How Monetary Policy Is Made: Two Canadian Tales[*]

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We examine policy rate recommendations of the Bank of Canada's Governing Council (GC) and its shadow, the C.D. Howe Institute's Monetary Policy Council (MPC). Individual recommendations of the MPC are observed but not those of the GC. Differences in the two committees' recommendations are small but persistent. The MPC is more responsive to the output gap than its GC counterpart. Both committees respond similarly to inflation. Disagreement within the MPC and with the GC is more likely when rates are rising. Finally, the Bank's forward guidance had a significant influence on the MPC's views about the future inflation path.

JEL Codes: E43, E52, E58, E61, E69.

1.   Introduction

Understanding how monetary policy decisions are made became easier, at least until the global financial crisis that began in late 2007. Most central banks gravitated towards reliance on a single instrument of policy, usually a short-term interest rate. This approach is more transparent and easier for markets and the public to follow. These developments popularized reliance on the Taylor (1993) rule—which relates the central bank's policy rate to indicators of inflationary pressure and slack in economic activity—as a straightforward device observers can rely on to determine whether policy is too loose or tight. If the actual policy rate is below that which Taylor's rule recommends, policy is deemed too loose and vice versa when the policy rate is above what the rule suggests.[1] The simplicity of this approach generates regular commentary in the press (e.g., see Davies 2011) and central bankers frequently comment about the stance of monetary policy in relation to what it would be if the central bank followed some monetary policy rule.

Enhanced central bank transparency has also stimulated interest in second guessing the decisions of the monetary policy authorities. In response, "shadow" committees have emerged. They provide independent recommendations on what the appropriate policy rate ought to be.[2] Canada pioneered their introduction when, in 2002, the C.D. Howe Institute (CDHI) created the Monetary Policy Council (MPC) to provide "the Bank of Canada, financial-market participants and economic policy commentators with a regular independent assessment of the appropriate stance of Canadian monetary

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[1]In light of the events since 2008, there has been a shift towards identifying and explaining persistent deviations from the Taylor rule, termed by some the "Great Deviation" (e.g., Taylor 2013). Indeed, it was this kind of analysis which prompted disagreement between the rule's creator and the former Chairman of the Federal Open Market Committee (FOMC), Ben Bernanke, about whether monetary policy was to blame for the U.S. financial crisis of 2007–9 (Taylor 2007, Bernanke 2010). Of course, monetary policy cannot be reduced to a simple equation as Poole (2006), among others, reminds us. Central bankers are also at pains to point out that there is considerable uncertainty, for example, about the size of any output gap.

[2]As this is written, there are shadow monetary policy committees in the United States, the euro area, the United Kingdom, Australia, and New Zealand. See also Neuenkirch and Siklos (2013).

policy."[3] The adoption of inflation targeting and a more transparent and accountable Bank of Canada also facilitated the formation of a shadow committee that could engage in the kind of second-guessing exercise examined in this paper.

This paper examines the record of the MPC and asks whether we can identify differences between its recommendations and the decisions of the Bank's Governing Council (GC). Second, we obtain insights about the sources of disagreement about the appropriate stance of Canadian monetary policy. In particular, the MPC records individual recommendations, whereas we cannot observe individual members' views inside the GC. Finally, the sample period under study is of specific interest since it covers the Bank's conditional commitment to keep the policy rate at the zero lower bound. This period marks the Bank's foray into providing forward guidance. How the Bank's announcement impacted the MPC's recommendations and views about the path for inflation in Canada is also investigated.

Our results suggest, first, that differences in the two committees' recommendations are small but persistent. Second, the MPC is more responsive to the output gap than its GC counterpart. Both committees respond similarly to inflation. Third, disagreement within the MPC and with the GC is more likely when rates are rising. Finally, the Bank's forward guidance had a significant influence on the MPC's views about the future inflation path.

The rest of the paper is organized as follows. Section 2 describes the functioning of the CDHI's MPC and compares it with the Bank's GC. Section 3 introduces the econometric methodology. Section 4 presents some stylized facts, the empirical results, and a counterfactual experiment. Section 5 concludes with some policy implications.

2.   The Monetary Policy Council and the Governing Council

2.1   The C.D. Howe Institute's Monetary Policy Council

Since 2002, the C.D. Howe Institute has convened a Monetary Policy Council that includes academic and professional economists.

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[3]See http://www.cdhowe.org/monetary-policy-council-2.

The MPC consists of twelve members named by the CDHI based on the expertise of potential candidates to comment and provide recommendations on the appropriate stance of monetary policy.[4] Its aim is to "discuss the Bank of Canada's policy toward the overnight rate ... shortly before each of the Bank's interest-rate announcements." In other words, the MPC provides *independent* advice about what the appropriate policy rate ought to be to reach the Bank's inflation target and *not* a forecast of how the Bank is likely to set future policy rates. Moreover, in the last few years, the MPC, unlike its counterpart at the Bank, has also provided information about the appropriate interest rate path for up to a year ahead.[5]

MPC meetings are usually chaired by the president and CEO of the CDHI or, in his absence, the vice-president of research. Meetings are normally held fivc days before the Bank's announcement of the overnight rate.[6] For a member's vote to be recorded, he or she must either be present in person or participate via teleconference. When the Bank sets the overnight rate on a Tuesday,[7] the MPC meets

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[4]The list of current members, along with their background and affiliations, can be found at http://www.cdhowe.org/monetary-policy-council-2. Members do not receive any financial support from the institute, nor are they asked to adopt a particular ideology in making monetary policy recommendations. Invitations to join the MPC normally come from the president of the CDHI, currently William Robson. He is also the one who first convened the committee when he was the CDHI's director of research. In correspondence with Robson, the MPC is deliberately structured to ensure a "diversity of approaches" about how monetary policy ought to be conducted. Former Bank of Canada employees have never been invited to join the MPC.

[5]An evaluation of this recommended forward interest rate path can be found in Neuenkirch and Siklos (2014).

[6]Clearly, the Bank may receive new information after the CDHI's MPC decision. Whether this delay has a material impact on potential differences between the MPC's recommendation and the Bank's decision is unclear. While the volume of information received by decision makers at the Bank is clearly greater than what the CDHI's MPC likely considers, it is not obvious—unless there is (i) a major crisis between the MPC and GC meeting dates or (ii) some decisive private information available only to the GC—that the gap between MPC and GC meeting days is significant. The timing gap was examined as part of our robustness tests but did not affect our conclusions (results are relegated to the appendix).

[7]In 2013 the regular policy rate announcement was rescheduled to Wednesday to parallel the release of the quarterly Monetary Policy Report.

the previous Thursday. Occasionally, when the Bank announces the policy rate on a Thursday, the MPC will meet the preceding Tuesday. Meetings follow an agenda which has remained unchanged since the MPC's inception.[8]

Each meeting lasts approximately one hour, begins at 11:30 a.m., and ends around 12:30 p.m.[9] The Chair opens the meeting with a roll call, then an introduction that may include a brief overview of the outcome of the last meeting, or some other item of interest to the MPC to start the discussion. From time to time, the Chair will also point out if a committee member has separately submitted some information in advance intended to highlight an area of concern or interest to the MPC.

Members are assigned a rank according to the first letter of their last name. A die is then thrown and this determines which member is asked, at the outset, to express a "bias" concerning the direction of the next policy rate setting. This is referred to as the "straw poll" and it serves to motivate the deliberations that follow. At this stage, there has been no discussion of policy issues or any debate about the appropriateness of the present stance of monetary policy. Put simply, each member provides a numerical value, expressed in fractions of 25 basis points (bps), indicating whether their recommendation at the beginning of the meeting leans toward a rise or a fall in the upcoming policy rate setting. Ostensibly, the objective of the exercise is to give all participants an idea of where each member stands, prior to any group influence. The straw poll is not taken as a commitment but rather helps focus the discussion and provides an ex ante signal of the likely consensus, or lack thereof, inside the MPC.

Next, the meeting considers the latest economic forecasts and outlook presented by the professional economists on the MPC. Members are then encouraged to address questions to the professional economists about their outlook and views concerning the Canadian

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[8]A copy of the agenda is reproduced in the appendix.

[9]Each meeting should be viewed as the conclusion of a process. In between each MPC meeting, there is an implicit expectation that each member, in their own manner, will prepare for the next meeting. Clearly, unlike their counterparts at the Bank (see below), MPC members likely devote relatively less time thinking about the future course of monetary policy.

economy.[10] Much of the remainder of the meeting is then devoted to a discussion during which all members express their views about what issue, domestic and foreign, is likely to influence their position about the current and future direction of the policy rate. The Chair ensures that all members' views are represented. In addition, he encourages everyone to query the views of others and to articulate the principal motivations in support of their recommendations. Generally, the focus of the discussion is on the next interest rate setting decision even though MPC members are subsequently also asked to take a stand on the policy rate settings up to one year into the future.

Just before the discussion ends, the Chair calls for each member's recommendations. Once again, a die is thrown.[11] Each MPC member must recommend the overnight rate setting the Bank should announce at (i) the upcoming meeting, (ii) the meeting thereafter, (iii) the meetings in six months' time, and (iv) the meeting in twelve months' time, keeping in mind the calendar of announcements that the Bank publishes well in advance (July of the previous year).

Each member is also permitted to make a very brief statement to emphasize the reasoning behind their recommendations and to offer advice that the Bank ought to consider. Once all the votes are cast, the Chair reviews the recommendations to ensure they were accurately recorded, announces the recommendations, and concludes the meeting. Members are asked to keep silent until the statement and individual recommendations are published on the CDHI's website at 2:00 p.m. While the statement explaining the outcome of the meeting is prepared by the CDHI, the text reflects the views of the committee as a whole, with any differences of opinion also being noted.

2.2   The Bank of Canada's Governing Council

The Bank of Canada's Governing Council publishes eight times a year a decision about the overnight interest rate target on

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[10]It should be noted that several of the professional economists on the MPC also meet and regularly exchange forecasts and other views about the Canadian economy with Bank of Canada officials.

[11]It is only fairly recently that the identity of the first member to vote has been recorded. Hence, we are unable to control for any "first mover" type of effect in the empirical work reported below.

Wednesdays at 9:00 a.m. (see also footnote 7). The GC consists of six members, namely the Governor, the Senior Deputy-Governor, and four Deputy-Governors. The Governor and Senior Deputy-Governor are appointed by a Board, subject to government approval. The remaining Deputy-Governors are appointed by the Bank. The Bank also publishes, four times a year, a Monetary Policy Report, on the same day as the policy rate announcement. It contains the latest assessment of domestic and global economic conditions as well as the GC's projections, in particular, for inflation and real GDP growth.

A statement accompanies each GC decision that briefly outlines its views and outlook. Decisions are reached through consensus. The GC is a creation of former Governor Gordon Thiessen intended to enhance central bank transparency but has no basis in statute. Accordingly, no votes or minutes are released. It was also under Thiessen's governorship, in November 2000, that fixed announcement dates for the overnight rate were introduced. It was precisely this innovation in policymaking, together with inflation targeting, that inspired the creation of the CDHI's MPC.

The Bank of Canada Act stipulates that monetary policy decisions are communicated by the Governor of the Bank, who is accountable for these decisions. Figure 1 reproduces the illustration used by Murray (2012) to explain the timing and stages in the Bank's decision-making process against the timing of the MPC's recommendations.

The staff recommendations are discussed by the Bank's Monetary Policy Committee—which consists of twelve to twenty senior officers—on the Friday prior to the decision. Every member of this MPC makes an individual recommendation for the policy rate. On the following Monday, the GC goes in camera to make the decision which is released on Wednesday.

In April 2009, the Bank made a commitment to keep the policy rate at the effective zero lower bound until the end of the second quarter of 2010, conditional on the outlook for inflation.[12] At the time, the Bank announced that "with monetary policy now

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[12]Evaluations of this episode suggest that the Bank was effective in communicating the conditionality of the commitment (e.g., see He 2010, Siklos and Spence 2010).

**Figure 1. Stages in the Bank of Canada's
Decision-Making Process**
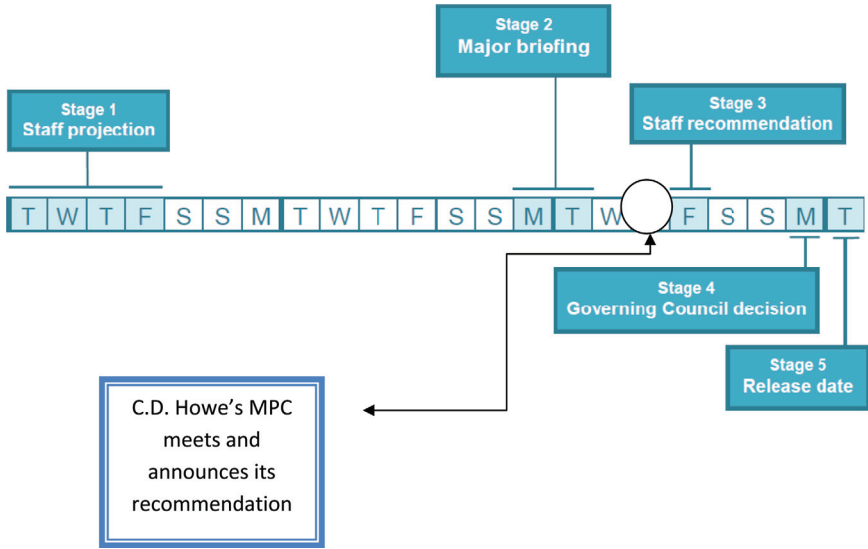
Source: Murray (2012) and authors.

operating at the effective lower bound for the overnight policy rate, it is appropriate to provide more explicit guidance than is usual regarding its future path so as to influence rates at longer maturities. ... The Bank will continue to provide such guidance in its scheduled interest rate announcements as long as the overnight rate is at the effective lower bound."[13] The commitment was repeated each time the Bank set the overnight rate until it was withdrawn in April 2010, ahead of schedule. The target rate was actually raised at the next meeting in May 2010. This episode is considered to be the first example of an explicit form of forward guidance later adopted by other central banks. The original, calendar-based, form of forward guidance introduced by the Bank has since been replaced by state-dependent forms of forward guidance as in, for example, the variants adopted by the Federal Reserve and the Bank of England (e.g., see Filardo and Hofmann 2014).

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[13]See http://www.bankofcanada.ca/2009/04/fad-press-release-2009-04-21.

3. Policy Rate Setting, Consensus, and Disagreement: Specifications and Econometric Issues

3.1 Monetary Policy Reaction Functions

A useful starting point to evaluate potential differences between the MPC and the GC is the Taylor rule (TR), though this rule does have its limitations due to the ultra-low interest rate environment of the past few years. The general specification is written as follows:

$$i_t^\tau = (1 - \rho_0)(\alpha r_t + \beta_0 \tilde{\pi}_{t+12|t} + \beta_1 \tilde{y}_{t+12|t}) + \rho_0 i_{t-1}^{CB}$$
$$+ \rho_1 i_t^{Fed} + \theta \boldsymbol{X}_t + \epsilon_t. \tag{1}$$

Equation (1), for the most part, incorporates a standard TR where the policy rate i_t^τ is set either by the MPC or the GC, together with an interest rate smoothing parameter ρ_0. Both committees must set the current-period policy rate according to the level set by the central bank in period $t-1$.[14] Given the potential role the United States plays in Canadian economic performance, we also control for the impact of the Federal Reserve's current target rate (ρ_1).[15] Following Clarida (2012), the real interest rate r_t is assumed to be time varying and is based on the real return yield on ten-year Canadian Government bonds.[16]

The determinants of the TR include an expected inflation gap $\tilde{\pi}_{t+12|t}$ defined as the twelve-month-ahead inflation forecast minus the stated inflation target of 2 percent. The headline consumer price index forecast by *The Economist* poll of forecasters is used to measure inflation expectations.[17] Furthermore, in proxying the

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[14]If the Bank decides on a policy rate that differs from the MPC's recommended setting, the former is the starting point of discussions at the next MPC meeting.

[15]Like the Federal Reserve, the GC meets eight times a year. Usually, FOMC and GC meetings are held in the same month.

[16]Most estimates of the Taylor rule do not permit a time-varying real interest rate. However, in view of the events during the sample period (i.e., the end of the Great Moderation, the global financial crisis, and the experiment with forward guidance), it is unreasonable to assume that the "neutral" real rate is constant throughout.

[17]This seems appropriate, since the published forecasts are made by financial institutions. Several of their chief economists are, or have been, members of the MPC.

unobservable expected output gap $\tilde{y}_{t+12|t}$, we follow past practice by employing a Hodrick-Prescott (HP) (1997) filter with the standard smoothing parameter of 14,400 for the one-year-ahead real GDP growth forecast by *The Economist*.[18] We chose not to add an exchange rate variable.[19]

We also consider several other determinants of i_t^τ, summarized by the vector $\boldsymbol{X}_t$. These are motivated by events during the global financial crisis and thereafter. First, the VIX volatility index[20] is employed as an indicator measuring financial market stress which is also monitored by the GC and the MPC. Second, the period of credit easing and quantitative easing in the United States is captured by a dummy variable. Third, and most significantly, we include a dummy variable set to 1 during the period of the conditional commitment, that is, when the Bank provided an explicit form of forward guidance (also see section 2.2).[21]

Equation (1) relies on data publicly available at the time of the MPC proposal and the GC decision. As a consequence, the specification is estimated via least squares.[22]

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[18]We also used the Bank's own output-gap series. However, the specification employing forecasts by *The Economist* yields more plausible results, which might reflect the fact that the Bank's forecasts are not updated monthly. The same explanation holds for the Bank's quarterly inflation forecasts.

[19]Inclusion of a U.S. interest rate can be said to indirectly capture any exchange rate motive in policy rate setting. In addition, research on estimated as well as optimal TR (e.g., Clarida 2001, Collins and Siklos 2004) suggests that adding this series does not make much difference to inferences based on the standard or extended TR specifications.

[20]The VIX is the Canadian version of the well-known U.S. VIX indicator. The indicator estimates the thirty-day volatility of the Toronto Stock Exchange that is implied by the Toronto Stock Exchange index options.

[21]As noted in the Introduction, there are claims that persistent deviations from TR-based recommendations may be partly explained by the failure of some central banks to respond to excessive credit growth. Accordingly, we also considered growth rates in two indicators of credit, namely consumer credit and residential mortgage credit. The results are relegated to the appendix.

[22]A referee has suggested that the time-series properties of some of the data may pose problems. In particular, the policy rates (Canada and United States) and inflation may display some evidence of non-stationarity. Conventional unit-root tests suggest that the series are either stationary or non-stationary, depending on the inclusion of a trend or the lag length in the test equation. For this reason, we supplement our results with R^2 values for non-stationary series. See Harvey (1989).

3.2   Consensus within the MPC and Disagreement with the GC

A principal concern in this paper is the information content of individual policy rate recommendations of MPC members. Individual behavior within the MPC effectively amounts to asking whether one can detect any evidence of the concerns sometimes raised about how committee members interact with each other, i.e., "free riding," "groupthink," or the risk of "information cascades" and whether committee decisions are necessarily superior to other forms of decision making (e.g., Mahadeva and Sterne 2000, Morris and Lybek 2004, Sibert 2006, Visser and Swank 2007, Maier 2010, Swank and Visser 2013).

Similarly, disagreements between the MPC and the GC raise a host of questions about the extent to which the two groups see eye to eye and whether the respective composition, size, timing of decisions, and possibly differences in information sets can account for different policy rate recommendations. Clearly, some of the potential determinants of consensus and disagreement are unobservable. Hence, any specification considered is only able to partially deal with the complexities of committees and policy rate setting behavior. The following two specifications are estimated:

$$
\begin{aligned}
Consensus_t = {} & \delta_0 + \delta_1\,Consensus_{t-1} + \delta_2\,\boldsymbol{Y}_t \\
& + \delta_3 Disagreement_{t-1} + \mu_t
\end{aligned}
\tag{2}
$$

$$
\begin{aligned}
Agreement_t^* = \Pr[i_t^{SC} - i_t^{CB} = 0 | Z_t] = {} & \kappa_0 + \kappa_1\,\boldsymbol{Y}_t \\
& + \kappa_1\,Consensus_t + \eta_t
\end{aligned}
\tag{3}
$$

$$
\begin{aligned}
\boldsymbol{Y}_t = \{ & Pros_t, In\text{-}Person_t, Cond.Commit._t, Cut_t, Rise_t, \\
& VIX_t, Infl.\,Volatility_t \}.
\end{aligned}
\tag{4}
$$

Equation (2) considers sources of consensus in committee decisions. We rely on two metrics to measure consensus. First, we rely on the fraction of MPC members who vote in favor of the committee's proposal (*Cons. Share*). Second, we rely on the simple standard deviation of proposals as an alternative since this gives a measure of the range of recommendations (*SD (Ind. Prop.)*).

As explanatory variables, we first employ the respective lagged consensus variable to test for persistence in the degree of consensus within the MPC. Second, we consider the representation of

professionals on the committee and the share of members attending the meeting in person. Third, we control for the conditional commitment period since, during this period, interest rate changes were potentially put on hold, subject to the Bank's inflation outlook.[23] Fourth, the specification reflects whether consensus is asymmetric, that is, whether there are differences between a rate rise or a fall. Fifth, we proxy macroeconomic uncertainty by the VIX volatility index and the conditional volatility of inflation obtained by estimating a GARCH(1,1) model. Finally, we test if past disagreements in policy recommendations between the MPC and the GC influences consensus within the MPC.[24] Equation (2) is estimated via OLS.[25]

Equation (3) transforms non-zero differences between the actual GC decision and the MPC recommendation into a binary variable (0 = disagreement, 1 = agreement). The purpose is to obtain, via probit estimation, estimates of the probability of agreement between the shadow and formal monetary policy committees, conditional on the set of observables in (4) and the current degree of consensus within the MPC.

## 4.   Stylized Facts and Empirical Results

4.1   Stylized Facts

Figure 2 plots the GC's policy rate, the MPC's recommendation, and the federal funds rate. It clearly reveals that there have been persistent differences between U.S. and Canadian policy rates. Until early 2005 the Bank's overnight rate was usually higher than its

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[23]As previously noted (see section 2), MPC members are not aware of the contents of the Bank's upcoming projections. These are published in the Bank's Monetary Policy Report released on the same day as the policy rate announcement is made.

[24]We also estimate a version of (2) where consensus in the actual poll is a function of MPC members' consensus in the straw poll. Put differently, adding this variable could be construed as reflecting the "distance" between an initial and a final position.

[25]We do not report the results for consensus in the straw poll as a left-hand-side variable since participants are forced to give a 25 bps interval rather than a single value. As suggested by one of the referees, this adds a lot of noise to each participant's outlook going into the meeting and leads to mostly insignificant coefficients for the explanatory variables. However, the results are relegated to the appendix for interested readers.

Figure 2. MPC Recommendation, GC Target Rate, and Federal Funds Target Rate
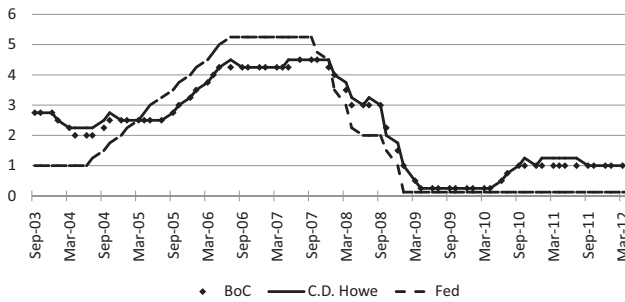
Source: CDHI, Bank of Canada, and FRED II (Federal Reserve Bank of St. Louis). The vertical axis is in percent.

Figure 3. Differences between the GC Target Rate and the MPC Recommendation
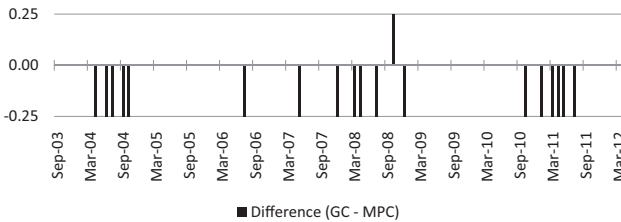
Source: Authors' calculations. The vertical axis is in fractions of 1 percent (i.e., basis points).

U.S. counterpart. A reversal takes place until the global financial crisis hits the U.S. economy in late 2007. Since then, the federal funds rate remains below the Bank's policy rate. Figure 2 also suggests that while the MPC and the GC are not too far apart in their views about the appropriate setting for the policy rate, differences do emerge and can remain persistent for some time.

Figure 3 plots the differences between the GC policy rate and the median MPC proposal. The MPC has tended to almost always recommend a policy rate that is higher than the one actually set by the GC in the case of disagreement between both committees. The only exception is in October 2008, right after the internationally coordinated interest rate cut of 50 bps. At the time, there were

**Figure 4. Minimum, Median, and Maximum Policy Rate
Recommendations from MPC Members**
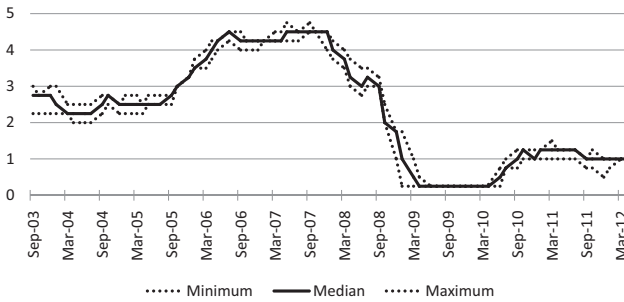
Source: CDHI and authors' calculations. The vertical axis is in percent.

several announcements from the United States aimed at stemming
the impact of the worsening financial crisis. This may have influ-
enced the MPC to recommend a 25 bps lower policy rate target
than the GC later adopted.

Figure 4 provides an indication of the range of policy rates based
on the individual recommendations of MPC members. It is interest-
ing that gaps between the most hawkish and most dovish recommen-
dations persist over time except during the period of the conditional
commitment and, more recently, when central banks, including the
Bank of Canada, have emphasized that policy rates are likely to
remain low for some time.

4.2   Monetary Policy Reaction Functions

Next, we compare the two committees through the device of the
TR. Table 1 presents estimates for the MPC (top panel) and the
GC (bottom panel) for several variants of equation (1).[26]

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[26]In addition to the determinants previously discussed, we also considered (i)
changes in the TED spread (i.e., the change in the difference between the yield
on three-month Canadian prime corporate papers and Treasury bills of the same
maturity), (ii) interaction terms wherein the proportion of professionals in the
shadow committee affects the reaction to inflation and output forecasts, and (iii)
the bias of the MPC based on future policy rate recommendations. The latter two
variations appear to play no statistically significant role in explaining the policy
rate recommendations. A rise in the TED spread has a significantly positive effect
on the recommendation. These results are relegated to the appendix.

Table 1. Taylor-Rule Estimates for the CDHI's MPC and the Bank of Canada's GC

	(1)	(2)	(3)	(4)
CDHI's MPC				
Lag BoC Target Rate	0.837***	0.877***	0.833***	0.790***
Lag Fed Target Rate	0.091***	0.052**	0.070**	0.115***
Real Bond Yield	1.438***	2.366***	1.581***	1.479***
Inflation Forecast Gap	1.177*	1.070*	0.800	−0.392
GDP Forecast Gap	1.192**	0.515	0.804**	0.508
VIX-20 Index		−0.008***		
Credit Easing/ Quantitative Easing			−0.146**	
Cond. Commitment				−0.286**
S.E. of Regression	0.180	0.158	0.169	0.174
Observations	105	105	105	105
R^2	0.985	0.988	0.987	0.986
Harvey's R^2	0.202	0.397	0.303	0.261
Bank of Canada's GC				
Lag BoC Target Rate	0.808***	0.836***	0.805***	0.787***
Lag Fed Target Rate	0.122***	0.095***	0.103***	0.133***
Real Bond Yield	1.097***	1.773***	1.321***	1.163***
Inflation Forecast Gap	1.131*	1.053*	0.777	0.304
GDP Forecast Gap	0.836**	0.339	0.549**	0.520
VIX-20 Index		−0.006***		
Credit Easing/ Quantitative Easing			−0.135***	
Cond. Commitment				−0.128*
S.E. of Regression	0.149	0.135	0.137	0.148
Observations	105	105	105	105
R^2	0.989	0.991	0.991	0.990
Harvey's R^2	0.334	0.455	0.441	0.348

Notes: Estimates are for equation (1). OLS is used. ***/**/* indicates significance at the 1 percent/5 percent/10 percent level. Newey-West (1987) standard errors are used. The table reports estimates for the steady-state coefficients for α (real bond yield), β_0 (inflation gap), and β_1 (output gap). The inflation and output forecast gaps are based on one-year-ahead forecasts of inflation and real GDP growth from *The Economist*. An HP filter is used to estimate the gap with the standard monthly smoothing filter.

Focusing on the steady-state parameter estimates, we find that the (time-varying) real interest rate of the MPC is consistently higher than the one implicit in the GC's TR.[27] Next, the MPC and GC are equally dovish in response to inflation surprises,[28] as the steady-state estimate of the inflation parameter is well below the 1.5 recommended by Taylor as reflecting best practice in maintaining inflation on "target."[29] Finally, the MPC is considerably more responsive to the output gap than its GC counterpart.

If the specifications are conditioned on periods when "unconventional" policies are in place, these clearly replace inflation as the primary driver of lower policy rate recommendations. In particular, the Bank's conditional commitment has a significantly larger negative effect on the MPC's recommendation than on the policy rate set by the GC. This might imply that the credibility of the Bank's conditional commitment has convinced the MPC to pause proposing interest rate changes as well. Alternatively, members of the MPC may have felt that, once announced, it was very important for the Bank to honor its conditional commitment, irrespective of whether they agreed with it or not. This would also partly explain the disappearance of the gap for the most hawkish and most dovish MPC recommendation shown in figure 4.

As previously stressed, possibly the most notable difference between the MPC and the GC is that the individual recommendations of the shadow committee are published. Consequently, we are also able to investigate if there are differences in the reaction functions across MPC members.

The first column of table 2 reproduces the baseline TR estimate found in table 1. Next, we examine the recommendations of two MPC members who, based on the historical experience, have consistently been either below the MPC recommendation ("dovish") or above the median recommendation ("hawkish"). As seen from

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[27]Note that this and the following conclusions are based on the comparison of point estimates unless otherwise stated.

[28]Statistical testing confirms that there are no significant differences in the MPC's and GC's reaction to inflation.

[29]Wald tests confirm that the inflation coefficient is statistically different from 1.5 for specification (4) in the case of the MPC (at the 1 percent significance level) and specifications (3) and (4) in the case of the GC (at the 5 and 1 percent significance levels, respectively).

Table 2. Taylor-Rule Estimates for the MPC Dove and Hawk

	(1)	Dove	Hawk
Lag BoC Target Rate	0.837***	0.718***	0.918***
Lag Fed Target Rate	0.091***	0.169**	0.035
Real Bond Yield	1.438***	0.993**	3.024***
Inflation Forecast Gap	1.177*	−0.255	3.586**
GDP Forecast Gap	1.192**	1.517*	0.833
Average Diff. to Median Proposal		−0.091	0.152
S.E. of Regression	0.180	0.334	0.196
Observations	105	69	46
R^2	0.985	0.949	0.983
Harvey's R^2	0.202	−0.384	0.699

Notes: Estimates are for equation (1). OLS is used. ***/**/* indicates significance at the 1 percent/5 percent/10 percent level. Newey-West (1987) standard errors are used. The table reports estimates for the steady-state coefficients for α (real bond yield), β_0 (inflation gap), and β_1 (output gap). The dove (hawk) is a time series of the recommendations of a member who consistently votes for a policy rate below (above) the recommendation of the MPC. The inflation and output forecast gaps are based on one-year-ahead forecasts of inflation and real GDP growth from *The Economist*. An HP filter is used to estimate the gap with the standard monthly smoothing filter.

table 2, the dove pays less attention to the GC's previous setting, while the opposite is true for the hawk on the committee. Further, the dove seems unresponsive to inflation, while the hawk not only responds positively to inflation shocks but does so by a magnitude that exceeds the Taylor recommendation for good practice in monetary policy by a wide margin. In contrast, the dove responds strongly to output fluctuations, while the hawk is unresponsive to real shocks emanating from GDP forecasts. Finally, the dove is clearly distinguished from the hawk based on the estimated steady-state real interest rate, with the dove's estimate being a third lower than the hawk's estimate. This suggests considerable diversity of opinion inside the MPC. Interestingly, the professional/academic distinction appears to matter less than the difference between hawks versus doves when viewed through the lens of the TR (see the appendix posted on the Central Bank Communication network website, http://www.central-bank-communication.net/).

Table 3. Consensus within the CDHI's MPC

Dependent Variable	Cons. Share	SD (Ind. Prop.)	Cons. Share	SD (Ind. Prop.)
Constant	0.516***	0.066**	0.450**	0.048
Lagged Dependent Variable	0.311*	0.283**	0.280	0.206
Consensus Straw Poll	–	–	0.071	0.344*
Professional Share	0.282	−0.056	0.383**	−0.093
In-Person Voting Share	−0.124	−0.043	−0.120	−0.017
Cond. Commitment	0.142**	−0.086***	0.117*	−0.072***
Lag (Diff (MPC – GC))	−0.232	0.141*	−0.215	0.142*
Proposal: Cut	−0.152**	0.049**	−0.149**	0.040*
Proposal: Hike	−0.094*	0.012	−0.107**	0.018
VIX Index	−0.001	0.002**	−0.001	0.001
Cond. Infl. Volatility	0.002	−0.001	−0.013	0.009
Observations	68	68	61	61
S.E. of Regression	0.145	0.049	0.146	0.048
R^2	0.547	0.649	0.520	0.650

Notes: Estimates are for equation (2). OLS is used. ***/**/* indicates significance at the 1 percent/5 percent/10 percent level. White (1980) standard errors are used.

4.3 Consensus within the MPC and Disagreement with the GC

Table 3 displays estimates of various specifications for equation (2). The results apply only to the MPC since the Bank does not release information about the individual positions taken by GC members.

Focusing on the results in the first and second column, consensus (or the lack thereof) is persistent, as the first lag is statistically significant for both indicators, that is, the share of votes in favor of the MPC proposal and the standard deviation of individual proposals. Second, policy rate cuts and hikes yield less consensus.[30] Third, past disagreement between the GC and the MPC also significantly reduces consensus in the MPC's current meeting. When overall

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[30]Note that a positive sign indicates greater consensus in the case of the indicator based on the share of votes in favor of the proposal, whereas in the case of the standard deviation indicator, a negative sign implies more consensus, i.e., a decrease in the standard deviation.

economic signals are uncertain, leading to disagreement between both committees, this is also reflected in a wider variety of views within the MPC. Fourth, in line with the previous interpretation, higher stock market volatility leads to less consensus inside the MPC. Finally, and perhaps most interestingly in terms of whether certain forms of central bank communication can help anchor expectations, the Bank's conditional commitment had a statistically significant impact on the degree of consensus inside the MPC. It raises the share of members who support the recommendation and reduces the variability of policy rate proposals.[31]

Next, we turn our attention to investigating the determinants of the agreement between the MPC and the GC. The results are shown in table 4.

When consensus in the MPC is higher, this increases the likelihood that both committees agree on the preferred level of interest rates. In addition, the period of the conditional commitment contributed to raising the agreement between the MPC and the GC as well. Hence, differences between the respective stances taken by the GC and the MPC dissipated during the roughly one-year period when the conditional commitment was in place. Finally, allowing for asymmetry between rate hikes and cuts proves to be important. While proposed rate hikes significantly increase differences of opinion between the MPC and the GC, rate cuts have no significant impact on disagreement. This may well reflect the relatively greater degree of hawkishness of the MPC's median member compared with the GC's position.

4.4   Counterfactual Analysis

In view of the influence of the conditional commitment on the MPC's median recommendation, we felt it was useful to investigate its

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[31]An interesting finding is that, when we add the degree of consensus in the straw poll as an additional determinant (third and fourth columns), the variable is significant only for one of the two indicators, the standard deviation of individual proposals (and only at the 10 percent level). Thus, there is no robust relationship between consensus in the straw poll and consensus in the actual poll. Whether this difference reflects the impact of groupthink or conveys the effect that committee discussions have on the outcome of individual decision makers is unclear. Nevertheless, the outcome suggests that there may be interesting information content in the differences between the actual published polls relative to the straw poll taken.

Table 4. Determinants of Disagreement between the MPC and the GC

Consensus Indicator	Cons. Share 1.162***	SD (Ind. Prop.) −1.833**
Professional Share	−0.256	0.041
In-Person Voting Share	−0.120	−0.443*
Cond. Commitment	0.730***	1.109***
Proposal: Cut	−0.088	−0.125
Proposal: Hike	−0.264***	−0.371***
VIX-20 Index	−0.001	0.001
Cond. Infl. Volatility	−0.140	−0.281*
Observations	69	69
LR Statistic	321.02***	315.07***
Pseudo Log-Likelihood	−19.128	−25.248
Pseudo R^2	0.529	0.378

Notes: The dependent variable is a dummy variable measuring if the BoC's GC was following the CDHI's MPC proposal or not (1 = Yes, 0 = No). The table shows average marginal effects for probit estimations of equation (3). ***/**/* indicates significance at the 1 percent/5 percent/10 percent level. Huber (1967)/White (1980) robust standard errors are used.

impact on the shadow committee's views about inflationary developments. Consequently, we consider a counterfactual experiment which asks the following: supposing that the conditional commitment essentially represented the GC's attempt to temporarily set the neutral real rate to zero,[32] what inflation path for the median MPC member would have been consistent with such an outcome?

For that purpose, we estimate a simple autoregressive distributed lag (ADL) model for inflation which includes lags of inflation, the output gap, the GC's target rate, and the real interest rate.[33] The solid line in figure 5 shows the observed inflation rate. The dashed line represents the fitted values from the ADL model with a time-varying real interest rate and relying on the GC's policy rate. The dashed line shows the counterfactual path for inflation when two

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[32]Presumably, as a device to communicate, as clearly as possible, a commitment to ease policy for an extended period of time.

[33]Lag length is determined based on a joint significance test of each additional lag.

Figure 5. Inflation Rates: Observed, Fitted, and Counterfactual
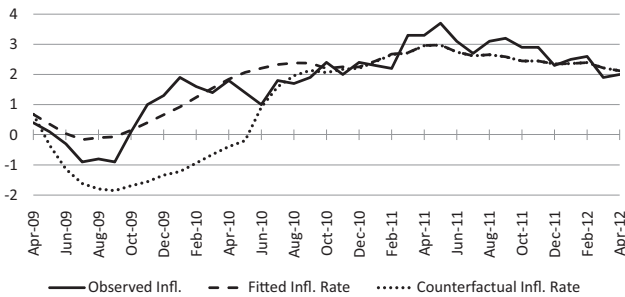
Notes: The vertical axis is in percent. The solid line is CPI inflation. The dashed line is the MPC's inflation path derived from the ADL model described in the text. The dotted line is the MPC's inflation path, assuming that the neutral real interest rate is set to zero and the MPC's median policy rate recommendation is followed but only during the period of the conditional commitment (April 2009–April 2010). The model is estimated over the period July 2003–April 2012.

variables from the ADL model have been replaced with their counterfactual values. This means that the neutral real interest rate is restricted to zero and the MPC's median recommendation replaces the GC's policy rate setting during the period April 2009–April 2010.

Figure 5 shows what inflation path the median MPC member had in mind under the counterfactual against observed inflation. The counterfactual effectively implies a temporary deflation of almost 2 percent by October 2009, thereafter rising sharply in early 2010 to around the Bank's inflation target of 2 percent by April 2010, when the commitment was removed by the Bank. Thus, the Bank's conditional commitment had the desired impact, and the MPC effectively treated the episode as leading back to the inflation target by the time the commitment ended.[34] This reinforces the potential impact of forward guidance in monetary policy. Whether guidance beyond the next interest rate decision is, in fact, a successful device is not immediately clear, however. After all, the timing of the

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[34]Standard-error bands (not shown) confirm that the counterfactual inflation path was statistically significantly lower throughout the December 2009–April 2010 period. Hence, it took some time for the MPC to adjust its view of the likely inflation path.

conditional commitment, arguably introduced at the height of the crisis, may also reflect a response by members of the MPC, and the Bank, to the unfolding of events in financial markets as well as to the ongoing poor economic environment.

5.   Conclusions and Policy Implications

In this paper, we examine the policy rate recommendations of the Bank of Canada's Governing Council relative to its shadow, the C.D. Howe Institute's Monetary Policy Council. In addition, we examine what determines the likelihood of consensus inside the MPC. Finally, we consider several factors in explaining disagreement between the GC and the MPC. The sample consists of seventy interest rate decisions between September 2003 and April 2012 and covers the Bank's conditional commitment to keep the policy rate at the zero lower bound. Our principal conclusions are as follows.

First, differences between both committees are small but persistent. In the case of disagreement between the committees, the MPC has tended to almost always recommend a policy rate that is higher than the one actually set by the GC. These differences are partly driven by the fact that the MPC assumes a higher steady-state real interest rate than its GC counterpart. In contrast, there are few differences in both committees' responses to inflation and output shocks. Finally, the period of the Bank's conditional commitment had a measurable impact on the MPC's views about future inflationary developments. This result is supported by a counterfactual experiment which finds that the median MPC member's inflation path decreases quickly once the conditional commitment policy is announced.

While comparisons between the two committees can yield useful insights, there are interesting additional results to be gained by investigating individual recommendations from the MPC since these are observable, while those of its counterparts in the GC are not. There is relatively less consensus inside the MPC when rates are rising or falling than when they remain unchanged. Differences between the MPC's and the GC's recommendations are least notable when there is consensus inside the MPC.

It appears that we can learn something from the comparison of a shadow committee and its counterpart formally responsible for the

conduct of monetary policy in Canada. Recently, there has been a resurgence in outsiders expressing independent opinions about the appropriate stance of monetary policy. This kind of development is helpful to central banks who seek to be transparent and accountable. Transparency and accountability also demand that central banks explain their actions and provide sufficient information to enable the public to understand why certain policy decisions are made. One way of independently assessing the value of monetary authorities' decisions is simply to provide the public with a second opinion, which is the MPC's task.

Our findings also suggest some policy implications. In spite of the variety of views and backgrounds of the members of the MPC and the GC, it is likely that similarity in training and experience contribute to narrowing the differences between the two monetary policy committees. In addition, there is the over-arching constraint imposed by inflation targeting and the transparency associated with such a regime. If the policy regime faced by the MPC was different, there may well be more disagreement about the appropriate policy stance.[35]

Conditional commitments, or forward guidance, of the kind the Bank of Canada introduced in 2009 influence the views of those who shadow monetary policy. Nevertheless, it remains to be seen whether calendar-driven forms of forward guidance are superior to threshold-based attempts, such as the variants introduced by the Federal Reserve or the Bank of England. While such forms of policymaking may be temporary, they ought to be used sparingly and in crisis conditions only since the risk of reputational loss may well prove significant and the task of communicating such commitments is difficult.

Finally, diversity within the MPC does not appear to pose any particular difficulties in setting the appropriate stance of monetary policy, nor do differences in views appear so large as to threaten the ability of diverse opinions to provide useful informed opinion about monetary policy actions. Inflation targeting, together with adequate transparency and accountability, provides the necessary constraint to ensure that there is some value in airing differences in opinion.

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[35]Neuenkirch and Siklos (2013) provide such evidence in the case of the European Central Bank.

Consequently, consideration should be given to formally recognizing and defining the responsibilities of the Governing Council. Explicit recognition of the committee structure as a means of delivering monetary policy has spread around the world, and there is no reason why this approach should not be followed in Canada.

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