

The Role of Central Banks

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L'auteur se penche sur les origines des banques centrales en général, parallèlement à celles qui sont propres à la Banque du Canada. Il établit un cadre de référence politique global ayant pour paramètres les buts, les règles politiques et la mise en œuvre, et il évalue le cadre de maîtrise de l'inflation de la Banque du Canada. L'auteur envisage des solutions de rechange à la maîtrise de l'inflation, notamment la stratégie axée sur le niveau des prix, la stratégie de l'inflation moyenne, le ciblage du produit intérieur brut nominal et le double mandat. Il analyse les enjeux de la politique monétaire associés à la persistance des faibles taux d'intérêt réels. L'auteur conclut que la stratégie de maîtrise de l'inflation s'est révélée efficace au Canada et qu'aucune autre stratégie n'apparaît manifestement supérieure.

Mots clés : banque centrale, macroéconomie, politique monétaire

The origins of central banking, in general, are examined, along with the specific origins of the Bank of Canada. A general policy framework is set out, in terms of goals, policy rules, and implementation, and the Bank of Canada's inflation targeting framework is evaluated. Alternatives to inflation targeting are considered, including price-level targeting, inflation averaging, nominal gross domestic product targeting, and a dual mandate. Monetary policy issues associated with persistent low real interest rates are discussed. The conclusion is that inflation targeting has been a success in Canada, and there are no obviously superior alternative approaches.

Keywords: central banking, macroeconomics, monetary policy

Introduction

Central banking has been in existence for a long time; the first central bank, the Sveriges Riksbank (the Swedish central bank), was established in 1668. Central banks have become a standard part of the institutional structure of most countries. They typically wield significant power, and governments and the public have come to expect a lot from their central bankers.

The early financial structure of central banks was based on the structure of private banks at the time and evolved through a series of experiments and sometimes unintentional innovations. By 1934, when the *Bank of Canada Act* passed Parliament, setting up Canada's own version of central banking, most of the key features that comprise central banking as it is currently known were in place in the Bank of England, the US Federal Reserve System, and other central banks in the world. Like those other central banks, the Bank of Canada was set up to have a monopoly on the supply of physical currency, to be an important lender to the government of Canada, to have responsibilities as a lender of last resort to the private banking sector, and to conduct open market operations as a means of influencing financial market activity and macroeconomic activity more generally.

Using the insights of modern macroeconomic theory, it is useful to think of a central bank as having goals, a policy rule, and an approach to implementation. For example, the Bank of Canada's current goal is to target the rate of inflation at 2 percent per year. The bank's policy rule consists of a target setting for the overnight nominal interest rate that depends on the state of the Canadian economy, in some manner that is not explicitly stated. Implementation is a mechanism used each day to intervene in financial markets so as to achieve the target setting for the overnight nominal interest rate. The central bank's goals, policy rule, and implementation are an integrated whole that should be consistent with the cutting edge of economic science and perform well in practice in achieving what is set out in the central bank's legislative mandate – the *Bank of Canada Act*, in the case of the Bank of Canada.

Central bank goals, policy rules, and implementation have evolved significantly over time. For example, during 1975–1982, the Bank of Canada followed a monetarist approach in targeting money growth and then was an early adopter (after New Zealand in 1989) of inflation targeting in 1991. Also, given advances in macroeconomics in the 1970s that emphasized the importance of predictable policy behaviour, central banks, including the Bank of

Canada, have become more transparent—the goal being to reveal central bank policy rules to the public implicitly, if not explicitly.

The Bank of Canada is now typical in adhering to an inflation-targeting regime. Such an approach could potentially be improved, and many alternatives have been proposed, including price-level targeting, inflation averaging, nominal gross domestic product (NGDP) targeting, and a dual-mandate approach. One goal of this article is to evaluate these alternatives, particularly in light of the upcoming renewal of the Bank of Canada's agreement with the government of Canada in 2021. We assess the Bank of Canada's performance under inflation targeting since 1991 and attempt to determine the wisdom of abandoning this approach—which has met with remarkable success—in favor of something else.

Central banks currently face some new challenges, in particular a period of persistently low real interest rates. In a low-real-interest-rate world, a central bank targeting inflation at 2 percent will on average be targeting nominal interest rates at lower levels than has historically been the case. This implies that, given macroeconomic shocks of the size and frequency observed in the past, and a corresponding countercyclical central bank interest rate policy, central banks will more frequently encounter the zero lower bound, or effective lower bound, on nominal interest rates. Some (e.g., Williams 2014) have argued that this implies that output and inflation will on average be lower, unless central banks engage in unconventional monetary policies, including quantitative easing, forward guidance, and negative nominal interest rate policy. In this article, we assess such claims.

The article proceeds as follows. Next, we address the origins of central banking practice, and we then deal specifically with the origin of the Bank of Canada. In the fourth section, we discuss central bank goals, rules, and policy implementation. Then, we examine the evolution over time in central bank goals, rules, and implementation. The sixth and seventh sections deal with, respectively, an evaluation of the Bank of Canada's current inflation targeting regime and an assessment of alternative approaches. In the following section, we analyze policy rules; then, we deal with the potential problem of low real interest rates. In the last section, we conclude.

Origins of Modern Central Banking Practice

The world's first central bank was the Sveriges Riksbank (the Swedish central bank), which was founded in 1668. As with the later introduction of other central banks in the world (particularly the Federal Reserve System in the United States), the founding of the Riksbank was in part a response to instability in the financial sector, in this case the failure of the first private bank in Sweden, the Stockholms Banco, founded in 1656. The Stockholms Banco was perhaps the first bank in Europe to issue paper bank

notes, but the bank sparked a financial crisis that, it was argued, created the need for a public financial institution that evolved into the modern Sveriges Riksbank.

Although Sweden had the first central bank, the key innovations of the Bank of England, founded in 1694, form part of the basic framework of modern central banking as we know it. The Bank of England was initially granted an advantage over the existing private banking system—the goldsmiths—in Great Britain at the time, in that it was a limited liability joint stock company. In exchange for this privilege granted by the Crown, the bank became a principal creditor for the Crown. King William III, in power at the Bank of England's founding, needed financing for armed conflict in the Jacobite Wars and the war with France. To help finance lending to the Crown, the Bank of England, until 1946 a private institution, issued paper notes and stock. Ultimately, under the *Bank Charter Act of 1844* (United Kingdom 1844), the Bank of England became the monopoly issuer (except for grandfathered banks) of currency in the United Kingdom. Most of the world's central banks founded subsequently share this property. Typically, the founding of a central bank is coupled with legal restrictions prohibiting the issuance of a widely used means of payment—physical currency—by any entity other than the central bank. Understandably, such legal restrictions can cut into the business of existing banking institutions, which typically oppose the introduction of central banking, because it reduces bank profits.

A key innovation of the Bank of England was crisis lending. That is, the bank essentially invented the lender-of-last-resort function of central banks. An early episode that taught British central bankers much about financial stress occurred shortly after the bank's founding. In 1720, the Bank of England had to deal with its first financial crisis, typically called the *South Sea Bubble*. The South Sea Company was chartered by the Crown and grew to be a rival to the Bank of England in financing the government. In 1720, the price of the South Sea Company's stock crashed, and there were widespread losses and ancillary business failures. During the crisis, the Bank of England came under pressure to assist in a bailout of the South Sea Company but declined to do so, leaving the resolution of the matter to the government. Ultimately, the Bank of England's position was strengthened as a result of the South Sea Bubble, because a competitor disappeared and the public's appetite for future competitors to the Bank of England was much diminished.

Lender-of-last-resort lending by the Bank of England became institutionalized in the nineteenth century, when the United Kingdom experienced recurrent banking panic episodes. The bank appears to have been able to profit from financial crises as a result of its superior information relative to other financial market participants. Typically, banking panics feature a widespread flight from bank liabilities to assets that are perceived to be safe. By the

nineteenth century, the Bank of England had established a reputation for safety, so some of the flight in nineteenth century UK panics was from other bank liabilities to Bank of England liabilities. Bank of England note issue and deposits expanded, and this increase in the bank's liabilities had to be matched by an increase in assets, which took the form of crisis lending. The bank proceeded to separate the likely winners from the likely losers among the UK banks. Basically, during the crisis the Bank of England wanted to differentiate between illiquid but solvent banks and insolvent banks. The bank could then profit from acting as a lender of last resort to the illiquid but solvent banks, replacing deposit outflows at such institutions with Bank of England loans.

[Bagehot \(1873\)](#) in part describes Bank of England behavior during nineteenth-century UK banking panics and provides a roadmap for central bank crisis lending – and for central bank lending in general. Bagehot argued that central bank loans should be advanced to banks at a high rate – high enough to discourage borrowing by non-distressed banks. In addition, these loans should be advanced freely. Basically, once the loan rate is set, the central bank should fund all loan requests at that rate, provided the borrower can post good collateral. In standard central bank corridor systems, this is essentially the standard rulebook. Central bank lending rates are typically set above the overnight interest rate, and central banks avoid bearing risk in lending by extending funds only on a secured basis against specified high-quality collateral, with haircuts varying with the perceived riskiness of the collateral.

So, to summarize, by the late nineteenth century the Bank of England had three features that are shared by most modern central banks. First, the bank was a monopoly supplier of physical currency, a principal means of retail payment. Second, the bank was a principal lender to the government. Third, the bank served as a lender of last resort for individual banks in temporary distress and for the whole banking system in crisis times.

The origins of the US Federal Reserve System (the Fed) and the subsequent innovations in central bank practice represent an interesting case study. Leading up to the 1913 *Federal Reserve Act*, it was widely understood that the US financial system was defective and that corrective action might include the introduction of central banking to the mix ([United States 1913](#)). The National Monetary Commission sponsored research and congressional hearings into the state of the US monetary system, and the nature of banking and central banking in other countries, including Canada. As in the United Kingdom, the United States had experienced repeated financial crises, particularly after the Civil War, with the last pre-Fed crisis being the panic of 1907. These panic episodes had coincided with general declines in aggregate economic activity.

The Fed was originally conceived as a somewhat mutually independent group of 12 regional banks whose primary purpose was to issue Federal Reserve notes to finance lending to their respective member banks. Each regional bank had the freedom to set its own discount rate (lending rate on central bank loans). The idea was to furnish an elastic currency, with the primary Fed asset being central bank loans. The Fed was to play the role of lender of last resort, so as to stem incipient banking panics and mitigate their effects should any arise. Unlike the Bank of England, lending to the federal government – or to governments at the state or local level, for that matter – was not initially seen as part of the Fed's role.

After World War I, however, things changed. During a downturn in 1922, lending by Federal Reserve Banks declined so much that the regional banks were having difficulty paying their costs. That is, central bank independence from the government depends in part on the central bank's ability to keep its operations out of the normal budgetary process of the central government. This ability comes from the central bank's monopoly on the issue of zero-nominal-interest currency and a ready supply of safe interest-bearing assets that the central bank can purchase to back the currency issue. The central bank makes a profit on the interest rate spread between its assets and its liabilities, pays its costs, and then returns the remainder to the central government. Given a sufficiently large indefinite flow of central bank profits, the central bank never has to receive a capital infusion from the central government, which helps to reinforce central bank independence.

The reduction in the Fed's loan portfolio in the early 1920s resulted in the regional banks seeking alternative safe assets to hold, and they opted for Treasury debt. In the course of purchasing more Treasury debt, the Fed discovered that open market purchases could move asset prices, and this led to the use of open market operations as a regular central bank tool and to a changed institutional structure that would accommodate this tool (see, e.g., [Burgess 1964](#)). In particular, the Federal Open Market Committee was founded as part of the *Banking Act of 1933* ([United States 1933](#)), which helped to tilt power away from the regional Federal Reserve Banks and toward the Board of Governors in Washington and the New York Fed.

So, by the 1930s the world's central banks had invented most of the modern framework that is now the template for all central bank institutions. These central banks had a monopoly on physical currency issue, were lenders of last resort to the financial sector, and typically held government debt that could be bought and sold in open market operations to control short-term interest rates. A further development that mattered for central banks, because it altered their financial stability role, was the introduction of deposit insurance, which occurred in the [United States in 1933](#). Those who framed the *Federal Reserve Act* ([United](#)

States 1913) thought that central bank lending would be sufficient to stem banking panics, but those ideas changed during the Great Depression in the United States. Perhaps this was due to some shortcoming of central bank lending as a tool in mitigating panics, but some (e.g., [Friedman and Schwartz 1963](#)) argue that the Fed did not behave appropriately as a lender of last resort during the Great Depression, thus making the downturn worse than it might have been.

Origin of the Bank of Canada

The 1933 Royal Commission on Banking and Currency was charged with the task of evaluating the need for a central bank in Canada. The issues driving the Royal Commission were quite different from those that motivated the framers of the *Federal Reserve Act* in the United States because there was no widespread view that the Canadian monetary system was unstable or fundamentally inefficient ([United States 1913](#)). Indeed, the monetary system in place at the time had served Canada well. Canadian chartered banks were permitted to issue paper notes in denominations larger than \$5, and those notes circulated at par and were widely accepted and redeemable in Dominion notes (issued by the federal government) at all the chartered banks. As [Champ, Smith, and Williamson \(1996\)](#) argue, Canada had achieved currency elasticity – the beneficial fluctuation of the quantity of means of payment in tandem with economic activity – through the endogenous behavior of the private banks, without central banking. Canadian banks had been very stable, with only one chartered bank failure (in 1923), of the Home Bank, in the twentieth century preceding 1933. There had been no systemic banking panics, and there were no chartered bank failures in Canada during the Great Depression.

Why then the need for a central bank in Canada? The *Report of the Royal Commission on Banking and Currency* ([Canada 1933](#)) states four primary reasons. First, although there was a lack of concern regarding domestic financial instability, there was significant concern about the importation of financial instability, particularly from the United States. The commission's report deemed a central bank to be more capable of responding to imported financial instability than were private-sector financial institutions, however well coordinated. Second, the commission argued that, in spite of the success of the existing monetary system in accommodating macroeconomic activity, a central bank was necessary to provide optimal macroeconomic management (as it was understood at the time). Third, other countries in the world had central banks, and other commonwealth countries – Australia, South Africa, and New Zealand – already possessed, or were about to establish, central banks. Fourth, having a central bank was thought to be necessary to participate in international financial coordination.

Although the Royal Commission on Banking and Currency recommended that a central bank be established in Canada, two of the five commissioners dissented. The dissents, as was typically the case in other countries when central banks were introduced, came from members of the banking community, because the Canadian chartered banks stood to lose their profits from note issue. In any event, the *Bank of Canada Act* passed Parliament in 1934, and the Bank of Canada opened its doors in 1935.

The Preamble to the Bank of Canada Act states,

WHEREAS it is desirable to establish a central bank in Canada to regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada. . . . ([Canada 1933](#), 1)

The Preamble provides some flexibility for the Bank of Canada in setting its goals and achieving them, but at the same time it does not make the bank's mandate too broad. The bank is supposed to manage the macroeconomy in the public interest, and the Preamble recognizes that a central bank's power to do so may be limited.

Central Bank Goals, Policy Rules, and Implementation

Before I examine the particulars of current central banking issues, it is useful to discuss a basic framework that allows readers to organize their thinking about what central banks do. Central banks have goals, they achieve those goals by formulating policy rules, and those policy rules are implemented through actual central bank actions.

Ultimately, central banks are constrained by their mandates – the legislation that sets out the rules that govern the central bank and what it is supposed to achieve. In the Canadian case, the Bank of Canada is constrained by the *Bank of Canada Act* ([Canada 1985](#)), which gives the bank a fairly broad mandate to maximize aggregate economic welfare by mitigating aggregate fluctuations and stabilizing prices. The act is not very specific about how the Bank of Canada should go about doing this, for good reasons. People's knowledge of how the economy works was, and is, limited, and they would not be content if the Bank of Canada Act had dictated the details of Bank of Canada policy intervention on the basis of the state of knowledge and technology in 1934.

The central bank's goals are objectives for policy, for example an inflation target, a money growth target, or an NGDP target. For the public, and for central bankers, such goals should be easy to understand, so that everyone is capable of evaluating the central bank's performance relative to its goals. In addition, and perhaps most important, the

best available economic science should tell people that the central bank will do a better job of fulfilling its mandate, in some well-defined sense, under the specified central bank goals than under some alternative goal or goals.

The central bank's policy rule is a mapping from the state of the economy to a setting for some economic variable—typically an asset price—that the central bank considers to be amenable to control. For example, in the very short run, most central banks establish a target for an overnight nominal rate of interest, and a Taylor rule—which yields a setting for the overnight interest rate given observed inflation, the inflation target, and a measure of macroeconomic slack—is one type of policy rule. Macroeconomic theory and practice has established that important benefits arise from well-understood policy rules. Predictable monetary policy reduces aggregate uncertainty, but this predictability is the result of committing not to particular future actions but to a systematic response of policy to the state of the economy. Although some economists argue to the contrary, it is beneficial if the policy rule is not explicitly specified. This is because, again, people's knowledge of the economy, and the state of technology, is evolving over time, so in general the form of the optimal policy rule should evolve as well—perhaps in radical ways. Knowledge of the existing policy rule is built up over time by careful communication by the central bank. If the central bank clearly explains the reasons for every policy action it takes, central bank behavior should become predictable, with a high degree of accuracy.

Perhaps obviously, the policy rule should do a good job of achieving the central bank's goals. Solid economic science should tell one that the policy rule is an efficient one, in a well-defined sense, for achieving the central bank's goals. Also, that science should be consistent with the observed performance of the economy under the policy rule.

Implementation is the operating procedure the central bank uses to achieve a particular setting for the variable in the policy rule. For example, in Canada, the Bank of Canada implements policy through a corridor system. The overnight nominal interest rate on repurchase agreements (repos) is the variable the bank wants to target on a day-to-day basis, and this target interest rate is bounded by the bank rate (the Bank of Canada's lending rate to financial institutions, 25 basis points above the target repo rate) and the interest rate on the deposits of financial institutions with the Bank of Canada (the interest rate on reserves, 25 basis points below the target repo rate). The bank has a system of intraday intervention in financial markets—essentially open market operations—that achieves the target repo rate with a reasonable degree of accuracy. Alternatively, the US Federal Reserve System currently implements policy via a floor system, under which arbitrage in overnight credit markets should drive overnight interest rates to the interest rate on reserves, given the

large stock of reserves outstanding. Implementation in a floor system is in principle easy, in that the setting for the interest rate on reserves achieves the central bank's interest rate target by fiat.

The system of monetary policy implementation should be successful in achieving the setting for the central bank's target variable. For example, the Bank of Canada would have to re-evaluate its daylight intervention system if it were not accurately pegging the overnight repo rate each day. It is perhaps not important for the public to understand the details of implementation, but central bankers should be able to successfully explain why things are going wrong—at least to professionals—if such is the case.

Finally, the central bank's goals, policy rule, and implementation should be an integrated whole. For example, if the approach to implementation is poor, this could be detrimental to achieving the central bank's goals, even if the goals themselves and the policy rule are sound. For example, the large Fed balance sheet in the United States may work against achieving the Fed's 2 percent inflation target if central bankers believe that having a large balance sheet has strong effects on inflation that do not exist in reality. But the large balance sheet necessitates a floor system approach to policy implementation.

Evolution over Time of Central Bank Goals, Policy Rules, and Implementation

This narrative starts in 1970, because this year was a watershed in inflation experience for the rich countries of the world, and it was also a turning point for macroeconomic theory. In particular, [Milton Friedman \(1968\)](#) had recently published his influential work on monetary policy, and the [Phelps \(1970\)](#) volume had helped usher in a new approach to macroeconomic analysis, based on microfoundations.

The 1970s proved to be a period of persistently high inflation in Canada and in other countries. During the 1970s, Canadian Consumer Price Index (CPI) inflation averaged 7.6 percent, and it reached a high (year-over-year) of 12.7 percent in December 1974. Inflation experience was similar in the United States, and by the latter half of the 1970s macroeconomists and policy-makers seemed in agreement that inflation should be brought down. But how?

[Tobin \(1980\)](#) provided what appears to be a consensus view among influential macroeconomists at the time. This view was that inflation is very sticky, due to slow-moving inflation expectations and because of sticky wages and prices. So, if inflation is too high, and an attempt were made to reduce it through monetary policy, as the argument goes, then people would have to suffer a very long period of high unemployment, and the benefit-cost ratio (in terms of economic welfare) would be far too low. So, [Tobin \(1980, 71\)](#) stated, "It is not possible to do the job [disinflation] without effective wage and price controls of some kind . . . there could be worse prospects, and

probably they include determined but unassisted monetary disinflation.”

However, in spite of what [Tobin \(1980\)](#) recommended, in the United States the approach to disinflation followed the recommendations of Friedman and the monetarists. Paul Volcker, the Fed Chair from 1979 to 1987, acted to reduce inflation by reducing the growth rate in the monetary base, without regard for the path for nominal interest rates (see [Williamson 2019b](#)). Although the United States experienced a moderately severe recession in 1981–1982, Volcker’s monetarist disinflation experiment is generally regarded as a success. Indeed, the experience appeared inconsistent with the dire effects that Tobin predicted.

Canada’s attempt to disinflate did not meet with the success of the Volcker experiment. The Canadian approach to disinflation was more in line with Tobin’s playbook than Friedman’s. Canada’s parliament passed the *Anti-Inflation Act* in 1975 ([Canada 1976](#)), setting up the Anti-Inflation Board, which stayed in operation until 1979. In tandem, the Bank of Canada set targets for growth in M1, which were to be reduced over time according to a monetarist prescription. These M1 targets were in place from 1975 to 1982. When the Anti-Inflation Board ceased operation in 1979, the CPI inflation rate in Canada was still high, at 9.8 percent (year-over-year), and when money growth targets were abandoned in 1982 the inflation rate was 9.7 percent. So, in spite of a coordinated program aimed at disinflation, inflation was still moderately high in Canada after the program ended.

Although monetarist approaches may have worked in some instances, as in the United States, to reduce inflation, it became clear to central bankers in the 1980s that monetarism did not work well in ongoing inflation control. Basically, the relationship between growth in monetary aggregates (however measured) is an unstable one because of changes over time in regulation and the technology of financial intermediation and retail and wholesale payments. Empirically, this shows up as instability in money demand functions, although one can still find claims in the economics literature that money demand functions are stable if one finds the right specification ([Lucas and Nicolini 2015](#)) or constructs monetary aggregates “correctly” ([Barnett et al. 2013](#)).

Currently, however, it is hard to find elements of monetarism in central banking communication or in discussion of monetary policy issues. Money growth targeting is not typically practiced in the twenty-first century, although monetarism has had a lasting impact on central banking practice. First, it has become widely accepted that inflation control is the job of the central bank, a view that was not the consensus in 1980 (e.g., see [Tobin 1980](#)). Second, the idea that it is beneficial for the central bank to commit to simple, easily understood policy rules was emphasized by [Friedman \(1968\)](#). Although Friedman appears to have chosen the wrong policy rule, commitment and central

bank credibility (see also [Kydland and Prescott 1977](#); [Sargent 1982](#)) have now become common currency in central bank policy discussions.

In the monetarist framework, a low and stable inflation rate and stable real GDP growth are viewed as policy goals, and Friedman thought (see [Friedman and Schwartz 1963](#)) that a policy rule targeting the growth rate in some monetary aggregate would serve to achieve all of these goals. When central bankers became discouraged with the monetarist framework, they looked for alternatives. One approach that was considered was to simply target inflation directly, rather than relying on some intermediate variable such as money growth. Inflation targeting was first implemented in New Zealand in 1989, and Canada followed suit in 1991.

Since 1991, the Bank of Canada’s inflation targeting regime has been essentially unchanged. The bank targets headline CPI inflation at 2 percent per year, in a range of 1 percent to 3 percent. It does not announce a specific policy rule, but press conferences are given by the Governor and Senior Deputy Governor after four of the eight meetings of the Governing Council of the Bank of Canada to explain the Governing Council’s decisions. The Bank also issues a statement after each Governing Council decision and provides more details in its Monetary Policy Report, which is issued four times per year. Implementation is accomplished with a corridor system (excepting a period of about a year in 2009–2010, when the Bank of Canada used a floor system) under which the bank targets an overnight repo rate, with the repo rate target set at each of the eight annual Governing Council meetings.

Bank of Canada’s Inflation Targeting Regime: An Evaluation

The goal of the Bank of Canada is to achieve stable CPI inflation of 2 percent per year. That goal is easy to understand and to evaluate. [Figure 1](#) shows the path of the log of the Canadian CPI relative to a 2 percent inflation path for the period since the inflation targeting regime was put in place in 1991. It also shows the path for the log of the CPI in Japan, to enable a comparison of the Bank of Canada’s performance with that of a central bank that has difficulty in achieving its inflation target. The Bank of Japan has had a 2 percent inflation target since 2013. In the figure, one can see that the Bank of Canada has been remarkably successful in hitting its 2 percent inflation target. In fact, the cumulative deviation from a 2 percent inflation path has been small. Even for 2009–2019, when the bank tended to undershoot its inflation target, average CPI inflation has been 1.8 percent, which is not far off the 2 percent target (as inflation targeting regimes go) and well within the 1 percent to 3 percent range. See also [Beaudry and Ruge-Murcia \(2017\)](#), who evaluate inflation targeting in Canada.

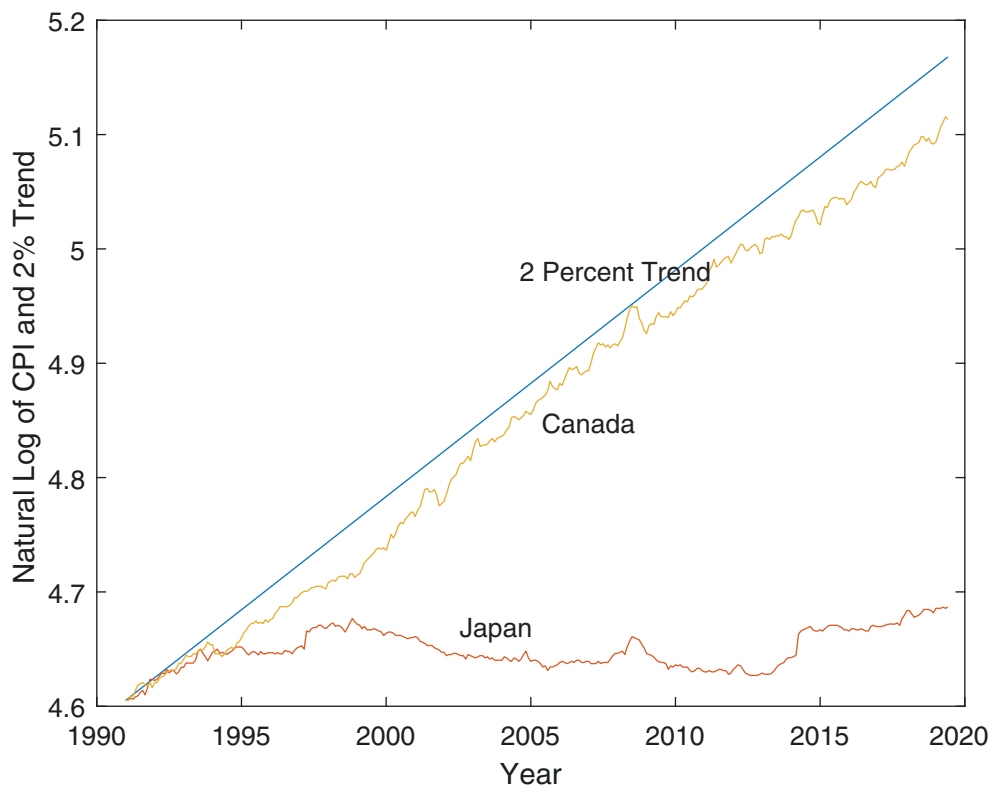


Figure 1: Consumer Price Index, Canada and Japan

Source: Statistics Canada and Statistics Bureau of Japan databases.

In [Figure 1](#), the average inflation rate in Japan has been close to zero since 1995. In spite of the adoption of a 2 percent inflation target by the Bank of Japan in 2013, there has been no significant sustained increase in the inflation rate, especially if one takes into account the effect of a 3-percentage-point increase in the consumption tax on prices in 2014. This helps to illustrate that adopting an inflation targeting approach does not imply that the central bank can hit its target.

One could also evaluate the Bank of Canada on the basis of the observed variability in prices. [Figure 2](#) shows the percentage deviations from a Hodrick–Prescott (HP) trend in the CPI since 1991 (see [Hodrick and Prescott 1997](#)). The standard deviation of percentage deviations from trend in the figure is 0.53 and, perhaps most important, the deviations from trend are not persistent. Therefore, the trend in the CPI closely follows a 2 percent trend path, and the CPI is stable around the trend, both of which indicate success relative to the Bank of Canada’s goal.

But why target inflation? The modern consensus among macroeconomists is that central bank control of inflation is feasible, and that is consistent with Canadian experience since 1991. No similar consensus exists on the ability of the central bank to control real aggregate economic activity or asset prices (other than the price of

short-term government debt), for example. Moreover, there is strong evidence that both anticipated and unanticipated inflation are costly, in terms of economic welfare. Anticipated inflation distorts intertemporal decisions (e.g., [Cooley and Hansen 1989](#)) and causes significant redistributive effects (e.g., [Doepke and Schneider 2006](#)). Variability in inflation results in distortions either because of sticky prices and wages ([Woodford 2003](#)) or because it creates uncertainty in credit markets as a result of the predominance of nominal debt contracts. Thus, commitment to low inflation reduces intertemporal distortions, and commitment to an arbitrary rate of inflation reduces inflation variability and cuts down on uncertainty.

However, economic science does not say that a 2 percent inflation target is optimal. Measures of the cost of anticipated inflation are typically small (e.g., [Cooley and Hansen 1989](#)), and [Schmitt-Grohe and Uribe \(2010\)](#) argue that there is nothing to justify the choice of 2 percent as an inflation target by most of the central banks in the world with inflation-targeting regimes.

So, could the Bank of Canada improve on its inflation targeting regime? Could the bank be performing better relative to its stated goal? Should the bank have a different goal?

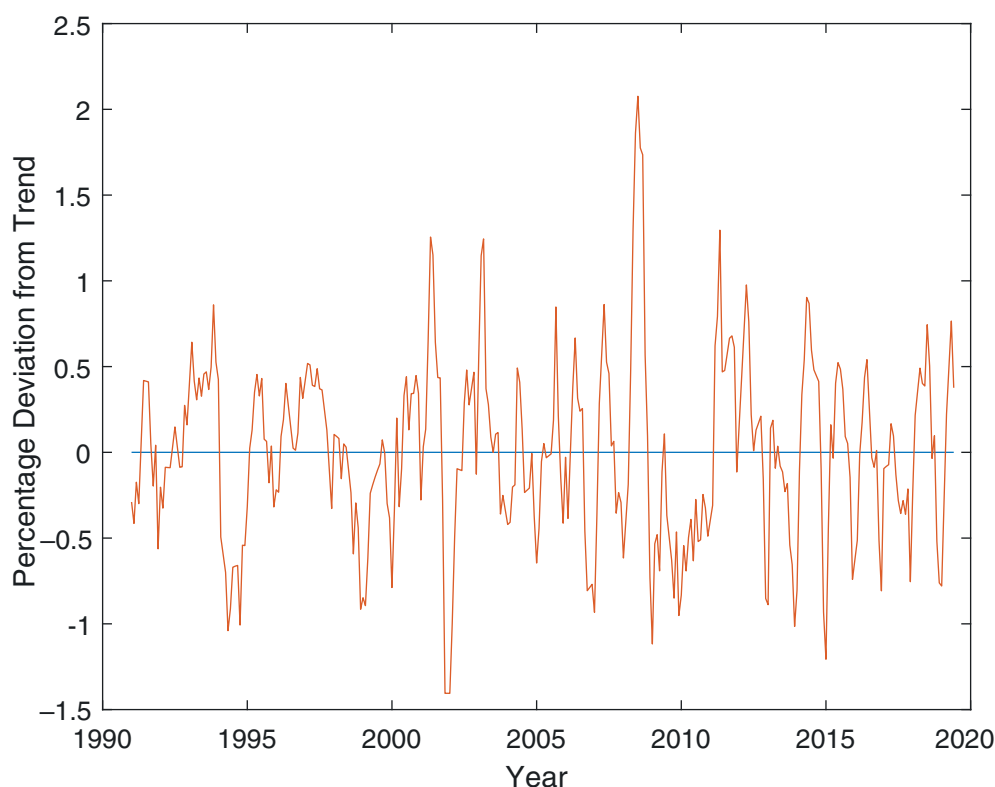


Figure 2: Percentage Deviations from Trend in Consumer Price Index
Source: Statistics Canada database.

Alternatives to Inflation Targeting

Every five years, the Bank of Canada renews its agreement with the government of Canada. The last agreement occurred in 2016, and it that renewed the inflation-targeting approach with some minor changes (see [Canada and Bank of Canada 2016](#)). In the period between agreement renewals, the bank seeks input from the general public, including the academic and business communities. The bank should, and does, consider alternatives to the incumbent arrangement at each renewal, in light of experience and advances in economic theory. Many alternatives to inflation targeting have been proposed by economists and sometimes put into practice by other central banks. Some of these alternatives are significant departures from inflation targeting, and some would only represent marginal changes.

Price-Level Targeting

Inflation targeting implies that history does not matter. Under this approach, the current inflation rate is a by-gone, and the focus of the central bank is on managing policy so as to achieve 2 percent inflation in the future. In contrast, in a price-level-targeting world, the central bank sets a long-run target path for the price level, then manages policy to return the price level to target when it

deviates. Therefore, history matters, because the central bank needs to make up for past inflation that was either above or below target.

To be more concrete, under price level targeting, the central bank needs to choose a base period, b , a growth rate for the price level i^* , and a rate of adjustment γ that will determine the rate at which the central bank makes up for past misses. Then, letting P_t denote the actual price level in period t , and P_{t+1}^* the price level target for period $t + 1$, the price-level target for the next period depends on the base period, the current price level, the growth rate, and the rate of adjustment according to

$$P_{t+1}^* = [P_t(1+i^*)]^{1-\gamma} [P_b(1+i^*)^{t+1-b}]^{1-\gamma} \quad (1)$$

or, in logs and approximating, where lowercase denotes the log of the uppercase variable,

$$p_{t+1}^* = (1-\gamma)p_t + \gamma p_b + [1+\gamma(t-b)]i^*. \quad (2)$$

Note, in [Equations \(1\) and \(2\)](#), that inflation targeting is the special case where $\gamma = 0$ and, if $\gamma = 1$, then the central bank aims to return to the constant-growth price-level path in one period.

In theory, the potential benefit of price level targeting is that, if well understood, it reduces inflation uncertainty

over all horizons. If the central bank comes close to its target P_t^* in every period t , then the public knows that the price level in every future period will be in close proximity to the constant-growth price-level path, so inflation can be accurately forecast over any horizon. In contrast, inflation targeting could potentially lead to high variability in inflation at long horizons, if the central bank persistently misses its inflation target on the high or low side. See, for example, [Ambler \(2009\)](#) for a review of arguments for and against price-level targeting.

A drawback of price-level targeting is that, in general, anticipated inflation will be different at different horizons. For example, if the price level is currently below the constant-growth price-level path, then anticipated inflation will be higher in the immediate future than in the distant future. In other words, price-level targeting, as represented in [Equations \(1\) and \(2\)](#), involves three parameters, whereas inflation targeting involves one parameter. Inflation targeting is much easier to understand, both for the public and for central bankers, and much easier for central bankers to explain, than is price level targeting.

There are also elements of price-level targeting that make central bank performance difficult to evaluate and that potentially give central bankers too much wiggle room. The speed-of-adjustment parameter γ is important to how price-level targeting performs and how it is evaluated, but this parameter would likely be unspecified if price-level targeting were implemented. One possible approach would be for the central bank to announce target bands around the constant-growth price-level path, as was done with M1 targeting by the Bank of Canada during 1975–1982. However, such target bands would have to change over time, further complicating communication with the public.

In any event, as [Figure 1](#) shows, under inflation targeting the bank actually comes close to price-level targeting anyway. So why change the approach?

Inflation Averaging

A closely related approach to price-level targeting is inflation averaging. Under this type of goal, the history of inflation matters, but in a somewhat different way than with price-level targeting. We can specify an inflation-averaging regime as involving the choice of a moving window of time over which inflation averaging is to occur, and a target rate of inflation. More specifically, the central bank has a window of length s centred around the current period t . The central bank aims to make up for inflation target misses during the last s periods by making these misses up in equal amounts over the next s periods. So, the target price level next period is

$$P_{t+1}^* = P_t^{1-\frac{1}{s}} (1+i^*)^2 P_{t-1}^{\frac{1}{s}}, \quad (3)$$

or in logs, and approximating,

$$p_{t+1}^* = \left(1 - \frac{1}{s}\right) p_t + \frac{1}{s} p_{t-s} + 2i^*. \quad (4)$$

Inspection of [Equations \(1\)–\(4\)](#) indicates that inflation averaging is price-level targeting with a speed of adjustment parameter $\gamma = \frac{1}{s}$ and a moving base period, that is, $b = t - s$. Inflation targeting is simpler, because it has two parameters instead of the three parameters in the price-level targeting approach. Basically, though, inflation targeting has all of the drawbacks of price-level targeting. It hampers central bank communication, potentially permits excessive discretion by the central bank, and in practice may make little difference for the Bank of Canada's behaviour.

Nominal Income Targeting

NGDP targeting appears to have evolved from monetarist ideas (e.g., see [McCallum 1987](#)). In quantity theory economics, the quantity equation, $MV = PY$, plays an important role, where M is the nominal quantity of money, V is the income velocity of money, P is the price level, and Y is real GDP, so PY is NGDP. In monetarist doctrine, V is viewed as predictable, so that there is a systematic relationship between the money stock and nominal income. Central banks abandoned money growth targeting because the relationships among money growth, inflation, and real GDP growth are unstable—velocity is not predictable. Advocates of NGDP targeting, however, argue that the instability in velocity becomes irrelevant if the central bank focuses on growth in NGDP as a goal rather than money growth.

It is hard to make a tight and robust argument as to why NGDP growth is closely connected to aggregate economic welfare. One might construct an argument whereby, in the context of wage rigidity, an optimal allocation is achieved if the price level fluctuates in response to aggregate shocks. Thus, price stability is judged to be bad, and NGDP targeting might approximate an optimal policy. Alternatively, [Sheedy \(2014\)](#) constructs an example in which a policy that promotes risk sharing, in an incomplete markets world, looks like NGDP targeting. However, these examples are special, and they tend to leave out realistic model elements that would tend to support inflation targeting.

A key problem with NGDP targeting is that it requires taking a stand on the future long-run growth rate of real GDP, something macroeconomists in general know little about because they cannot foresee future productivity growth. For example, suppose that in 1991 the Bank of Canada had chosen to target a path for nominal GDP. Suppose also that the bank had taken the average growth rate of real GDP for 1961–1991 as an estimate of future real GDP growth. Then, given the average GDP growth rate of 3.8 percent for real GDP for 1961–1991, and allowing for 2 percent inflation, suppose the bank had chosen in 1991 to target NGDP growth at 5.8 percent per year.

Figure 3 shows a 5.8 percent growth path and the path of actual NGDP for Canada from 1991 to 2019. Until the 2008–2009 recession, the Bank of Canada would have been performing well, if evaluated on the basis of a 5.8 percent NGDP growth target. That is, over the period 1991–2007, it would not have made much difference if the Bank of Canada had announced that it was targeting NGDP rather than CPI inflation. From 2008 to 2009, however, the actual path for NGDP diverges from the 5.8 percent growth path as a result of a level drop in NGDP during the 2008–2009 recession and a subsequent decline in the growth rate of NGDP relative to the pre-2008 period.

It is hard to argue that monetary policy could have increased the growth rate of real GDP over the ten-year period from 2009 to 2019, so if an NGDP target had been in place, the Bank of Canada would have been faced with a choice between two alternatives. First, it could have conducted monetary policy over the 2009–2019 period so as to generate higher inflation, thus increasing the inflation rate above 2 percent. Second, it could have announced a lower growth rate for the target path of NGDP. The first option would be undesirable if one values low and predictable inflation, and the second would bring the bank's credibility into question. The key idea behind an announced goal is that commitment by the central bank

reduces uncertainty for the public. This example illustrates one facet of the difficulty with NGDP targeting. Because long-run trend growth in real GDP cannot be predicted well, low and stable inflation and central bank credibility may be on the line.

Figure 4 illustrates a potential second problem with NGDP targeting. The figure shows the HP-filtered percentage deviations from trend in Canadian real GDP and NGDP for 1991–2019. First, note that fluctuations in NGDP closely follow the fluctuations in real GDP about trend. This is consistent with Figure 2, which indicates that the price level over this period was smooth, through some combination of the Bank of Canada's success in stabilizing prices and inherent price inertia. In any case, most of the variation in NGDP from 1991 to 2019 can be attributed to real GDP variation. Second, the deviations from trend in NGDP are large and highly persistent.

Therefore, if the goal in an NGDP-targeting regime is to induce a smooth path for NGDP, the Bank of Canada would have had to be doing something very different over the period 1991–2019 to achieve that. If NGDP targeting could successfully have eliminated much of the variation about trend in real GDP, that could well have been beneficial. It is hard, however, to make the case that monetary policy could have done more in the way of conventional

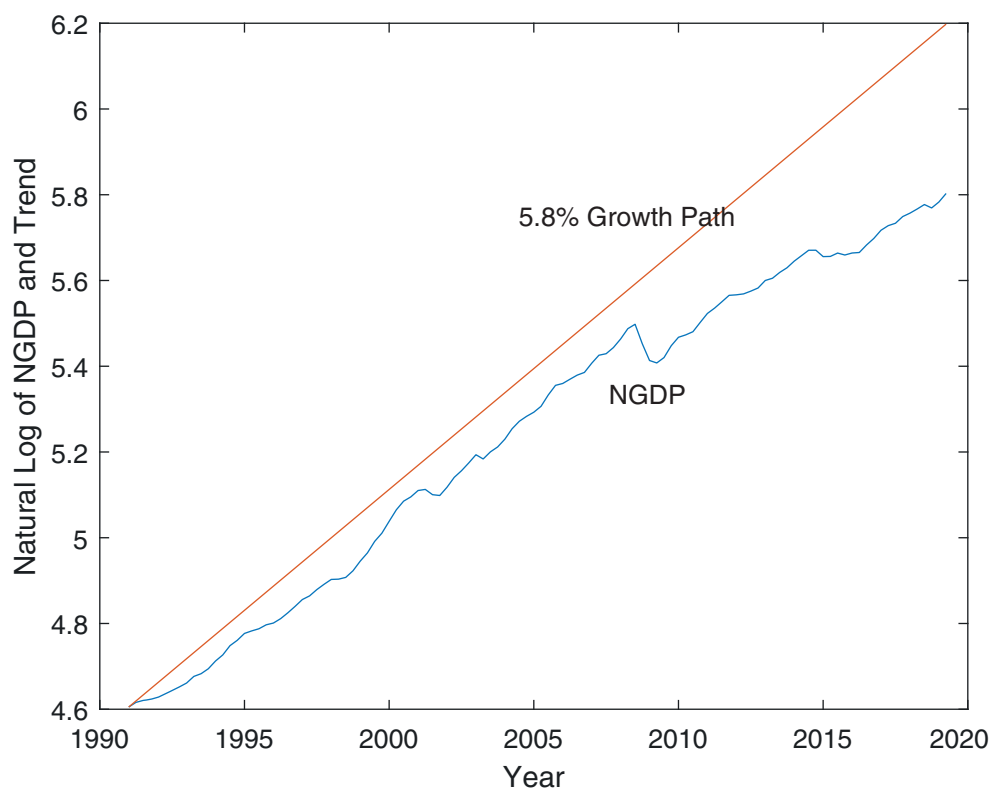


Figure 3: NGDP and NGDP Target

Note: NGDP = nominal gross domestic product.

Source: Statistics Canada database.

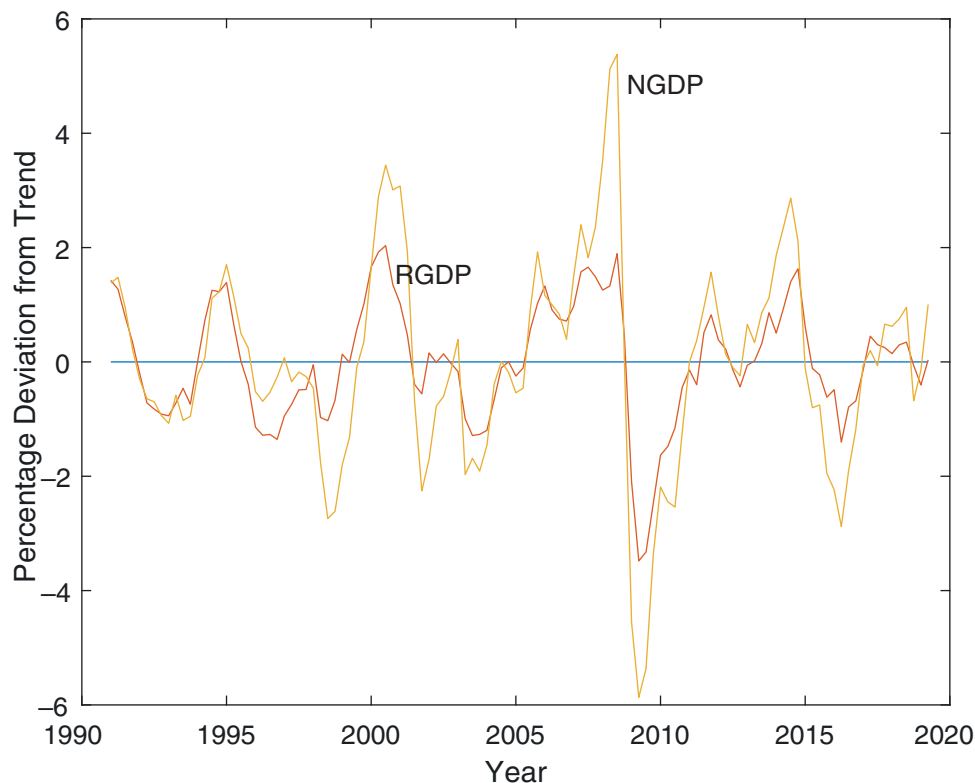


Figure 4: Percentage Deviations from Trend in RGDP and NGDP.

Notes: NGDP = nominal gross domestic product; RGDP = real gross domestic product.

Source: Statistics Canada database.

stabilization policy during this period. The bank's inflation-targeting regime is a flexible one, and nominal interest rates clearly respond strongly to short-run fluctuations in the unemployment rate, as I show in what follows. Most, or all, of the variation in real GDP observed in [Figure 4](#) is thus likely the residual that monetary policy cannot do much to mitigate.

Therefore, if the Bank of Canada had adhered to an NGDP-targeting regime for 1991–2019, there would have been two possible outcomes. First, if the bank had been successful in achieving a smooth path for NGDP, this would necessarily make inflation, and possibly real GDP, more variable. So if stable inflation and stable real GDP are valued, that would be a poor outcome. Second, by adopting NGDP targeting, the Bank of Canada could have set itself up for failure. NGDP may have fluctuated much as in [Figure 4](#), and the bank's performance would have been judged as poor relative to its goal.

Dual Mandate

Many central banks have adopted inflation targeting, typically with some flexibility to focus on other goals when required – in financial crises, for example – or to pursue active conventional stabilization policy, provided that

it does not imply excessive sacrifice with respect to the inflation target. The United States is somewhat different, in that the US Congress has established a dual mandate in the *Employment Act of 1946* and the *Full Employment and Balanced Growth Act of 1978* ([United States 1946, 1978](#)). The Fed's dual mandate is typically characterized as specifying that the Fed pursue price stability and maximum employment.

The US Federal Open Market Committee (FOMC) recognizes that the dual mandate opens up some thorny issues. In particular, in [FOMC \(2019\)](#), the FOMC states that

the maximum level of employment is largely determined by nonmonetary factors that affect the structure and dynamics of the labour market. These factors may change over time and may not be directly measurable. Consequently, it would not be appropriate to specify a fixed goal for employment. (1)

The Fed's dual mandate specifies that it should care about inflation and real aggregate economic activity. However, the consensus of economic science is that, although it is feasible for a central bank to control inflation in the short and long runs, it is not feasible for the central bank to control real aggregate economic activity in the long run.

Also, even though there are short-run non-neutralities of money, it would be foolish to set a numerical target for a real quantity – the unemployment rate, for example.

So, even when a dual mandate has been put into practice, as in the United States, central bankers appear disinclined to address the real part of the mandate explicitly, although public statements by the Fed typically speak to the dual mandate in some fashion. It is certainly feasible for a dual mandate to enter explicitly into the agreement between the Bank of Canada and the federal government, and doing so appears to be well within what is specified in the *Bank of Canada Act* (Canada 1985). The bank's flexible approach to inflation targeting, however, appears to be a good compromise, and one could argue that the bank's actual behaviour is in the spirit of the US dual mandate. Perhaps an explicit dual mandate for Canada would just be asking for trouble.

Policy Rules

Thus far, I have addressed issues related to alternative central bank goals. In this section, I examine the role of policy rules in achieving the central bank's goals.

When central banks abandoned money growth targets in favor of inflation targeting and became more focused on announcing short-run targets for overnight nominal interest rates, some guidance was required as to how inflation targets would be connected to short-run interest rate targets. Taylor (1993) provided this guidance by way of his well-known rule, which can be specified as

$$R_t = r_t^* + \pi^* + \alpha(i_t - i^*) + \gamma(y_t - y_t^*). \quad (5)$$

In Equation (5), R_t is the central bank's target for the overnight nominal interest rate at time t , r_t^* is the "natural real rate of interest," i_t is the actual inflation rate, i^* is the inflation target, y_t is actual aggregate output, and y_t^* is some measure of potential output. Typically $\alpha > 1$, which is the Taylor principle specifying that the nominal interest rate respond in the same direction, and more than one for one, in response to deviations of inflation from target, and $\gamma > 0$, so the nominal interest rate responds positively to deviations of output from potential.

The Taylor rule is designed for a dual mandate, and it takes a stand as to what is optimal (target inflation and potential output) and then specifies how the interest rate target should move when the central bank is not meeting its goals. The rule is based loosely on theory. First, if the central bank meets its goals, that is, $i_t = i^*$ and $y_t = y_t^*$, then the target for the nominal interest rate is consistent with the long-run Fisher relation. Second, the rule seems based on a Phillips curve theory of inflation and money non-neutrality in the short run, in the sense that in the underlying theory the real rate of interest moves in the same direction as the nominal rate in response to a policy change. So, if the theory is correct, then increases in the

inflation rate above target, or of output above target, will induce a policy response that increases the real interest rate, reduces output (according to static Keynesian theory), and reduces inflation, by way of a Phillips curve effect.

The Taylor rule entered into New Keynesian (NK) theory (see Woodford 2003, e.g.), but as an equilibrium selection device rather than as a behavioural rule that one would observe in operation in practice. Monetary models typically exhibit multiple equilibria, and interest rate rules are noted for inducing, or adding to, indeterminacy. However, as Woodford (2003) argues, the Taylor rule implies local determinacy in the neighbourhood of the steady state in which the central bank achieves its goals. Determinacy is desirable, because NK models cannot be useful as policy tools if the policy rule does not imply a unique outcome.

The problem is that, in setups in which one can work out global dynamics, the Taylor rule with the Taylor principle in place worsens the indeterminacy problem in a wide class of models (see Benhabib, Schmitt-Grohe, and Uribe 2001; Williamson 2018, 2019b). The issue is that Fisher effects (the inflation-premium effect of inflation on nominal interest rates) are far more important in NK models – and in other macroeconomic models as well – than is generally recognized. So, if inflation is below target and a central banker blindly follows the Taylor rule, the nominal interest rate goes down, which reduces inflation given the dominant Fisher effect. Then, the central banker reduces the nominal interest rate target further, further reducing inflation, and so forth, until the nominal interest rate reaches the zero lower bound (ZLB) or an effective lower bound (ELB). The ZLB or ELB then becomes a policy trap if a central banker adheres to the Taylor rule. The Taylor-rule central banker observes inflation below target but persists in the belief that inflation will surely go up if the nominal interest rate stays lower for longer.

"Neo-Fisherite" ideas have been expounded by Cochrane (2016) and Rupert and Sustek (2016), with supporting empirical evidence in Uribe (2018). Neo-Fisherism is consistent with the observed behaviour of some central banks, the most obvious case being the Bank of Japan (BOJ), which has had very low (and at times zero or negative) overnight nominal interest rates since about 1995, with Japanese inflation averaging about zero since then. The Bank of Japan has had a 2 percent inflation target since 2013, but it has been unable to generate sustained inflation, in spite of extensive unconventional monetary policy, including forward guidance, large-scale asset purchases, and negative nominal interest rate policy.

If following a Taylor rule potentially leads to chronic undershooting of the central bank's inflation target in theory, then why has the Bank of Canada been so successful in targeting inflation? The answer is that the bank does not follow a strict Taylor rule in practice. To focus on the short run, suppose that a least squares Taylor-rule

regression is run in which HP filtered Canadian monthly data for 1991–2019 are used. So, the regressors are HP-filtered year-over-year CPI inflation, $\tilde{\pi}_t$, and the HP-filtered unemployment rate, \tilde{u}_t , and the independent variable is the HP-filtered overnight repo rate for Canada, \tilde{R}_t . A least squares regression yields

$$\tilde{R}_t = 0.12\tilde{\pi}_t - 1.37\tilde{u}_t + \varepsilon_t \quad (6)$$

where ε_t is the error term. Therefore, estimates are that a 1-percentage-point increase in the inflation rate relative to trend induces an increase in the nominal interest rate target relative to trend of 0.12 percentage points, but a 1-percentage-point increase in the unemployment rate relative to trend induces a decrease in the nominal interest rate target relative to trend of 1.37 percentage points.

If one believes these estimates, then the Bank of Canada appears to be in the business of responding mainly to the unemployment rate in the short run. Possibly this works to target inflation because the bank gets the medium- to long-run nominal interest rate about right, in line with the long-run Fisher effect, so as to come close to its inflation target. In addition, a key problem for any central bank is to come up with justifications for interest rate increases. The asymmetry in public resistance to interest rate increases relative to decreases adds to the tendency for low nominal interest rates and inflation-target undershooting. Again, particularly in the most recent tightening cycle in Canada, beginning in mid-2017, Canada was not experiencing inflation persistently above target, but the bank nevertheless justified its interest rate hikes using an incipient inflation argument. Basically, Bank of Canada officials made a Phillips curve argument that tightness in labour markets would ultimately produce inflation above target in the future and that the bank needed to be pre-emptive. That is not a Taylor rule argument, however, unless one was to modify the rule by replacing actual inflation with the central banker's claimed measure of anticipated inflation.

Issues with the poor properties of Taylor rules – Taylor rule perils – could apply equally as well to cases in which the central bank's goal is something other than inflation targeting – price-level targeting, inflation averaging, NGDP targeting, or a dual mandate. For example, Ben Bernanke's (2017) proposal for temporary price-level targeting asks one to envision a situation in which the nominal interest rate has hit the ZLB or ELB and inflation is below target. Then, in line with the forward guidance recommendations coming from Werning (2012), for example, the central bank could, according to the argument, temporarily adopt price-level targeting, promise higher future inflation, and therefore generate higher current inflation. The problem is that Bernanke imagines that these effects of inflation are engendered by keeping the nominal interest rate low for longer. However, persistently low nominal interest rates, given the Fisher effect, imply

persistently low inflation. NGDP proponents indulge in arguments similar to Bernanke's, seemingly imagining a world in which wishful thinking achieves an NGDP target, but the policies that NGDP targeters appear to have in mind to return NGDP to its target in a persistent downturn – low interest rate policies – appear to be the ones that trap the central bank at the ZLB or ELB with persistently low inflation.

Low Real Interest Rates

Real rates of return on safe assets – safe government debt in particular – have fallen worldwide since about 1980 and have been persistently low relative to history since the 2008–2009 recession. Proposed explanations for low real interest rates include the effects of low productivity growth and demography, but the most likely primary cause is high demand and low supply of safe assets. The demand is high as a result of the expanded use of safe assets as collateral, particularly in overnight markets, and regulatory demand coming from new Basel III banking regulations. Supply of safe assets is low as a result of sovereign debt problems and mistrust of private assets – particularly asset-backed securities – after the financial crisis.

A low real rate of interest implies that, for a central bank targeting inflation at 2 percent, the average nominal rate of interest needs to be lower than it was historically. This is just Fisherian logic; given 2 percent inflation and a low real interest rate, the average nominal interest rate must be low. Standard countercyclical monetary policy, with a fluctuating central bank nominal interest rate target, implies the ZLB should be encountered with higher frequency. Conventional reasoning (see, e.g., Williams 2014) implies that this is a problem, in that a binding ZLB constraint on policy will imply that output and inflation are on average lower. That is, under conventional reasoning, a downturn features low output, and low inflation, as the economy moves along a stable Phillips curve. Once the central bank lowers its nominal interest rate target to the ZLB, further accommodation cannot be had, which, according to conventional logic, implies that output and inflation are too low, relative to what could be achieved if the ZLB could be relaxed.

According to conventional reasoning, what are the potential solutions to the problem of a frequently binding ZLB constraint?

1. *Increase the inflation target.* If the central bank conducts countercyclical policy in the same manner as in the past, and if the frequency and size of adverse shocks is about the same, then by Fisherian logic an appropriate increase in the inflation target implies a higher average nominal interest rate, and the ZLB will bind with lower frequency. There are two problems with this solution. First, this will increase the

welfare losses from inflation. Second, and perhaps more important, this would call the central bank's credibility into question. A key benefit of inflation targeting is that commitment to some inflation rate reduces uncertainty. If the central bank is seen as willing to change the target, though, what prevents it from doing it again, repeatedly?

2. *Negative nominal interest rates.* Some central banks, including the Bank of Japan, the Swiss National Bank, the Swedish central bank, and the European Central Bank, have already experimented with paying negative interest on central bank reserves, which, with a large central bank balance sheet, implies negative nominal rates of interest on all safe short-maturity assets. This relaxes the ZLB constraint, and there is an ELB determined by the arbitrage opportunities that open up because of the existence of zero-interest currency. Some advocates of negative nominal interest rates (e.g., [Agarwal and Kimball 2015](#)) have proposed schemes for inhibiting these arbitrage opportunities that would reduce the ELB. The key problem with negative nominal interest rates is that they squeeze banks, because zero-interest currency is a substitute for small retail bank deposits, and so negative nominal interest rates will tend to reduce the interest rate spread on which banks earn a profit. Negative nominal interest rates are intended to correct an inefficiency – sticky prices, typically – but if they make financial intermediation less efficient in the process, the costs could outweigh the benefits.
3. *Quantitative easing (QE, or large-scale asset purchases).* During and after the financial crisis, with interest rates at or near the ZLB in many countries, the Fed, the Bank of England, the European Central Bank, the Bank of Japan, the Swedish central bank, and the Swiss National Bank, among other central banks, experimented with QE, in the form of exchanges of reserves for long-maturity government debt and private assets. Central bankers argued that QE was somehow equivalent to conventional interest rate policy and would work in the same way. That is, more purchases would increase aggregate output and inflation. There is some debate over whether QE works as advertised – it may have little or no effect, or it may actually be harmful (see [Williamson 2017](#)). There appears to be little or no empirical support for the notion that QE has any effect with respect to the central bank's ultimate goals. For example, the Bank of Japan has pursued a very aggressive QE policy since 2013, with little apparent effect on inflation.
4. *Forward guidance.* From the work of [Eggertsson and Woodford \(2003\)](#) and [Werning \(2012\)](#), for example, forward guidance is a particular type of commitment to future policy. In NK frameworks, these authors argue that, when the ZLB is a binding constraint

on current policy, there are economic benefits from keeping the nominal interest rate at the ZLB for a longer time than might otherwise be the case. This, they argue, serves to increase current output and inflation. In practice, the key problem is commitment, with a good example being the forward guidance provided by the Fed in the post-financial crisis period. This guidance took the form of a series of changing calendar-date commitments, followed by a contingent commitment that seemed to bear no relation to any actual policy actions (see [Williamson 2015](#)). In the course of offering up this forward guidance, the FOMC's press statements became increasingly wordy and difficult to understand. So, in the US case, forward guidance was particularly poor, and it is not clear that other central banks could do it better.

So, any “solutions” offered to the ZLB problem are problematic in themselves – but is the ZLB really a problem in a low-real-interest-rate world? A contradiction in conventional reasoning is that a persistently low real interest rate implies that inflation would exceed the 2 percent inflation target if nominal interest rates are kept at their historical levels. However, the ZLB is perceived to be a problem for the inflation target by causing the central bank to undershoot its inflation target. One might think the problem would be a tendency to overshoot. Indeed, that is what [Williamson \(2019a\)](#) shows. For inflation targeting, the issue with a low-real-interest-rate world is that, when the ZLB binds (even in the context of sticky prices), inflation is too high rather than too low. Therefore, because central banks have been undershooting rather than overshooting inflation, the cause of low inflation is nominal interest rates that are chronically low, not a binding ZLB or ELB constraint.

Another issue is whether, if one models the cause of the low real interest rate, a ZLB policy is the appropriate one (at least with higher frequency). In [Andolfatto and Williamson \(2015\)](#) and [Williamson \(2019a\)](#), a low real interest rate arises because of a shortage of safe assets, implying binding collateral constraints, and an inefficiency in markets in which collateral is used. That inefficiency can be mitigated with a positive nominal interest rate. Then, even if there are sticky price inefficiencies, a safe asset shortage moves the optimal nominal interest rate away from the ZLB, rather than toward it.

Conclusion

Central banks are highly successful institutions, having survived since the seventeenth century while adapting to advances in economic knowledge and unfolding events. The Bank of Canada has been a particularly successful central bank, and its inflation-targeting regime, in place since 1991, is working well.

Should the Bank of Canada alter its approach significantly, for example by adopting price-level targeting, inflation averaging, NGDP targeting, or a dual mandate? Given the current state of economic theory and evidence, I think the answer is no. There is always room for improvement, but there are no alternative goals the Bank of Canada could adopt that would obviously improve macroeconomic performance in Canada. The bar should be set high when the bank renews its agreement with the federal government in 2021 – it is potentially very costly to experiment with untested policy approaches and then have to backtrack if those policies do not work.

A world with persistently low real interest rates presents some challenges for central banks, but conventional wisdom concerning approaches to this potential problem are perhaps wrongheaded. Quantitative easing, negative nominal interest rates, and other unconventional approaches to monetary policy, although tempting, have yet to demonstrate their value and may ultimately do more harm than good.

Acknowledgements

The author thanks the Jarislowsky Foundation, the Bank of Canada Fellowship Program, and the Social Sciences and Humanities Research Council of Canada for financial support. This article is based on a Bank of Canada Fellowship lecture at the Canadian Economic Association Meetings, Banff, Alberta, June 2019.

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