebanon	Guinea Bissau			Rwanda	Indonesia	Pakistan
Liberia	Kosovo			Seychelles	**Israel**	Papua New Guinea
Maldives	Mali			Sierra Leone	**Japan**	Samoa
Marshall Islands	Montenegro			Suriname	Kazakhstan	Solomon Islands
Micronesia	Niger			Tajikstan	**Korea**	Somalia
Nicaragua	Rep. Of Congo			Tanzania	Mexico	South Sudan
Oman	San Marino			The Gambia	Moldova	Sri Lanka
Palau	Sao Tome and Principe			Uzbekistan	**New Zealand**	Sudan
Panama	Senegal			Yemen	**Norway**	Switzerland
Qatar	Togo				Paraguay	Tonga
Saudi Arabia					Peru	Tunisia
St Lucia					Philippines	Ukraine
St Vincent and the Grenadines					**Poland**	**United States**
St.Kitts & Nevis					Romania	Vanuatu
The Bahamas					Russia	Zambia
Timor-Leste					Serbia	
Trinidad and Tobago					South Africa	
Turkmenistan					**Sweden**	
UAE					Thailand	
Venezuela					Turkey	
Zimbabwe					Uganda	
					United Kingdom	
					Uruguay	

Source: Table 2 of IMF Annual Report on Exchange Arrangements and Exchange Restrictions 2016

1\ Countries included in the study are highlighted in red.

Table 2: Monetary Policy Decisions

Central Bank	# of MPMs	MPMs with Policy Change	Unanimous Policy Decisions	Policy Change & Unanimous Decision	Policy Change Following a Non-Unanimous Decision
Chile	123	43	115	41	5
Iceland	65	28	35	10	17
Israel	65	13	49	2	5
Czech Republic	85	16	47	2	15
Sweden	56	26	28	13	12
UK	121	19	58	11	6

Source: Central bank websites, meeting minutes, Annual Reports.

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