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Time to Change the Bank of Canada's Mandate

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"Twenty-five years ago, in 1991, Canada adopted an inflation-targeting framework to guide its monetary policy. During this time, Consumer Price Index (CPI) inflation has been reduced and maintained at a level of close to 2 per cent, with no persistent episodes of inflation outside of the 1-to-3 per cent inflation-control range."

2016 Renewal of the Inflation-Control Target

Asya Kostanyan and Douglas Laxton

November 11, 2020

Abstract

A very important foundation of Canada's macro-policy framework is that every five years the Government of Canada (GoC) and the Bank of Canada (BoC) reconsider and agree upon the objectives of monetary policy for the next five years. On the basis of reviewing international best practices, this paper argues that it's time to change the mandate to emphasize that, while price stability should remain the primary objective of monetary policy, full employment is also a very important objective. Specifically, we recommend the creation of a formal and accountable monetary policy committee (MPC) and enshrining the dual mandate (price stability and full employment) into law as New Zealand has recently done and explicitly giving more meaning to the price stability objective by adopting flexible average-inflation targeting. The paper argues that an important benefit of the dual mandate is that it would help reduce the risks associated with the effective lower bound (ELB) on the policy rate by incentivizing the BoC to use its instruments aggressively to combat periods of large economic slack and excessive unemployment, such as what was experienced after the global financial crisis (GFC). The dual mandate would also encourage the fiscal authorities to provide a backstop when conventional monetary policy space is constrained by the ELB. We also recommend higher levels of transparency so that Canada can rejoin the club that has the topmost transparent inflation-targeting central banks (CBs) in the world.

JEL Classification Numbers: C5, E5, E6.

Keywords: Dual Mandate, Flexible Average-Inflation Targeting, Monetary Policy, Fiscal Policy.

I. Introduction

In 2019 New Zealand created a formal monetary policy committee (MPC) and enshrined the dual mandate (price stability and full employment) into their CB law and the policy targets agreement between the government and the Reserve Bank of New Zealand (RBNZ).[1] This, combined with higher levels of other forms of transparency about the analytical framework and decision-making process has put RBNZ back into the club of the top 3 most transparent CBs in the world (Czech National Bank, Sveriges Riksbank, and New Zealand Reserve Bank).[2] Canada has fallen well behind these transparency leaders, but could easily catch up if it followed these CBs and improved transparency about monetary policy objectives and the monetary policymaking process. This paper provides a package of proposals about how the BoC and GoC could improve inflation targeting (IT) in Canada and deal more decisively with the effective lower bound (ELB) without raising the long-term 2 percent numerical objective. One important advantage of the proposal is that it would also be helpful for income distribution issues by recognizing that better monetary policy choices would result in lower uncertainty in real income and wealth by reducing uncertainty in the future price level and unemployment. These changes would obviously not solve all income and wealth distribution issues, but if communicated clearly they would more effectively delineate what the BoC can and cannot achieve with their monetary policy instruments. Unfortunately, in Canada and many other countries, CBs are being blamed for low interest rates when in fact market forces are responsible for persistently low interest rates.[3]

The paper goes beyond technical modeling issues. It focuses more on practical implementation issues about what the GoC and BoC would have to do to achieve a state-of-the-art macro-policy framework. It is based to a large extent on an IMF book ("Advancing the Frontiers of Monetary Policy", edited by Tobias Adrian, Douglas Laxton and Maurice Obstfeld) that took stock of international best practices on advancing the frontiers of monetary policy as well as recent work completed since then.[4] Chapter 9 of the book, edited by Tobias Adrian, Douglas Laxton and Maurice Obstfeld, is focused on how to improve IT in Canada by adopting a dual mandate and becoming more transparent and accountable. This paper summarizes those arguments and extends them by developing the case for average-inflation targeting

[1] For the purpose of this paper we will assume that the output gap is a sufficiently reliable statistic to measure full employment. Consequently, the paper will focus on managing the short-run output-inflation tradeoff.

[2] See Haworth, Kostanyan and Laxton (2020).

[3] Given this environment of low rates of productivity growth and the neutral interest rate, a number of authors have been pushing for a comprehensive set of policies that include structural reforms and debt-financed increases in government investment. See Gaspar and others (2016) and Blanchard and Summers (2017). This paper proposes a fiscal backstop do deal with the effective lower bound on interest rates. It could be based on a combination of targeted and non-targeted transfers to low and middle-income households to support the economy when there is significant economic slack in the economy.

[4] See Adrian, Laxton and Obstfeld (2018a, b, c) on advancing the frontiers of monetary policy as well as 2 recent papers. For examples, see Al Mashat and others (2018a) and Haworth, Kostanyan and Laxton (2020) that develop better measures of monetary policy transparency that are in line with the principles of inflation-forecast-targeting CBs. See also Laxton and others (2019) for a methodology to measure the output gap. Constructing monetary-policy-relevant output gaps is necessary to communicate how the CB is managing the short-run output-inflation tradeoff.

(AIT).[5] In addition, having extensive experience working with CBs developing state-of-the-art monetary policy frameworks, we spell out what the BoC and GoC would need to do to implement measures to support these broad objectives.

The remainder of this paper is organized as follows. Section II reviews the principles of dual-mandate inflation-forecast-targeting (IFT) regimes. These regimes are the most open and transparent in the world and are much more efficient in terms of managing the short-run output-inflation tradeoff than other CBs such as the Bank of Japan and ECB, both of which have allowed periods of sustained economic slack and below-target inflation. The approach in this paper is to highlight the key analytics and framework-design features that account for the success of the top 3 most transparent CBs (Section III) and then take the best from each of these CBs to design a specific proposal to improve inflation targeting in Canada. In Section IV we also provide some analytical results to explain the benefits of a dual mandate and average inflation targeting. The model in Section IV is kept deliberately simple to illustrate the key points. Obviously, the BoC would need core models that were adequately tested to ensure that they behave sensibly based on a dual-mandate objective function and average inflation targeting. Section V provides a foolproof approach based on a fiscal backstop to escape from a low inflation trap with deflationary risks. Section VI summarizes the key findings and provides detailed recommendations.

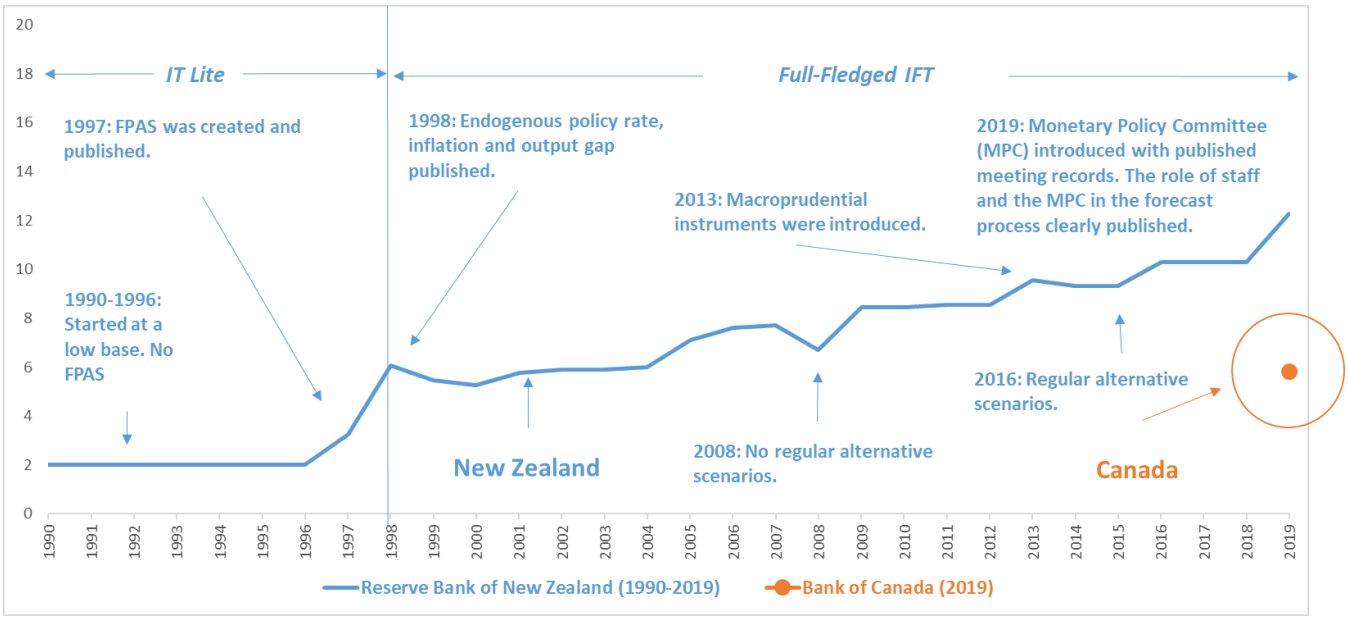
[5] Since the time that we drafted this paper, the Fed has announced a new framework that combines the dual mandate and AIT. Importantly, they have demonstrated how AIT can be implemented in a very flexible way. See speeches by chairman Powell (August 27, 2020), Williams (October 7, 2020) and Clarida (October14, 2020). The Better Policy Project provides training to central banks that are interested in developing analytical frameworks to support both dual mandates and flexible AIT. See https://www.thebetterpolicyproject.org/about-6.

II. Principles of IFT Regimes

Underlying IFT is the principle that, given a long-term objective for the rate of inflation, the CB's own forecast of inflation is an optimal, conditional, intermediate target. This is because the forecast, in principle, embodies all the relevant information available to the CB, including knowledge of the policymakers' preferences about the trade-off between deviations of inflation from target and output from potential as well as the bank's view of the monetary policy transmission mechanism. Box 1 summarizes the key features of IFT regimes and is based on Clinton and others (2015) and Al-Mashat and others (2018b, c, d, e, f, g, h) study of best practices.

Transparency is the foundation for accountability. IFT regimes have very high levels of transparency and accountability. Transparency starts with setting the objectives of the CB and ensuring that the CB's choices are consistent with these objectives.

Figure 1. CBT-IT Transparency Index for the Reserve Bank of New Zealand and Bank of Canada



Source: Haworth, Kostanyan and Laxton (2020) and Authors' Calculations.

Box 1. What is Inflation-Forecast Targeting (IFT)?

Basic features of IFT:

- Monetary policy uses the instruments (typically the policy interest rate) to achieve an official low-inflation target over the medium term.
- CB's inflation forecast is an ideal intermediate target for managing the short-term output-inflation trade-off.
- Staff forecast is a key input into the decision of the MPC, but only one input among others—committee members need not agree with the forecast and can incorporate other information into their decision-making.
- Staff uses a core model, with standard macroeconomic properties, to derive the forecast. The model-based forecast provides a basis both for policy decisions and for explaining the economic logic underlying these decisions in public communications. (The forecast path for the short-term interest rate—the policy instrument—is endogenous in the model, with the rate varying to achieve the long-term inflation target and managing the short-run output-inflation tradeoff).

Pragmatic requirements within the CB for an operational IFT regime:

- Structured forecasting and policy analysis system maintains relevant databases and produces a model-based staff forecast and associated economic analysis on a regular schedule.
- Policymakers and technical staff maintain communications to ensure that the forecast addresses the main broad concerns of the MPC.
- Forecast team presents policymakers with the forecast—which at least once a quarter would come from a full forecasting exercise, or in between from an update just to the main variables—shortly before each rate-setting meeting.

IFT also implies a transparent communications strategy. A typical schedule following a policy decision is as follows:

- Same-day announcement (press release) sketches a brief rationale.
- CB governor gives a review of the policy decision and the economic outlook at a press conference. Staff members may answer the more technical questions.
- A Monetary Policy Report or Inflation Report explains in greater depth the rationale for the policy actions. The report provides the baseline forecast path, usually quarterly, for the main goal variables, inflation and output growth, and for other macroeconomic variables. The latter include a conditional forecast for the short-term interest rate, for most CBs just in general qualitative terms, but for the full-fledged inflation-forecast targeters it is an explicit numerical path that is used as a frame of reference by policymakers for policy deliberations as well as easier and more consistent forward-looking communications.
- Presentations and publications underline conditionality and uncertainty by showing confidence bands around the baseline for relevant variables and by considering alternative scenarios with different assumptions germane to the economic conjuncture. These exercises do not just warn of the risks; they also give the public insight into how the CB might respond to a range of shocks.

Haworth, Kostanyan and Laxton (2020) review the history of IFT in New Zealand including the changes adopted in 2019 when they created a formal MPC and enshrined the dual mandate (price stability and full employment) into CB law and the Policy Targets Agreement (PTA).[6] Haworth, Kostanyan and Laxton (2020) also report historical measures of CB transparency for New Zealand and the Czech Republic, two of the top leaders in CB transparency. The CB-IT methodology developed by Al Mashat and others (2018a) and used to create these transparency measures are based on the principles of IFT regimes (Box 1) and have been designed specifically for evaluating IT regimes.[7] The three broad categories included in the CBT-IT are transparency about objectives, forecasting and policy analysis systems and the policy process. Figures 1 and 2 present the historical measures for New Zealand and the Czech Republic as well as the 2019 value for Canada.[8]

The stories for New Zealand and the Czech Republic are very similar. Transparency was very low in the early days of inflation targeting (IT) before these CBs had developed model-based, forward-looking Forecasting and Policy Analysis Systems (FPAS) specifically designed to support Inflation-Forecast Targeting. The Reserve Bank of New Zealand, which was the first CB to adopt IT in 1990, did not have a forward-looking FPAS in place until 1997, but then jumped straight to full-fledged IFT by publishing an endogenous policy rate path with inflation and the output gap in 1998. The Czech National Bank (CNB) could not maintain a peg and was thrown into the IT world in 1998. It published a book with an FPAS in 2003, but instead of immediately publishing the endogenous policy rate path, the CNB chose to simply use words to describe it. However, by 2008 policymakers at the CNB were sufficiently comfortable with the FPAS that they decided to publish the path for the policy rate. Many CBs have followed the lead of the RBNZ and CNB, finding that publishing the policy rate path actually simplifies communications and improves the effectiveness of the monetary transmission mechanism.

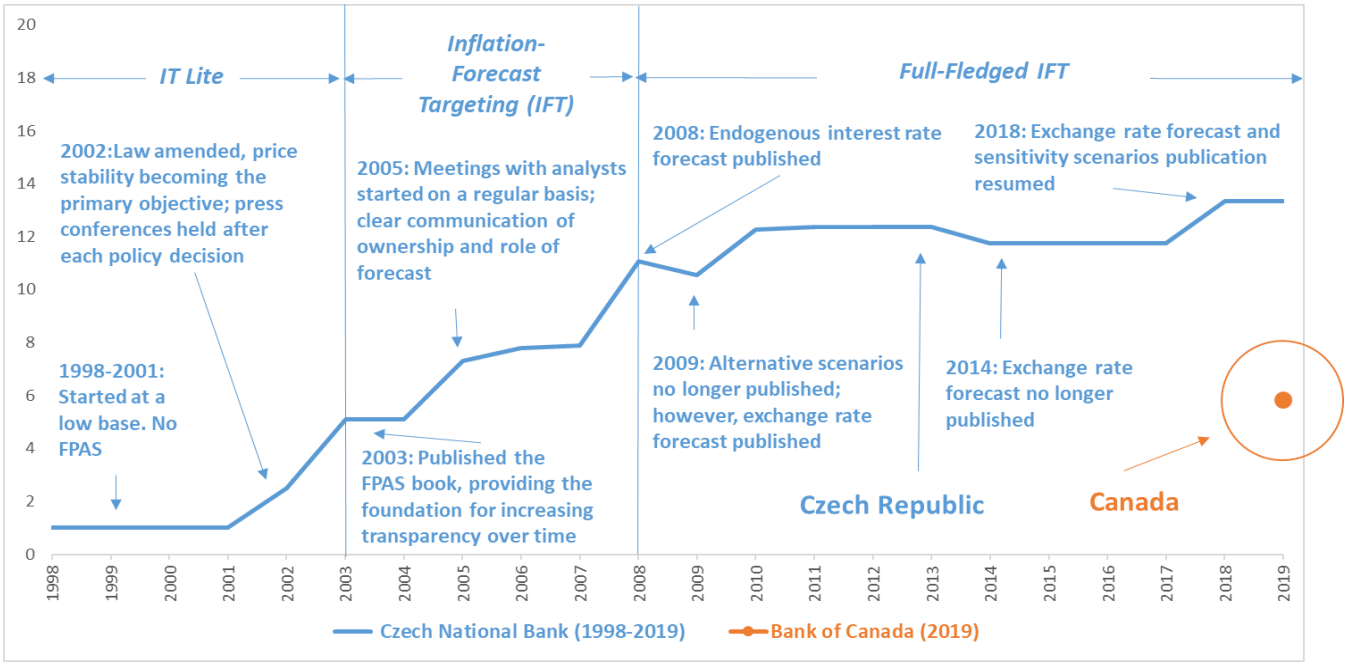
At a Bank of Canada conference on September 14, 2017, several prominent monetary policy experts were invited to discuss potential improvements to monetary policy in Canada. This included potential changes in the mandate as well as measures to improve transparency. At the conference, Svensson summarized his key recommendations in the last slide of his presentation, which is reported in Table 1. Svennson argues that not publishing the path of the policy rate is an incomplete decision-making process and effectively amounts to hiding the most important information.

[6] Inflation-Forecast Targeting is sometimes referred to as Flexible-Inflation Targeting. See, for example, Haworth, Kostanyan and Laxton (2020).

[7] The Dincer-Eichengreen transparency index covers many countries and regimes, but lacked a theoretical framework for designing questions to distinguish between frameworks. As a result, many of the results seem counterintuitive to monetary policy experts that know the details of specific regimes. Dincer's important contribution to the CBT-IT transparency index project was to employ the principles of IFT regimes in designing better questions for the CBT-IT index.

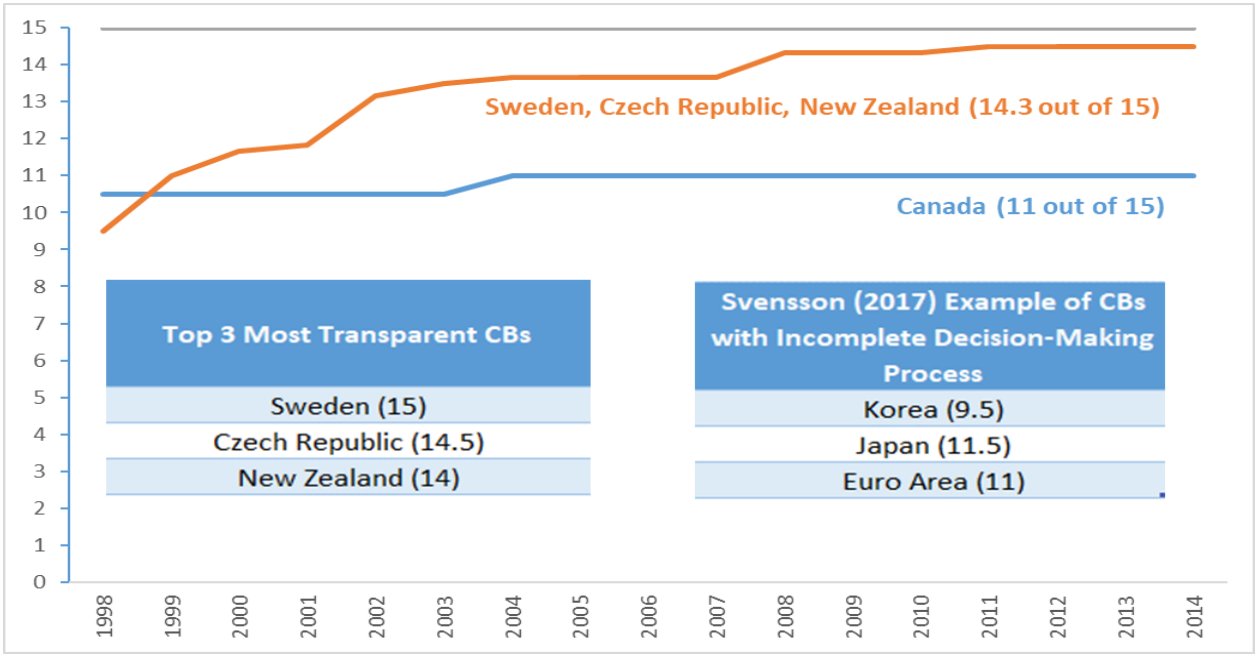
[8] Details about the scoring for Canada, New Zealand and the Czech Republic can be obtained by contacting Douglas Laxton at laxtoneconomics@gmail.com.

Figure 2. CBT-IT Transparency Index for the Czech National Bank and Bank of Canada.



Source: Al-Mashat and others (2018) and Authors' Calculations.

Figure 3. Dincer-Eichengreen (2014) Central Bank Transparency Index, 1998-2014.

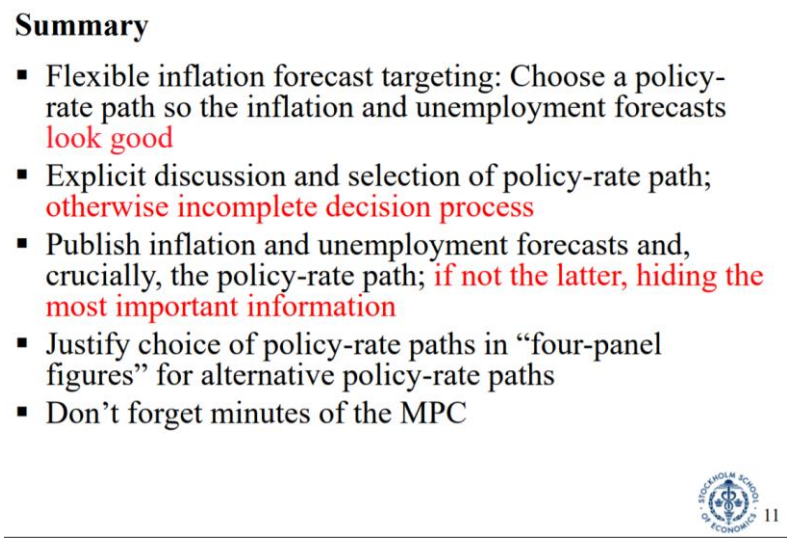


Source: Dincer and Eichengreen (2014).

According to Dincer-Eichengreen (2015) measures of transparency, the top 3 transparent CBs are Sweden, New Zealand and the Czech Republic. According to Svensson's definition all three have a complete decision-making framework in that they publish a complete macroeconomic forecast including an endogenous path for the policy rate designed to steer inflation back to a well-defined

point target—see Figure 3. Their transparent monetary policy regimes have been very successful in helping to anchor long-term inflation expectations at their clearly defined long-term objectives for inflation.

Table 1. Lars Svensson's Presentation at the BoC's Conference on "Monetary Policy Framework Issues: Toward the 2021 Inflation-Target Renewal" in 2017.[9]



By contrast, the Bank of Japan, the ECB and the Bank of Korea are examples of CBs that do not have very transparent forward-looking frameworks and in all three cases, according to Svensson's definition, have incomplete decision-making frameworks. All three have also had issues with allowing long-term inflation expectations to ratchet downwards with near-term inflation expectations and in the case of Japan because of insufficient policy responses in response to contractionary shocks, asset prices have been acting as strong shock amplifiers in response to contractionary shocks.[10] Japan is now in a very difficult situation because it will require a very Comprehensive, Consistent and Coordinated (the 3 Cs) approach using a range of instruments to convince people that it can credibly anchor long-term inflation expectations.[11]

[9] Source: https://www.bankofcanada.ca/wp-content/uploads/2017/09/transparency-communication-forecast-targeting.pdf

[10] See Al-Mashat and others (2018c) for a discussion of inflation expectations in the Euro Area and Japan. See Clinton and others (2019) for a discussion of Korea and Clinton and others (2015) for a discussion of Japan.

[11] Gaspar and others (2016) develop the 3-C approach to economic policy formulation using Canada and Japan as two ends of a spectrum in terms of the degree of difficulty. The conditions and framework in Canada would make it much easier to adopt this approach to economic policy formulation. Arbatli and other (2016) show that Japan needs to resort to very unconventional measures to escape a low inflation trap and to reduce the risks of a fiscal crisis over the long term.

III. Learning from the Top 3 Most Transparent CBs

Figure 4 reports a very good example of how a forecast is presented by a full-fledged IFT CB that uses its inflation forecast as an ideal intermediate target. It is based on the November 2013 policy decision when the Czech National Bank's MPC decided to use an FX intervention strategy to replace the policy space that was lost by being constrained by the effective lower bound (ELB) on the policy rate. It shows a forecast that has a deliberate plan with an overshooting in the inflation rate. This policy was designed to reduce the risks of deflation and eliminate wasteful economic slack in the economy. While the Czech economy was subjected to a sequence of negative shocks after the November 2013 policy decision, the exchange rate intervention strategy was eventually very successful in reducing unemployment and preventing the economy from getting stuck in a low inflation trap.[12] The important lesson here is not that all CBs should use FX intervention strategies to deal with the ELB, but that all CBs always need to be prepared to use alternative instruments aggressively to replace the space lost by hitting the ELB. The results by the Czech Republic are in a sharp contrast to CBs such as the Bank of Japan (BoJ), the European CB (ECB) and the Bank of Korea (BoK). These CBs have much lower levels of monetary policy transparency, and according to Svensson's definition have incomplete monetary policy decision-making processes. Unlike the top 3 most transparent CBs, the forecasts at the BoJ, ECB and BoK are constructed based on an exogenous path for the policy rate. They are not constructed to ensure that inflation returns to a well-defined point target and in a manner that efficiently manages the output-inflation tradeoff.[13] In these cases, a failure to develop macro policy frameworks with comprehensive measures has allowed long-term inflation expectations to remain well below the stated inflation objectives and for their economies to be subjected to long periods of time with excessive unemployment. This has created problems for fiscal policy as governments have lost revenues by not keeping their economies at full employment and allowing inflation to get stuck in low inflation traps. The combination of lower real GDP and the price level has reduced nominal GDP, the denominator in the government-debt-to-GDP ratio. Indeed, a more aggressive and comprehensive set of policies would have paid for themselves had they back stopped monetary policy by using high-multiplier fiscal measures and structural reforms to raise real and nominal GDP growth on a sustainable basis.[14] We all need to learn from these important experiences and not repeat the same mistakes.

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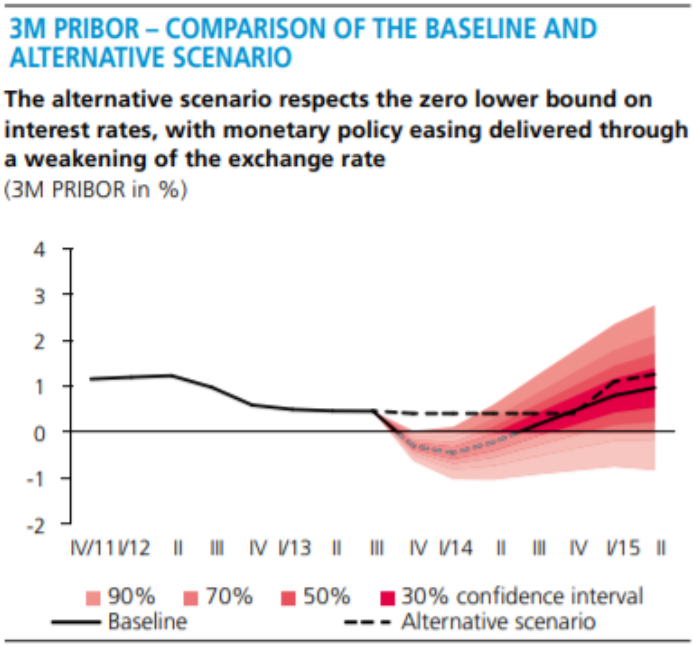
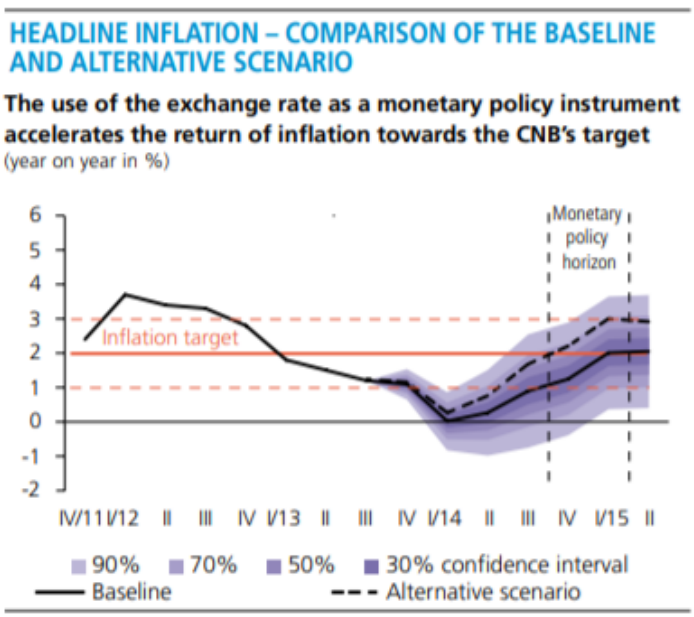
[12] See Al-Mashat and others (2018g). Indeed, the CNB was so successful that it exited the FX intervention strategy and now enjoys the lowest unemployment in Europe as well as ample policy space generated by having inflation modestly above its 2 percent target. See Laxton and others (2019) for a discussion about why the CNB pursued an aggressive strategy to escape an environment with significant deflation risks and didn't succumb to the bad-policy advice based on "lucky fool" strategies that hope that positive shocks will arrive in the future to get them out of dark corners.

[13] Monetary policy accountability and transparency starts with a clear statement of inflation objectives. The ECB for years has used terminology that their goal is "to maintain inflation rates below, but close to, 2% over the medium term" (https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html). In his speech in Sintra, Portugal in June 18, 2019, Mario Draghi indicated that the ECB's objectives were symmetric and that their "1.9 %" objective was not a ceiling. By contrast, the top 3 transparent CBs all use integers to emphasize a clear focal point for long-term inflation expectations.

[14] See Gaspar and others (2016).

Figure 4. Czech National Bank's State-of-the-Art Macroeconomic Projections with Overshooting Inflation





Source: Czech National Bank, Inflation Report, November 2013, page 8.

Adopting a dual mandate (price stability and full employment) by the BoC and average inflation targeting would also require extending the BoC's FPAS. The current 2 models used by the BoC have reaction functions designed to gradually bring inflation back to the target. One important lesson from the experiences since the GFC suggests that these reaction functions were not sufficiently aggressive to eliminate persistent economic slack. Indeed, Al-Mashat and others (2018f), in a fairly elaborate model of the Canadian economy show that a loss function approach would have been much more successful in reducing unemployment and eliminating economic slack in the Canadian economy. Specifically, they propose a loss function that has equal weights of one on squared inflation and output gaps as well as a weight of one half on squared changes in the policy rate. This loss function approach does a much better job representing the idea of a dual mandate than conventional reaction functions. Indeed, in a study by the Fed, Engen, Laubach and Reifschneider (2017) show that to represent the Fed's dual mandate it would require a time-varying parameter on the output gap with a large coefficient in 2009 to project a path for the Fed fund's rate that would be consistent with eliminating the massive estimates of economic slack and excessive unemployment—see Alichi and others (2015).

Using the loss function to project the path of the policy rate results in much better outcomes for the economy when policymakers are confident that there is significant slack in the economy and underlying inflation pressures are below target. Table 2 provides an example of a BoC forecast that is not consistent with a dual mandate and providing a plan to efficiently manage the short-run output-inflation forecast.

The April 2009 monetary policy report (MPR) has a forecast table on page 22 that shows inflation gradually returning back to the 2.0 percent target. A much more efficient scenario that is derived from a dual-mandate loss function and reported by Al-Mashat and others (2018f) would have kept the policy rate lower for longer—see Figures 5 and 6. In addition, while fiscal policy initially supported the Canadian economy after the GFC, it did not provide sufficient support to help eliminate the persistent economic slack—see Figure 6 and 7. Having a dual mandate and average-inflation targeting would have incentivized the BoC to be much more aggressive in reducing unemployment and raising inflation sufficiently to make up for the periods when inflation was below target—see the top panel of Figure 7, which plots the cumulative monthly change in the price level since December 2014 relative to a monthly trend line with an annualized 2% slope.

Table 2. Summary of the projection for Canada, year-over-year percentage change.

Table 4: Summary of the Base-Case Projection[a]

	2008	2009				2010		2011	
	Q4	Q1	Q2	Q3	Q4	H1	H2	H1	H2
Real GDP (quarter-over-quarter percentage change)[b]	-3.4 *(-2.3)*	-7.3 *(-4.8)*	-3.5 *(-1.0)*	-1.0 *(2.0)*	2.4 *(3.5)*	3.5 *(4.7)*	4.6 *(4.9)*	5.0	4.5
Real GDP (year-over-year percentage change)	-0.7 *(-0.3)*	-2.4 *(-1.3)*	-3.4 *(-1.7)*	-3.8 *(-1.6)*	-2.4 *(-0.1)*	1.2 *(3.0)*	3.7 *(4.6)*	4.6	4.8
Core inflation (year-over-year percentage change)	2.2 *(2.2)*	1.9 *(2.1)*	1.6 *(1.5)*	1.3 *(1.2)*	0.9 *(1.1)*	1.1 *(1.3)*	1.4 *(1.8)*	1.8	2.0
Total CPI (year-over-year percentage change)	2.0 *(2.0)*	1.2 *(1.2)*	-0.1 *(-0.6)*	-0.8 *(-1.0)*	1.0 *(1.1)*	1.6 *(1.6)*	1.7 *(1.8)*	1.9	2.0
WTI[c] (level)	58 *(58)*	43 *(43)*	51 *(52)*	57 *(56)*	60 *(58)*	63 *(62)*	67 *(64)*	69	71

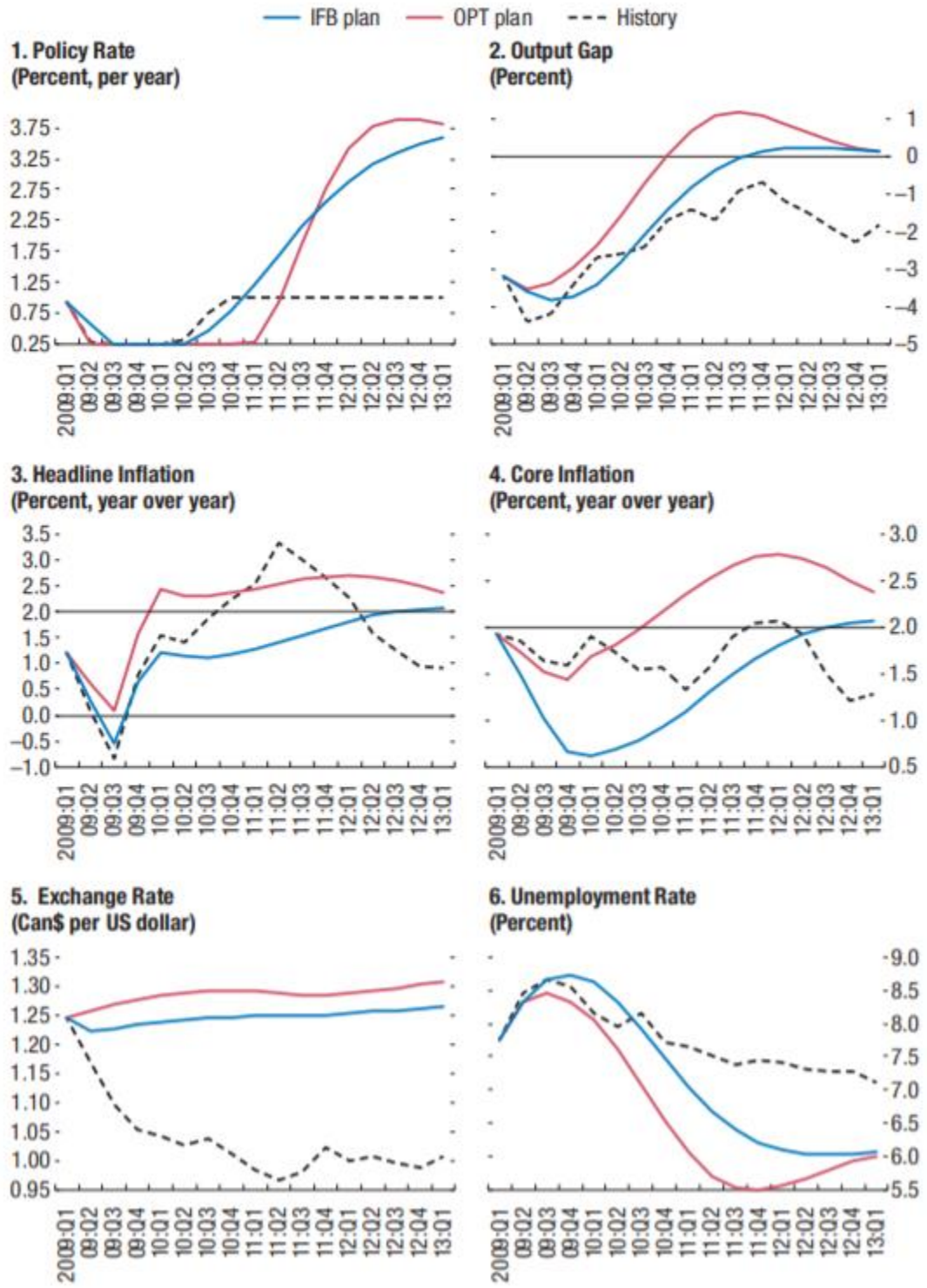
a. Figures in parentheses are from the base-case projection in the January *Monetary Policy Report Update*.

b. For half years, the number reported is the average of the respective quarter-to-quarter percentage growth at annual rates.

c. Assumption for the price of West Texas Intermediate crude oil (US$ per barrel), based on an average of futures contracts over the two weeks ending 17 April 2009.

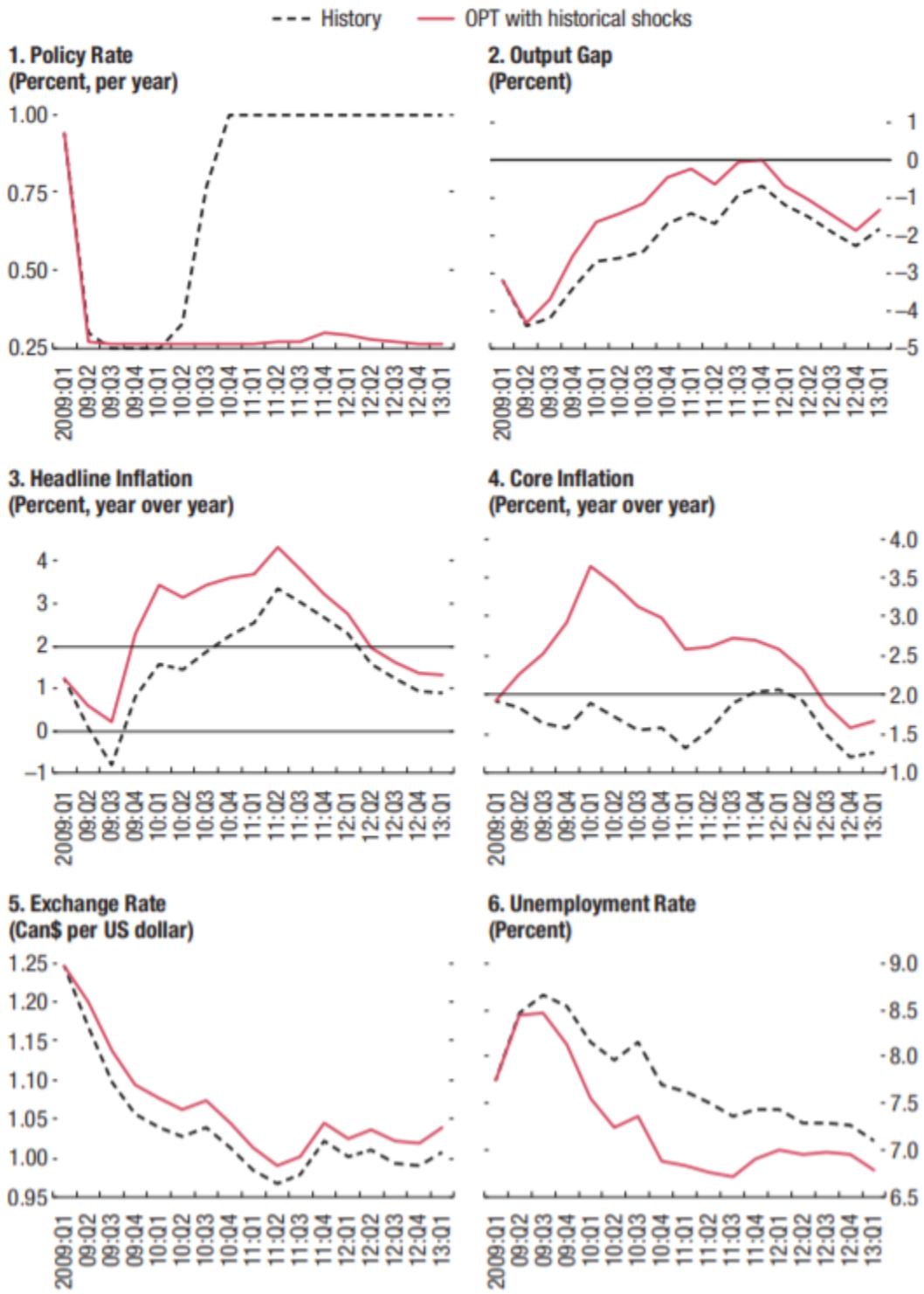
Source: Bank of Canada, Monetary Policy Report, April 2009, page 22.

Figure 5. Optimal Control versus IFB Reaction Function, 2009–13.



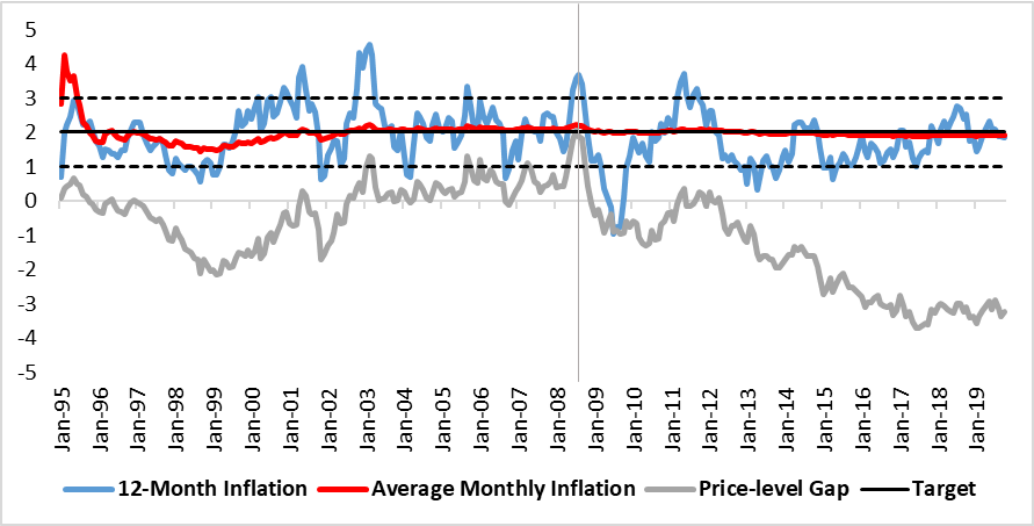
Source: Adrian, Laxton and Obstfeld (2018).

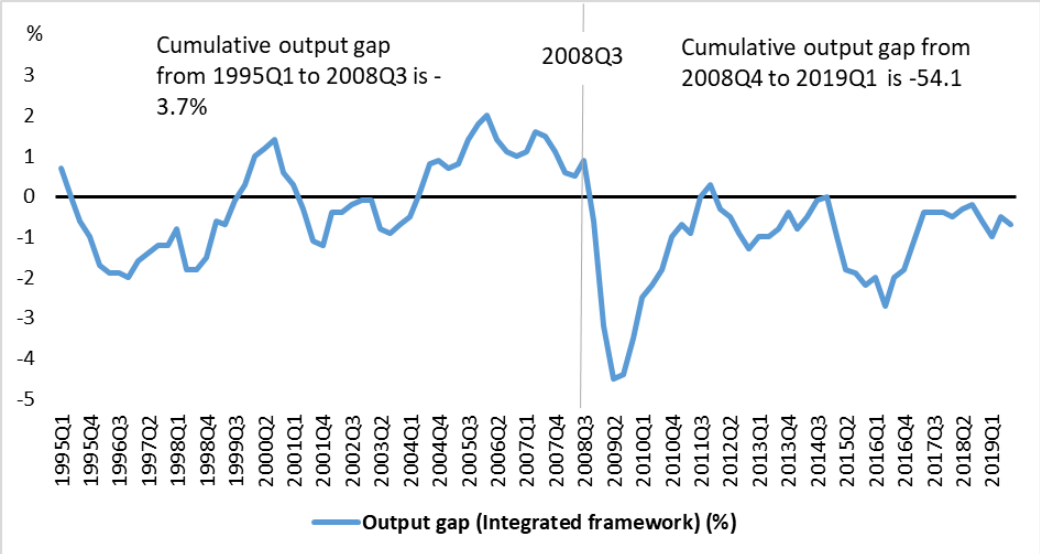
Figure 6. Predicted Outcomes under Optimal Control with Historical Shocks, 2009–13.

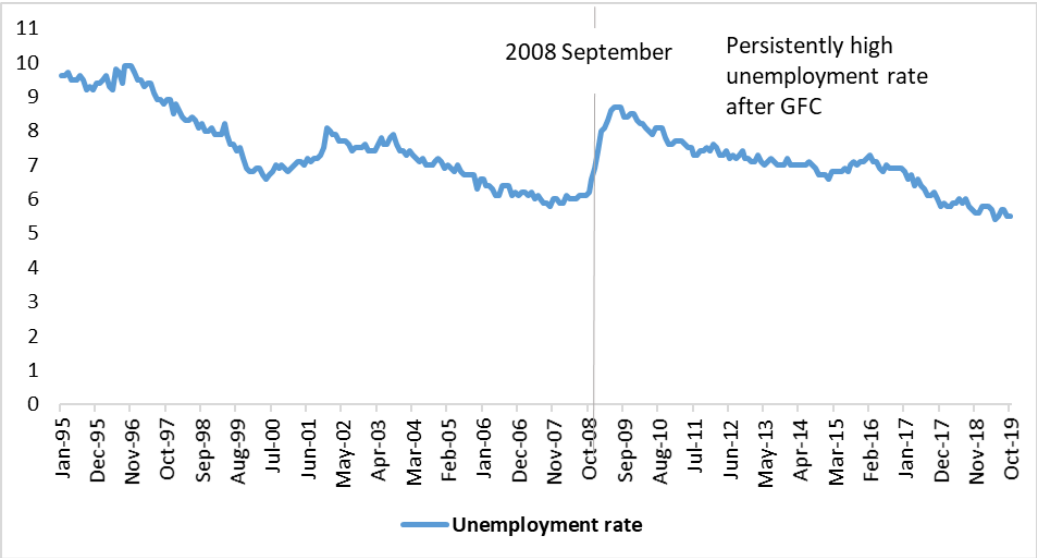


Source: Adrian, Laxton and Obstfeld (2018).

Figure 7. Inflation, Unemployment Rate and Output Gap.







Source: CPI and output gap from Bank of Canada and unemployment rate from FRED.

IV. The Case for a Dual Mandate with Average Inflation Targeting (Price Stability)

In the past, average-inflation targeting (AIT) was often referred to as price-level-path targeting (PLPT). There has been considerable work motivating the benefits of PLPT in terms of macro stability and reducing uncertainty in the future price level.[15] King (1999) finds the contrast between pure IT and AIT "somewhat artificial." The central bank will be perceived as doing a good job as an inflation targeter if the average inflation over the IT period has been close to the target. This backward-looking criterion is much easier to understand and verify than whether the bank is successful in targeting future inflation or the inflation forecast—a notion that is elusive and not readily verifiable. Indeed, the Bank of Canada has offered the fact that average inflation has been close to the 2% target as evidence of the success of its monetary policy (Longworth 2002). This accomplishment has also featured prominently in BoC speeches and in the Joint Statements of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target—the highest-level document defining Canada's monetary policy regime.

To understand the potential benefits of a dual-mandate framework based on AIT (price stability) and full employment we will employ a very simple model of the Canadian economy. It is a simplified version of a model by Kamenik and others (2008, 2013) that was used to study why inflation, on average, was so close to the BoC's target from December 1995 to August 2007—see Figure 7. An important argument that Kamenik and others (2008, 2013) stress is that planning to overshoot is roughly consistent with a dual mandate CB that cares equally about output and inflation. To understand the intuition about why overshooting can be optimal for a dual-mandate CB we take the model and remove all of the nonessential components, allowing us to focus on the drivers of the economy's macro dynamics. The basic arguments presented are based on a very simplified model, but will be consistent with all standard models of the monetary policy transmission mechanism where there are forward and backward-looking components in the output and inflation process. Table 3 reports a few key equations and parameter values reported in Kamenik and others (2008).[16]

Output Gap Equation

The structure of the simplified model includes an output gap equation that has a lead and lag of the output gap as well as a real exchange rate gap and a lagged real interest rate gap.[17] The estimated

[15] See Fillion and Tetlow (1994), Black, Macklem and Rose (1997), Coletti, Lalonde and Muir (2008) and Mertens and Williams (2019).

[16] Kamenik and others (2013) is the JMCB version of the paper that incorporates minor revisions of an IMF working paper by Kamenik and others (2008).

[17] The advantage of this type of model relative to a tightly specified micro-founded DSGE model is that policy modelers can easily allow for a more lagged response of economic activity to real interest rates. For example, incorporating informational lags and different information sets in a DSGE model would result in unwieldy complications. DSGE models are very useful for many purposes, but users need to recognize their strengths and weaknesses depending on the issues under consideration. For examples of a range of DSGE models with policy-relevant applications developed at the IMF see Laxton and Pesenti (2003), Faruqee and others (2005), Freedman and others (2009), Freedman and others (2010), Kumhof, Laxton and Leigh (2010) and Benes, Laxton and Mongardini (2016).

parameter on the lead of the output gap is much smaller (0.13) than the parameter on the lagged output gap (0.67). This implies that the output effects of real interest rate and real exchange rate gaps depend more on past gaps than future expected gaps. An important advantage of this type of model is that it allows for both expectational dynamics (leads) and intrinsic dynamics (lags), but the expectational channels are not as strong as in standard DSGE models and, therefore, this type of model does not suffer as much from the "forward-guidance" puzzles that plague standard DSGE models. In other words, the effects of policy in the structure of standard DSGE models are assumed to be too powerful in stabilizing inflation and the real economy. In real-world economies, there are usually more lags between monetary policy and the real economy than in standard DSGE models.

Table 3. Model in Kamenik and others (2008) Extended with Dual-Mandate Loss Function.

(1) $\hat{y}_t = 0.67\hat{y}_{t-1} + 0.13\hat{y}_{t+1} - 0.17\hat{r}_{t-1} + 0.05\hat{z}_t + 0.13\hat{y}_t^{US} + \epsilon_{\hat{y},t}$

(2) $\pi_t = 0.74\pi 4_{t+4} + (1.00 - 0.74)\pi 4_{t-1} + 0.20\hat{y}_{t-1} + 0.04\Delta\hat{z}_t + \epsilon_{\pi,t}$

(3) $\hat{r}_t$ = 4*($E_t\hat{z}_{t+1}$ - $\hat{z}_t$)

(4) $E_t\hat{z}_{t+1}$ = $0.87\hat{z}_{t+1}$ + (1.00 – 0.87) $\hat{z}_{t-1}$

Dual-Mandate Loss Function

(5) Loss = $\sum_{i=0}^{\infty} 0.98^i[1.00(\pi 4_{t+i} - \pi^*)^2 + 1.00\hat{y}_{t+i}{}^2 + 0.50(rs_{t+i} - rs_{t+i-1})^2$

Dual-Mandate Loss Function with Average-inflation targeting

(6) Loss = $\sum_{i=0}^{\infty} 0.98^i[1.0(\pi 4_{t+i} - \pi^*)^2 + 1.0\hat{y}_{t+i}{}^2 + 0.5(rs_{t+i} - rs_{t+i-1})^2 + 0.1(P_{t+i} - P_{t+1}^*)^2$

Inflation Equation

The second equation in Table 3 represents the inflation process. It has leads and lags on inflation as well as small values for parameters on the change in the real exchange rate gap and lagged output gap. In this case, the weight on lagged inflation is small (0.26 = 1.00-0.74) and reflects a low degree of inflation indexation that has been estimated over samples since the mid-1990s, when long-term inflation expectations became well anchored to the 2 percent target. Indeed, Laxton and N'Diaye (2002) show that many advanced CBs that successfully anchored long-term inflation expectations also experienced a reduction in lagged indexation. This evidence resulted in the development of models with endogenous credibility, where the parameters on the lags in the inflation process are not time

invariant, but depend on how successful the CB is at anchoring long-term inflation expectations.[18] We do not model endogenous credibility in this paper, but in Appendix A simply show the dynamic properties of the model under different assumptions for parameter values on the leads and the lags in the inflation equation.

Risk-Adjusted Uncovered Interest Parity (RAUIP) Equation

The third equation is the real risk-adjusted uncovered interest rate equation. It has been generalized so that the expectation of the 1-quarter-ahead real exchange rate is a linear combination of the lead of the real exchange rate and the lagged real exchange rate. The estimated weight on the lagged real exchange rate is 0.13 (1.00-0.87) suggesting that the exchange rate is largely a function of future real interest rate differentials.[19] Box 2 discusses the implications for policy based on the assumption that the weight is one on the lead. In this extreme case, the real exchange rate depends on the future sum of real interest rate gaps adjusted for the country risk premium. This assumption implies a very strong forward-looking expectational channel, but policymakers have different views about how reliable these expectational channels are. Isard and Laxton (2000) consider cases where the weight varies between zero and one. They then ask, given this uncertainty, what is a good choice for a base-case policy forecast that is designed to compute the optimal policy rate path. The case of a zero weight on the expected future real exchange rate implies that exchange-rate-market participants forecast exchanges rates as random walks. This assumption completely shuts down the expectational channel where future expected real interest rate differentials matter. Poloz (2014) correctly argues that "taking this interdependence on board is the only way the policy-maker can develop an interest rate path that will interact through the structure of the model to deliver the inflation path that is desired." But in each MPR the BoC indicates that "by convention, the Bank does not forecast the exchange rate in its base-case projection."[20] Making the assumption that there are no forward-looking expectational channels would obviously require much larger changes in interest rates in response to shocks to achieve the same objectives. Isard and Laxton (2000) show that when there is uncertainty about this parameter, it is best to assume an intermediate case where one allows for some expectational channels to work. Given the importance of the exchange rate in the monetary transmission mechanism for open economies like Canada it will be critical to reevaluate this assumption if they were to move to a dual mandate (full employment and average inflation targeting) as the exchange rate and the future path of interest rates would play important equilibrating roles in the economy.

[18] This type of empirical work inspired the development of models with endogenous monetary policy credibility. See for example, Argov and others (2007), Alichi and others (2009), Alichi and others (2010) and more recently Al Mashat and others (2018i). DSGE models, which presume full credibility, have expectational channels that are simply too strong. Policymakers at the ECB and other CBs that are losing credibility would be supported better by researchers investing part of their resources in this type of model rather than DSGE models that presume full credibility.

[19] Using US, euro area and UK data, Galì (2019) finds that expectations of real interest rate differentials in the near (distant) future have much larger (smaller) effects on the real exchange rate than is implied by RAUIP. Appendix A considers different specifications where expectations of future near-term real interest rate differentials matter more than forecasts of longer-term real interest rate differentials.

[20] See Box 1 of the January, 2020 MPR.

Box 2. Real Interest Rates and Exchange Rates as Shock Absorbers and Amplifiers.

The Risk-Adjusted Uncovered Interest Parity (RAUIP)

RAUIP suggests an arbitrage condition where the real domestic interest rate (r_t) depends on the real foreign interest rate adjusted for a country risk premium ($r_t^f + u_t$) plus the expected real depreciation in the currency:

$$r_t = (r_t^f + u_t) + (z_{t+1} - z_t),$$

This arbitrage condition can be written as a multi-period problem where the expected sum of short-term real interest rates over *k* periods depends on the expected sum of short-term foreign interest rates adjusted for the country risk premium as well as the expected real depreciation over the duration of the *k*-period bond.

$$\sum_{j=0}^{k} r_{t+j} = \sum_{j=0}^{k}(r_{t+j}^f + u_{t+j}) + (z_{t+k+1} - z_t).$$

Real Exchange Rate as Shock Absorber

In normal times with active policy, a negative demand shock reduces inflation in the short term, but does not affect the long-term real exchange rate (z_{t+k+1}). An IFT CB is expected in normal times to reduce the policy rate sufficiently to steer inflation back to target. This expectation would, through the RAUIP condition, lead to an immediate depreciation of the currency: the spot price of foreign exchange has to rise to the point that the expected decrease from then on compensates for the lower domestic interest rate.

Under a credible regime of aggressive policy responses, the expected medium-term inflation rate would also increase. The decline in real interest rates would be greater than that in nominal rates. At the effective lower bound, the current nominal interest rate cannot go any lower, but under the aggressive regime, people would expect the future nominal interest rate to be at the ELB for longer, and because of the anticipated increase in inflation, real interest rates would decline. Thus, in both normal times and at the effective lower bound, there is ($\downarrow \sum_{j=0}^{k} r_{t+j}$). Given that the long-term real exchange rate (z_{t+k+1}) and expected paths for foreign real interest rates and domestic risk premium $\sum_{j=0}^{k}(r_{t+j}^f + u_{t+j})$ are assumed not to change, this would result in a real depreciation ($\uparrow z_t$),

$$\downarrow \sum_{j=0}^{k} r_{t+j} = z_{t+k+1} - \uparrow z_t + \sum_{j=0}^{k}(r_{t+j}^f + u_{t+j}).$$

This helps support demand, through both exports and domestic expenditure switching (from foreign goods to domestic goods).

Real Exchange Rate as Shock Amplifier

At the ELB, the exchange rate can act as a shock amplifier. If policy is passive, and not credible, following a negative demand shock, people would expect the inflation rate in the future to be lower. Current and future short-term real interest rates could increase ($\uparrow \sum_{j=0}^{k} r_{t+j}$), resulting in a real appreciation ($\downarrow z_t$) that would reduce net exports and further deepen the recession.

$$\uparrow \sum_{j=0}^{k} r_{t+j} = z_{t+k+1} - \downarrow z_t + \sum_{j=0}^{k}(r_{t+j}^f + u_{t+j}).$$

These three equations have very important insights for understanding the monetary policy transmission mechanism. Poloz (2014) provides a very rich discussion about how policymakers at the BoC think about uncertainty. We agree with Poloz (2014) and want to emphasize that we do not recommend focusing exclusively on one model and a specific set of parameters. These are very important issues that need to be studied continuously by both the staff and the MPC, but especially during the MPC's policy deliberations.[21]

Using the simple model in Table 3 we present some illustrative simulations to explain the key policy insights. As indicated earlier, the more elaborate model presented by Al-Mashat and others (2018f) shows that reaction functions designed to bring inflation gradually back to the target are not consistent with either the dual mandate or AIT. These reaction functions simply do not respond sufficiently aggressively during times like the GFC when there was massive economic slack and inflation below target. This model will have similar insights.

Figure 8 shows the effects for a contractionary shock in the global economy that is designed to reduce the Canadian output gap to around -1 percent. Recall, from Figure 7 that this is about one quarter of the size of the output gap that was experienced in early 2009 when there was a collapse in the global economy following the Lehman bankruptcy in September of 2008. We will consider a larger shock shortly, but start the presentation with a smaller unitary shock to explain the intuition behind the results and why the loss function approach would do a much better job at representing the objectives of a dual-mandate CB and the benefits of AIT.

Illustrative Simulation Results Based on Model by Kamenik and others (2008)

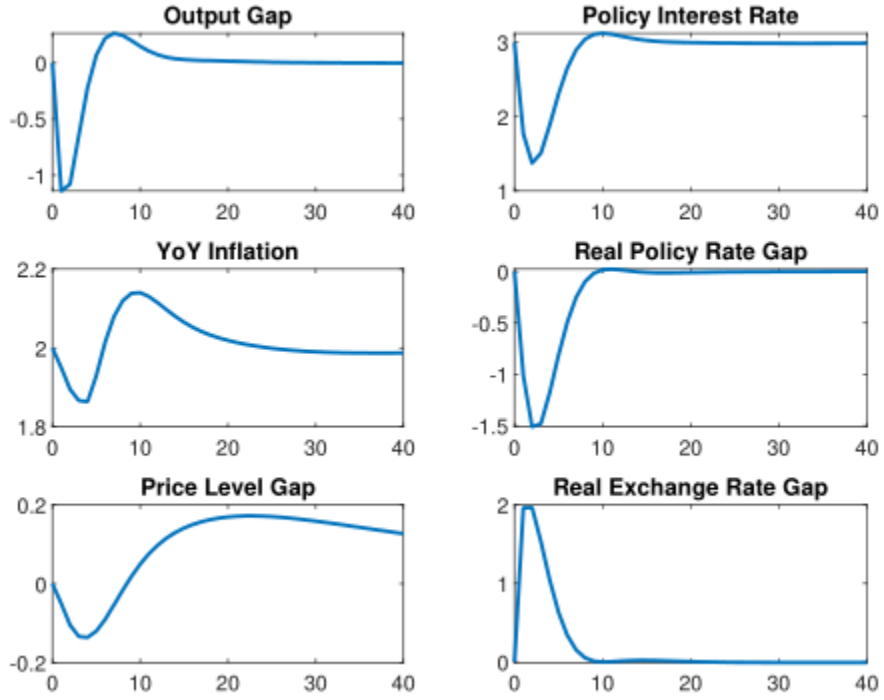
The first column of Figure 8 presents the goal variables that enter the objective function. This includes the output gap, inflation and the price level gap. But, under a dual mandate (inflation and full employment), the CB would be ignoring the implications of their policy on price stability and would be allowing the price level to drift up or down in response to shocks. The bottom panel of Figure 8 presents the results for the same shock when there is AIT and a small weight on the price level gap. There isn't much difference in the results, which is one of the key points of this paper and Kamenik and others (2008 and 2013). In this situation, the dual mandate is consistent with planning to overshoot the target.

The economy starts off with excess supply of around -1 percent, which initially causes a small downward adjustment in inflation below the 2 percent target. The objective of a dual-mandate CB would be to ease real monetary conditions (the combination of lower real future interest rates and depreciation in the real exchange rate). The CB does this by cutting rates and publishing a forecast that shows that it will respond sufficiently aggressively with the current and future policy rate to eliminate the economic slack and bring inflation back to the target. But, unlike the BoC forecast reported in Table 2, which brings inflation gradually back to the 2 percent target, a dual mandate CB would respond more aggressively by convincing the public and financial-market participants that with a sufficiently aggressive monetary policy response inflation should overshoot the target.

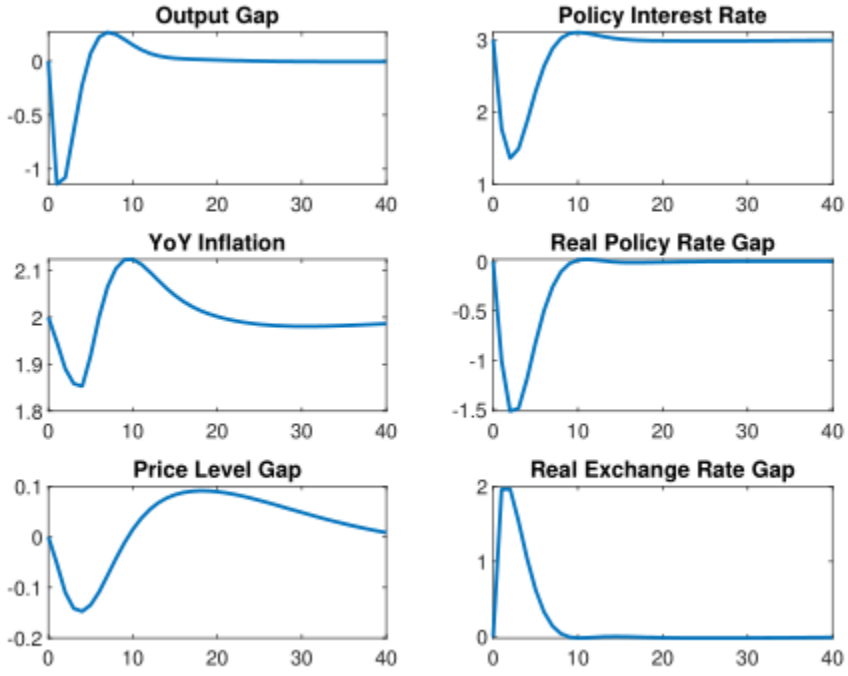
[21] Chen and others (2009) provide a methodology for deriving forecast confidence intervals when there are important nonlinearities in play such as the effective lower bound for the policy rate.

Figure 8. Illustrative Results of the Model by Kamenik and others (2008) with 1% shock.

a) Dual-Mandate Central Bank (1% shock).



b) Dual-Mandate Central Bank with Average Inflation Targeting (1% shock).



Source: Authors' Calculations.

An expected overshooting in the inflation rate combined with a low path for the policy rate results in a larger and more persistent reduction in short-term real rates, which results in a larger real depreciation in the currency. Interestingly, for this type of shock reported in Figure 8a the eventual overshooting in inflation more than offsets the initial decline in inflation and results in a small permanent increase on the price level. Figure 8b reports the results using the loss function with both a dual mandate and AIT. Interestingly, AIT actually contains the increase in the price level, which returns back to the desired target gradually over time. Implementing the price stability objective in this way would not create any significant communication challenges for an IFT CB, which uses its inflation forecast as an ideal intermediate target. The BoC would simply need to explain how the monetary transmission works and that as in the past, Canadians should be confident that the BoC will keep inflation close to the target on average and not allow long-term inflation expectations to ratchet downwards as has been experienced in other countries with incomplete decision-making frameworks (e.g. Bank of Japan, the ECB and Bank of Korea).

May Take Some Time to Achieve Credibility

Some might argue that the simulation results make excessively strong assumptions that the public and financial-market participants believe in the overshooting scenario, but in reality it may take time for people to be convinced until they see evidence that inflation is rising. Nothing new here for seasoned IFT CBs. There will always be skeptics, and this is healthy. However, it is important to emphasize that IFT is not a one-shot game and successful IFT CBs understand this from their experiences anchoring long-term inflation expectations.[22] If expectations were to adjust more slowly than in the simulation reported in Figure 8 monetary policy would need to be adjusted more aggressively in the future. Understanding this process of learning and responding to new information is fundamentally why IFT has been so successful in many countries. The CB does not need to know the transmission mechanism perfectly but has to be committed to adjust their instruments sufficiently aggressively in response to new information. CBs that have not done this have allowed long-term inflation expectations to ratchet downwards and have subjected their economies to getting stuck in low inflation traps with low interest rates.

In situations such as early 2009 when the economy was experiencing the effects of a very large contractionary shock, a dual mandate with AIT would have been particularly useful in guiding expectations about future policy responses without resorting to the types of non-robust unconventional forward guidance that was used by the large CBs.[23] The top panel of Figure 9 shows an illustrative scenario where the economy is hit by a very large external contractionary shock that creates a 4 percent negative output gap.[24] Given the magnitude of the shock, the policy rate is cut substantially and hits the assumed zero interest rate floor. The optimal plan in this case is to keep the

[22] Laxton and N'Diaye (2002) showed that it took several years for the early inflation-targeting adopters to anchor long-term inflation expectations to the targets. Indeed, policymakers understood very clearly that it would take time and experience achieving their targets. For example, based on work done in the early 1990s by the Bank of Canada, it suggested that it may take around 5 years to anchor the expectations of wage and price setters (see Laxton, Ricketts and Rose (1993)).

[23] For a discussion of the issues with unconventional forward guidance see Al-Mashat and others (2018g).

[24] The CB would have to study the policy implications of uncertainty in the output gap and measures of full employment. See Isard, Laxton and Eliasson (2001).

policy rate at the effective lower bound for several quarters and keep it low enough afterwards to generate a sufficient reduction in real interest rates and depreciation in the real exchange rate to be consistent with inflation overshooting the 2 percent target. While the scenario is purely illustrative, it is dramatically different than the forecast produced by the BoC in April 2009, which showed a very gradual closing of the output gap and gradual increase in inflation to the 2 percent target. By contrast, in this scenario, inflation is projected to overshoot the target sufficiently to generate a large easing in real monetary policy conditions (reduction in expected future real interest rates and real depreciation).

Given that monetary policy is constrained by the ELB, market participants might question the credibility of this scenario and it may have to be backstopped by other instruments. The CNB has provided a practical example of Svensson's foolproof approach for dealing with the ELB using a foreign-exchange-rate (FX) intervention strategy. In the case of a large country like Canada, it might be difficult politically for the GoC and BoC to employ an FX intervention strategy to ensure a large easing in monetary conditions and fiscal policy may have to come to the rescue. However, the objective of escaping from a potential low inflation trap and generating future policy space is more important than the specific instrument that is used to ensure that it happens. Indeed, having been very successful in stimulating their economy and getting inflation to overshoot the target, the Czech National Bank had more policy space than many other central banks to help deal with shocks related to COVID-19. In this case, the real exchange rate depreciated significantly through lower real interest rate differentials and did not require implementing an FX intervention strategy.[25]

[25] See Czech National Bank's Inflation Report for third quarter of 2020:

https://www.cnb.cz/export/sites/cnb/en/monetary-policy/.galleries/inflation_reports/2020/2020_III/download/ir_III_2020.pdf

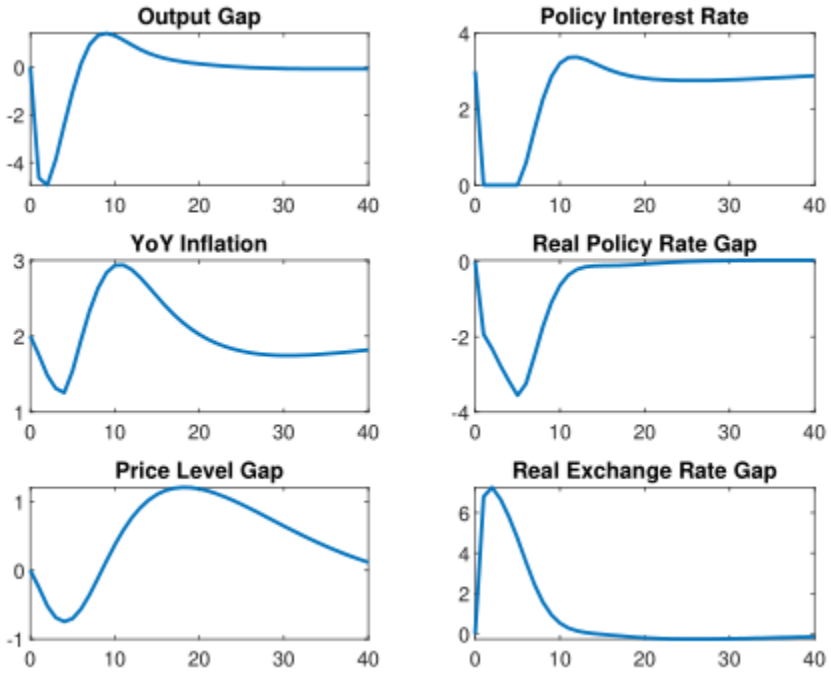
V. Fiscal Policy to the Rescue

Kumhof and Laxton (2009) argue that rules-based transfers targeted to households with high marginal propensities to consume would be the best instrument for dealing with negative income shocks. This would be consistent with helping to address income-distribution issues and would take some of the burden off monetary policy when the policy rate is constrained by the ELB. Figure 9b responds to the contractionary shock presented in Figure 9a by assuming that the large output gap triggers fiscal transfers to low and middle-income Canadians. The fiscal measures directly support aggregate demand and prevents the policy rate from hitting the ELB. This would ensure that the BoC would never run out of policy space and would bolster the credibility of the BoC's policies and prevent Canada from getting stuck in a low-inflation trap with super-low interest rates.

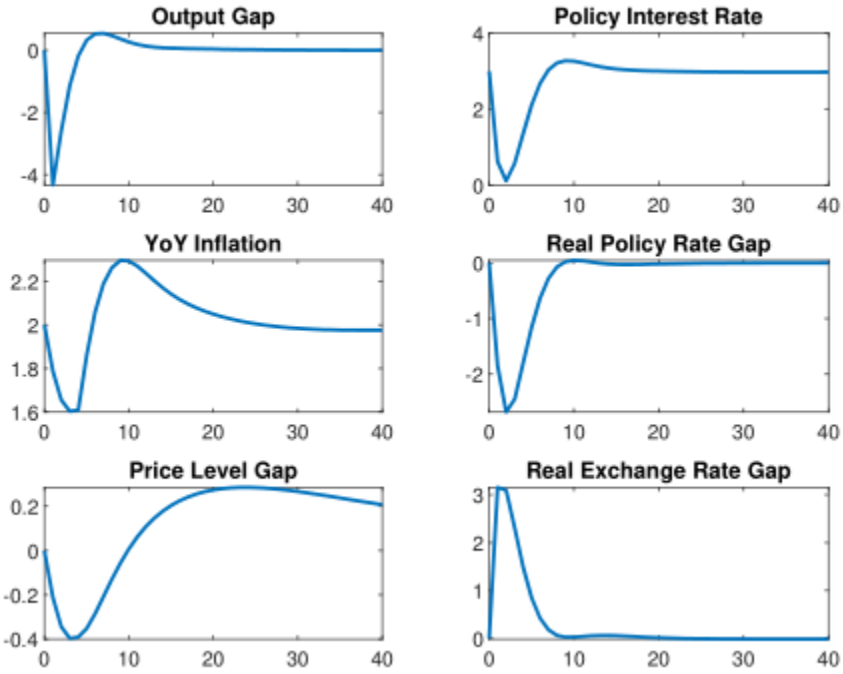
Both types of scenarios (Figure 9a and b) could be published by the BoC so that the public and financial market participants are forewarned that BoC policy space is becoming constrained and may need to be backstopped by the GoC to achieve the dual-mandate objectives. This would also incentivize the BoC and the GoC to deploy other instruments to eliminate wasteful economic slack and unemployment. Using other instruments may be important for establishing credibility in the overshooting scenario. Indeed, a comprehensive set of measures that included timely fiscal transfers would help deal with the lags in the monetary transmission mechanism.

Figure 9. Illustrative Results of the Model by Kamenik and others (2008) with 4% shock.

a) Dual-Mandate Central Bank with Average Inflation Targeting (4% shock).



b) Dual-Mandate Central Bank with Average Inflation Targeting and Fiscal Backstop (4% shock).



Source: Authors' Calculations.

VI. Summary of the New Framework

This paper has made the case for developing a better macro-policy framework in Canada. It is based on updating the monetary policy framework to include a dual mandate (full employment and average-inflation targeting) as well as a fiscal rule to backstop monetary policy when it is constrained by the ELB. It would consist of the following:

1. Amending the Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target to include a dual mandate of price stability and full employment. This would include a commitment by the government of Canada to backstop monetary policy at the effective lower bound.
2. Creating a fiscal rule that would provide transfers to low and middle-income households in times when there is significant economic slack and high unemployment. The BoC would continue to be responsible for providing timely measures of the output gap as these measures would be used to trigger the transfers.
3. To ensure high levels of accountability and transparency for both the monetary policy framework and the fiscal rule we would suggest that the GoC enshrines the dual mandate into the Bank of Canada Act with a formal monetary policy committee. This would allow the BoC to publish minutes with their deliberations. In addition, as is the case at the CNB, the staff would need to provide the MPC with a consistent macro forecast that had endogenous paths for both the policy rate and the exchange rate. This macro forecast as well as risk assessments would be used as an important frame of reference for the MPC to have a rich discussion of potential policy choices and provide a foundation for higher levels of monetary policy transparency and accountability.

Since the time that we drafted this paper, the Fed has announced a new framework that combines the dual mandate and AIT. Importantly, they have demonstrated how AIT can be implemented in a very flexible way. See speeches by chairman Powell (August 27, 2020), Williams (October 7, 2020) and Clarida (October14, 2020). The Better Policy Project provides training to central banks that are interested in developing analytical frameworks to support both dual mandates and flexible AIT.[26] This includes an important course about how to measure output gaps for conventional monetary policy and how they are completely different than output gaps that are designed to measure financial cycles.[27] Both are important for monetary and fiscal policy, but the former is specifically designed to support central-bank communications about how they are efficiently managing the short-run output-inflation tradeoff.

[26] See https://www.thebetterpolicyproject.org/about-6.

[27] See https://www.thebetterpolicyproject.org/about.

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Appendix A. Sensitivity Analysis

The sensitivity analysis is reported in Figures A1-A4.

More Academic Specification of the Inflation Equation (A1)

This first set of figures replace the Y-o-Y measure of inflation with Q-o-Q measure of inflation. None of the results change in a substantive way. The real interest rate gap still declines by 1.5 percentage points and the real exchange rate depreciates by about 2 percent. The price level gap still overshoots the long-run target but is constrained to return to the target under average inflation targeting.

More Backward Looking Inflation Process (A2)

In this case the optimal path for the inflation results in a less aggressive overshoot and as a consequence the price level gap does not overshoot the target and under AIT gradually approaches the target from below. The responses of the real policy gap and real exchange rate gap are very similar in helping to equilibrate the economy.

Level Real Exchange Rate Gap and Inflation Equation (A3)

This specification is based on the notion that the inflation process is driven by imported intermediate goods that enter a production function to produce final consumption goods. Again, the results do not change in any fundamental way.

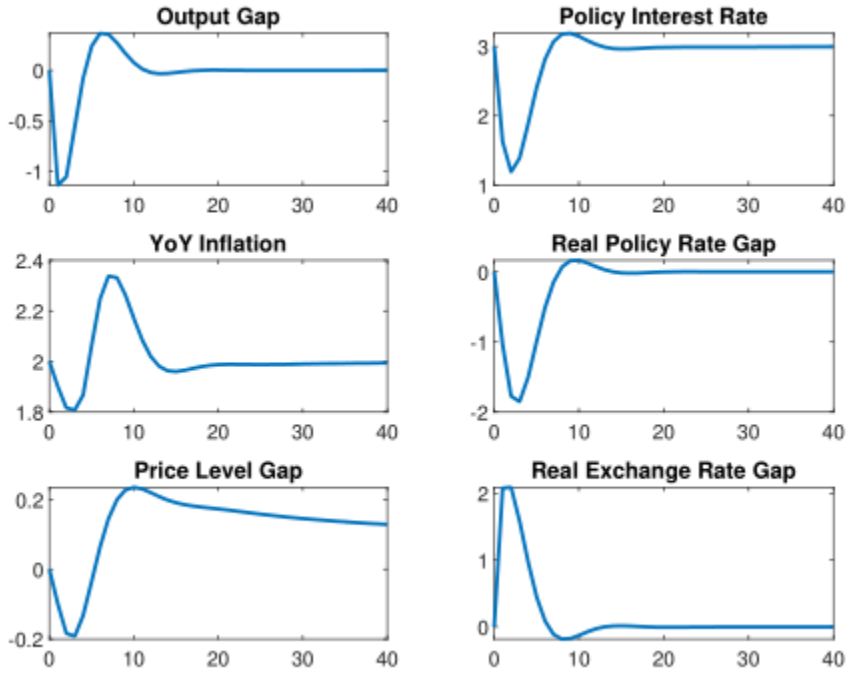
Less Forward Looking Transmission Mechanism (A4)

This specification assumes that exchange rate participants base their expectations more on past trend in the exchange rate. As a consequence, the real exchange rate ends up playing a much stronger role in the equilibration process.

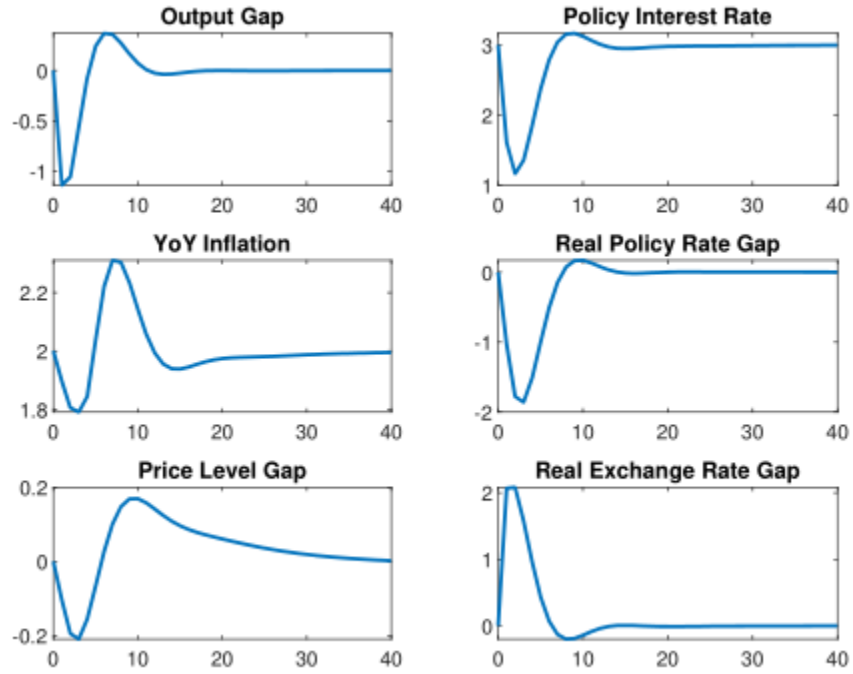
Figure A1. Alternative Inflation Equation (Version 1).

$$\pi_t = 0.75\pi_{t+1} + (1.00 - 0.75)\pi_{t-1} + 0.20\hat{y}_{t-1} + 0.04\Delta\hat{z}_t + \epsilon_{\pi,t}$$

(1) Dual-Mandate Central Bank (1% shock).



(2) Dual-Mandate Central Bank with Average Inflation Targeting (1% shock).

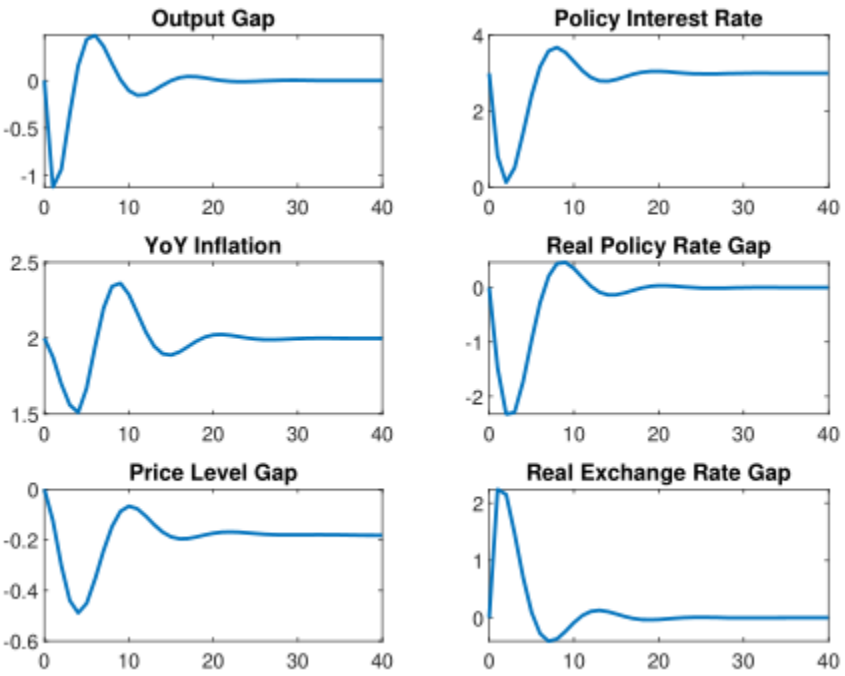


Source: Authors' Calculations.

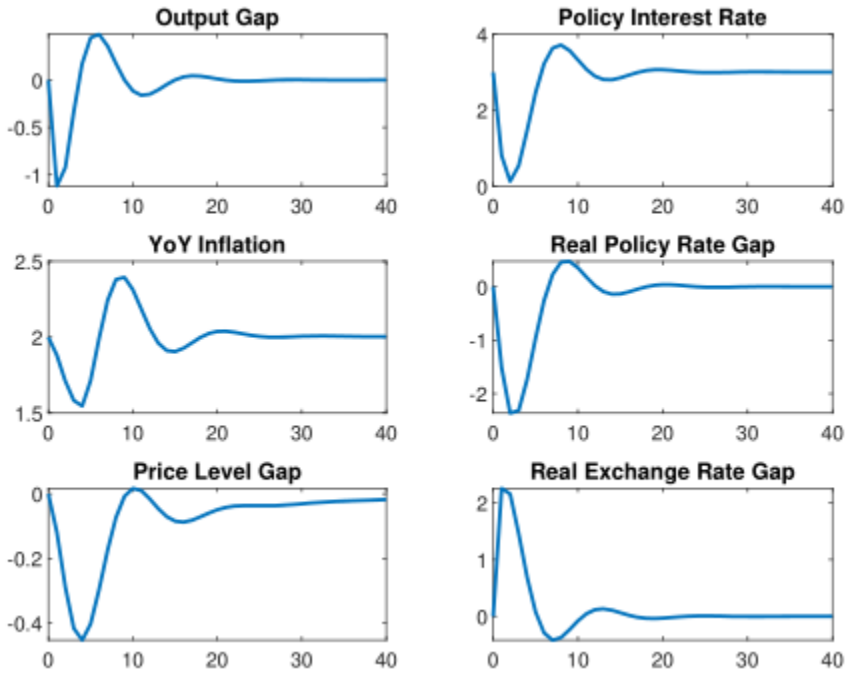
Figure A2. Alternative Inflation Equation (Version 2).

$$\pi_t = 0.50\pi_{t+1} + (1.00 - 0.50)\pi_{t-1} + 0.20\hat{y}_{t-1} + 0.04\Delta\hat{z}_t + \epsilon_{\pi,t}$$

(1) Dual-Mandate Central Bank (1% shock).



(2) Dual-Mandate Central Bank with Average Inflation Targeting (1% shock).

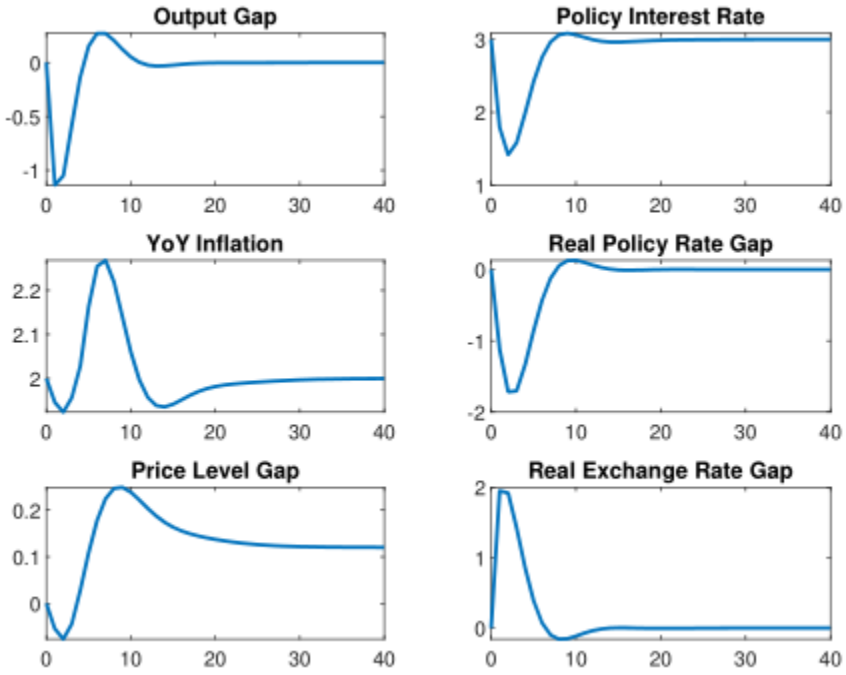


Source: Authors' Calculations.

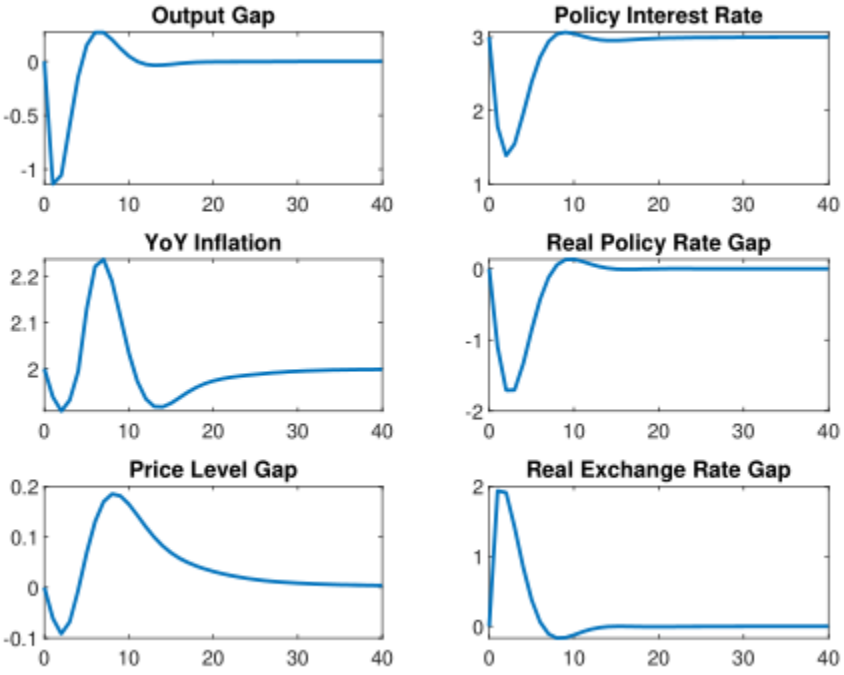
Figure A3. Alternative Inflation Equation (Version 3).

$$\pi_t = 0.75\pi_{t+1} + (1.00 - 0.75)\pi_{t-1} + 0.20\hat{y}_{t-1} + 0.04\hat{z}_t + \epsilon_{\pi,t}$$

(1) Dual-Mandate Central Bank (1% shock).



(2) Dual-Mandate Central Bank with Average Inflation Targeting (1% shock).



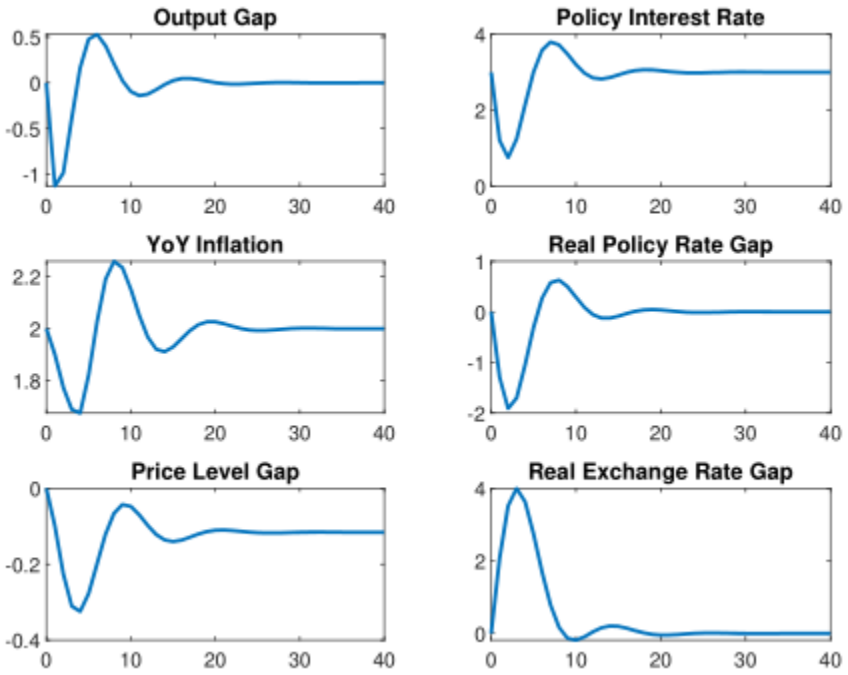
Source: Authors' Calculations.

Figure A4. Weaker Expectational Channels (Version 5).

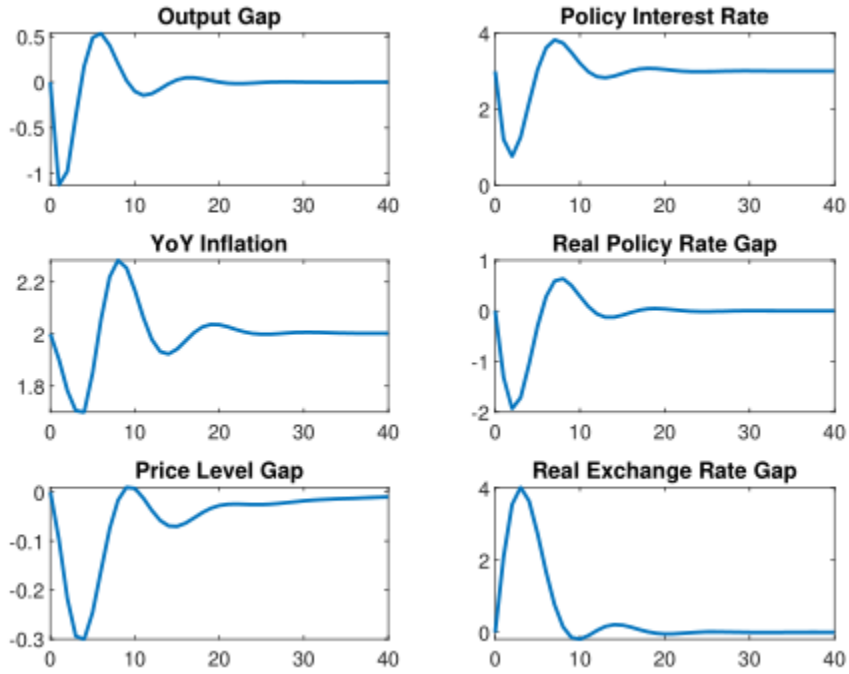
$\pi_t = 0.50\pi_{t+1} + (1.00 - 0.50)\pi_{t-1} + 0.20\hat{y}_{t-1} + 0.04\Delta\hat{z}_t + \epsilon_{\pi,t}$

$E_t\hat{z}_t = 0.50\hat{z}_{t+1} + (1.00 - 0.50)\,\hat{z}_{t-1}$

(1) Dual-Mandate Central Bank (1% shock).



(2) Dual-Mandate Central Bank with Average Inflation Targeting (1% shock).



Source: Authors' Calculations.

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