

Central Bank Forays Into Unconventional Monetary Policies

Explanation, Assessment, and Implications

Pierre Siklos



April 2023 • Fraser Institute

Central Bank Forays into Unconventional Monetary Policies: Explanation, Assessment, and Implications

by Pierre L. Siklos

Contents

Executive Summary / i

Introduction: Unconventional Monetary Policy and
Whence It Came / 1

Words and Deeds: Why and How the Conduct of Monetary Policy Changed
in the US and Canada / 7

Assessing the (Mixed) Record of UMP / 30

Conclusions: The Challenges that Lie Ahead / 37

Concluding Comments / 29

References / 42

About the author / 52

Acknowledgments / 52

Publishing information / 53

Supporting the Fraser Institute / 53

Purpose, funding, and independence / 54

About the Fraser Institute / 55

Editorial Advisory Board / 56

Executive Summary

This paper describes the era of unconventional monetary policies (UMP) and its principal motivations and tenets. The principal instruments of UMP are quantitative easing (QE), which encompasses central bank purchases of government-issued bonds, and private sector debt, such as mortgages, as well as forward guidance. The latter encompasses the public statements made by central bank officials that signal the likely direction of future monetary policy.

Much of the paper's focus is on the activities and experience of the US Federal Reserve, which has been practicing UMP since the financial crisis of 2008-2009. It also examines the Bank of Canada's more limited forays into UMP.

The reliance on UMP by central banks in both countries and in the European Union and Japan pre-empted reliance on changes in central bank policy rates, which was the traditional instrument of monetary policy. Rates of inflation that were persistently below central bank targets as well as policy rates approaching what is known as a zero lower bound motivated central banks to implement new policy instruments.

There has been a great deal of controversy surrounding both QE and forward guidance. Specifically, there is contention about the effectiveness of UMP in counteracting recessionary forces subsequent to the financial crisis, as well as concern that major and sustained QE initiatives contributed to the surge in inflation in 2021-2022.

The paper discusses the challenges that central banks confront in calibrating their monetary policy initiatives. It also reviews available evidence on the effectiveness of unconventional monetary policies with respect to their contribution to macroeconomic stability. The evidence points to a mixed record for UMP. Specifically, UMP likely prevented even worse macroeconomic outcomes following the great financial crisis of 2008 and the subsequent euro area sovereign debt crisis than the world would otherwise have experienced. However, there is also a concern that both extensive QE after the onset of the pandemic and central bank forward guidance signaling that inflation was likely to be transitory exacerbated the inflationary effects of supply chain and related disruptions to production activities.

The effective use of UMP faces significant challenges. In particular, critical indicators that central bankers use to justify continuing to rely on UMP and accompanying ultra-low interest rates rest on unobservable metrics, particularly the neutral real rate of interest. This is the real rate of interest consistent with holding inflation at the central bank's target rate. Estimates of the unobservable neutral real rate of interest by central banks have declined substantially since the financial crisis, in part reflecting a belief in the phenomenon known as secular stagnation. The theory of secular stagnation holds that weak aggregate demand is the main factor explaining below-trend economic growth and below-target inflation for much of the period following the financial crisis. The secular stagnation phenomenon helped support the view that the neutral rate of interest had declined substantially, and that expansionary monetary policy as manifested in UMP was less likely to cause inflation than had been thought by previous generations of central bankers.

When the combination of fiscal and monetary expansion in response to the pandemic of 2020-22 coincided with increased inflation, central bank credibility was adversely affected. The events of 2021 and 2022 arguably revealed over-confidence on the part of central bank officials that inflation could be kept in check despite warnings to the contrary by at least some prominent economists.

Scholars can reasonably argue that UMP initiatives were appropriate given the widespread economic shutdowns pursuant to the initial spread of the COVID virus, particularly given the perception of central bankers that they shared responsibility with the government for preventing a major COVID-related economic downturn. Nevertheless, the accumulated impact of those policies are proving difficult to reverse, which highlights a well-known but largely forgotten rule: monetary policy has its limits. It was arguably too loose for too long and the problem was made worse by over-burdening central banks with too many tasks.

While the main near-term focus of monetary policy is to restore price stability, it is not too soon for a rethinking of the primary role and responsibility of central banks as well as the monetary policy strategies appropriate to the central banks' policy focus. Such a rethinking should include whether and how monetary and fiscal policies might be better coordinated and whether a return to relying primarily on the policy interest rate as the main monetary policy tool is advisable.

Introduction: Unconventional Monetary Policy and Whence It Came

On the eve of the Great Financial Crisis of 2008-2009 (hereafter GFC), central banks around the world converged on a model of monetary policy centered primarily around changing a policy interest rate to influence aggregate demand and hold inflation around an announced target via the policy interest rate's impact on other market-determined interest rates.¹ This strategy encapsulated what observers meant by conventional monetary policy. Indeed, many central banks would publish flow charts showing how a change in policy interest rates winds its way through the economy (the so-called transmission mechanism) by influencing other interest rates, expectations and, conditional on shocks outside the system (e.g., changes in fiscal policy or commodity prices), influences price developments.² Perhaps in part for this reason, any other approach to monetary policy would eventually be referred to as unconventional (hereafter UMP), even though some of the policies that central bankers introduced subsequent to the GFC were known to them for decades.³

Prior to the GFC, changing the policy rate⁴ was also thought to be the most effective way to communicate the stance of monetary policy to

¹ The targets were either agreed to by their respective government, as in Canada, or represented a quantification of the definition of price stability that was part of the legislated mandate of the central bank, as in the United States.

² Fewer of these charts are published given the decades-long experiment with unconventional monetary policies. As this is written, one illustration that survives can be found at the European Central Bank. See <https://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html>.

³ For example, all relevant textbooks describe open market operations, that is, the buying and selling of short-term government bonds. These operations have an impact on the central bank's balance sheet by changing the assets of the central banks (i.e., how many government bonds are held) and the liabilities (i.e., the money supply used to pay for or the proceeds from the sale of these same bonds).

⁴ The policy interest rate in the US is called the (effective) federal funds rate, or fed

markets and the public. If investments and loans were to provide a positive real return, that is, provide an incentive for lenders to delay current consumption, this could only be achieved if compensation was also added for the inflation that was expected over the term of the investment or loan. For borrowers, of course, the inflation premium represents a penalty for preferring current over future consumption. The higher is expected inflation, for a given real return, the higher is the nominal interest rate. Hence, a rise in the policy interest rate, holding all else constant, signals a tighter monetary policy, while a reduction in the same interest rate translates into a looser policy since the only variable that changes under these conditions is the real interest rate.

In Canada, an agreement between the government of Canada and the Bank of Canada aims for a 2 percent annual inflation rate in the Consumer Price Index (CPI). This agreement has been in place since 1995.⁵ The US would wait until 2012 to explicitly declare its aim of maintaining inflation over the medium-term at 2 percent,⁶ although this number was for many years assumed to be the implicit target that the Federal Reserve (hereafter the Fed) sought to achieve (e.g., see Hetzel, 2008). If the target is credible, and the central bank is accountable, then the public and financial markets ought to expect 2 percent inflation for the foreseeable future, at least in theory. Unfortunately, as we shall see below, events can get in the way with a possible loss of credibility in the central bank and trust in the institution.

Convergence towards the view that low and stable inflation is the best guarantee to dampen, if not overcome, the business cycle not only spread among central banks but became the academic consensus of sorts by the early 1990s. Indeed, some academics favoured price stability as a vehicle to also achieve and maintain financial stability (e.g., Schwartz, 1995), even if central bankers themselves felt that the connection between the two was still far from being well understood.⁷ The foregoing narrative

funds rate, while in Canada the policy rate is called the overnight rate.

⁵ Inflation targets were introduced in 1991, but inflation reduction targets were in place until 1995. The most recent agreement, as well as a link to earlier agreements, can be found at <https://www.bankofcanada.ca/core-functions/monetary-policy/monetary-policy-framework-renewal/>.

⁶ The Fed tracks the Personal Consumption Expenditures index (PCE) because it is defined in a more flexible manner than the headline Consumer Price Index (CPI) to account for changes in the basket of goods and services households consume. See Bernanke (2022: 88). There are several excellent histories of the Federal Reserve. See, for example, Hetzel (2008), and Meltzer (2002, 2010).

⁷ For example, Bernanke acknowledges that “we did not understand very well the links between monetary policy and financial stability” (2002: 188). Despite the lack of

was the theory. Events quickly revealed weaknesses in the theory.⁸ Sadly, the consensus was fractured when financial markets began to experience stress in 2007 culminating with the GFC that erupted in late summer and early fall of 2008.

The US was one of the first advanced economies to seek creative ways of providing economic stimulus once its policy interest rate reached what is known as the zero lower bound (ZLB) by reverting to operations that directly affected its central bank's balance sheet. In doing so, the Fed was merely following in the footsteps of Japan where, since the late 1980s, the Bank of Japan had been experimenting with UMP.⁹

The Fed began large scale financial asset purchases and provided guarantees of liquidity to financial institutions should they require injections of funds. Despite restrictions on the ability of the central bank to finance private sector debt, the Fed took advantage of a section in the legislation governing its remit to ensure that the US and, by implication, the global economy was spared a financial collapse that might usher in a second great depression (see below).¹⁰

What was expected to be a temporary fix to allow the economy to heal from the financial crisis apparently could not be quickly unwound. A passive fiscal policy,¹¹ a looming sovereign debt crisis in Europe, and

understanding central banks around the world instituted so-called macro-prudential policies designed to reign in the likelihood of a future financial crisis. The success of these programs continues to be a work in progress. See, for example, Lombardi and Siklos (2016) and Boar et al. (2017).

⁸ There is, of course, some dispute about the precise dating and origins of the GFC. The Council on Foreign Relations provides a useful chronology of US events (<https://www.cfr.org/timeline/us-financial-crisis>). The Bank of Canada has published a chronology of Crisis Response Measures that includes coordinated interventions that preceded the 2020 COVID-19 pandemic, that is, before UMP were introduced (<https://www.bankofcanada.ca/markets/market-operations-liquidity-provision/a-chronology-of-crisis-response-measures/>).

⁹ Indeed, Japan had been experimenting for some time with UMP and some Bank of Japan officials lamented the ignorance or misunderstandings surrounding the Japanese experience. See, for example, Shirakawa (2021).

¹⁰ The period usually dated from 1929 to 1933 is known as the Great Depression. The depression led to the addition of section 13(3) into the Federal Reserve Act, which permits the central bank to lend to institutions beyond the financial sector in case of "unusual and exigent" circumstances (see Sastry, 2018, for more details).

¹¹ By passive I mean that the government primarily relies on automatic stabilizers (ie., employment insurance and other social programs) and its spending behaviour is constrained. In contrast, a more activist fiscal policy will pay less attention to the deficit and debt consequences of its spending programs. Leeper (1991) develops a model where active and passive fiscal policies are defined in a similar manner.

a growing chorus of observers felt that the advanced world was in the throes of secular stagnation, that is, a period when an aging population and a slowdown in technical change conspire to slow the economy below its previous growth potential. A belief that continued UMP was necessary began to take hold. More than a decade later, as the Fed finally started to contemplate a world without UMP, the COVID-19 pandemic triggered further aggressive responses by central banks around the world of both the conventional and unconventional varieties to keep monetary policy loose. This was supplemented by equally large and strong fiscal measures to ease the economic suffering, a fallout from the global health crisis. Less than two years after the pandemic erupted, the world's economy began a sustained rebound, thanks largely to vaccination campaigns, following stop-and-go attempts to restart national economies after each wave of infections in 2020 and 2021.

The combination of fiscal and monetary stimuli, removed only gradually due to a build-up of caution among policymakers, started to show up in inflation rates that were rising quickly to levels not seen in decades. Early signs were apparent from the behaviour of commodity prices (e.g., food and energy prices), although this development could be partly explained by supply chain concerns that emerged as the pandemic spread around the globe. Almost overnight, central bankers who had worried about inflation being too low for too long were relieved to see inflation rates they initially claimed would remain higher only temporarily.¹² As the months went by the monetary authorities came to see rising inflation as warranting a swift response, particularly when price increases spread across the basket of goods and services that make up consumer price indices. This time the reaction would be to tighten monetary policy by reverting to raising policy interest rates and simultaneously withdrawing support via UMP at a speed not seen in decades. As this is written, the same policymakers responsible for maintaining low and stable inflation are hoping that inflation will return to target in a timely manner and at a modest economic cost.¹³

¹² The word “transitory” entered the language of monetary policy in 2021 once inflation began to rise in the United States and elsewhere. By November of the same year, Fed Chair Jerome Powell argued: “I think it’s probably a good time to retire that word and explain more clearly what we mean” (see <https://www.youtube.com/watch?v=MhAeUHLJoKk>). Many other central banks followed suit. Echoing Chair Powell, Box 3 in the Bank of Canada’s October 2021 Monetary Policy Report states that inflation is “larger and more persistent than expected.”

¹³ This is the ongoing debate over whether central banks are able to engineer a “soft” versus a “hard” landing as they move from an ultra-loose monetary policy to something more akin to pre-crisis monetary conditions.

This paper provides a broad overview and assessment of UMP, as well as an explanation of the principal motivation and tenets of UMP. Much of its focus is on the US Fed's experience, given that that body has resorted to UMP since 2008. Nevertheless, the paper also considers Bank of Canada's forays into UMP. A separate section assesses the record of UMP in both countries. Overall, the results have been mixed. Indeed, analysts voiced dissatisfaction with UMP more frequently when central banks resorted again to unorthodox policies to stimulate the economy as the 2020 pandemic unfolded.

Several observers thought that UMP was the wrong prescription for economies that were partially shut down because of COVID. Instead, they argued that the economy needed the protection that fiscal policy could and did offer, not more monetary stimulus. Stated differently, the pandemic shock was not the usual kind economists have in mind when discussing how fiscal and monetary policies should react. Woodford (2021a), drawing on Keynes's effective demand failure concept, argues that fiscal transfers of a sufficient size obviate the need for a loosening of monetary policy under a COVID-19-style shock. Others felt that the combined aggressive monetary and fiscal loosening was essential to counter the shock and uncertainty of entire sectors of the economy being shut down for unknown lengths of time. Nevertheless, the seeds of the eventual spike in inflation beginning in 2021 were sown, although few observers imagined that the confluence of multiple shocks originating from the real side of the economy, including the ongoing war in Ukraine and rising trade tensions between the US and China, would generate rapidly rising inflation now deemed "much too high" by policymakers in both the US and Canada.¹⁴

Some (e.g., Summers, 2021, February 4; Blanchard, 2021), while sympathetic to the plight of the US economy faced with a large negative shock stemming from the pandemic, did warn loudly that inflation would rise to levels "not seen in a generation" (Summers, 2021, February 4). Others (e.g., Krugman, 2022, July 21) would later admit that they had been too optimistic about inflation not surging in response to the aggressive fiscal and monetary responses beginning in March 2020.

As explained below, initially UMP likely put a floor under the severe drop in economic growth in response to the emerging GFC. Unfortunately, some of the indicators central bankers use to justify continued reliance on UMP, including the maintenance of ultra-low interest rates, rests on

¹⁴ US Federal Reserve Board Chair Jerome Powell expressed this sentiment at the May 4, 2022 press conference following the Fed's policy rate decision released that day (<https://www.federalreserve.gov/monetarypolicy/fomcpresconf20220504.htm>). Bank of Canada Governor Tiff Macklem expressed the same sentiment in an op-ed published in August 2022 (Macklem, 2022).

unobservable metrics that are only imprecisely measured and may mislead policymakers when underlying economic conditions change (Timiraos, 2018< October 2). Additionally, in the wake of the GFC, politicians put additional responsibilities on central banks beyond stabilization policy. Arguably, this may have left monetary authorities over-burdened (Orphanides, 2013).

When the combination of fiscal and monetary expansion did not contain inflation in 2021, central bank credibility took a hit. Suddenly, uncertainty was seen as the reason for not acting sufficiently quickly, and given the events of 2021 and 2022, the ability of central banks to keep inflation in check was increasingly questioned. The paper concludes by arguing that while UMP was essential at first, consistent with the firm belief among central bankers that they shared responsibility for preventing economic downturns, monetary and financial policies were too loose for too long. The accumulated impact of these policies may prove difficult, but not impossible, to reverse. Whether the exit from the current environment can be achieved at little economic cost, either in terms of an economic downturn or rising financial instability, remains unclear. Central bankers are clearly aware of the challenges (e.g., see Johnson et al., 2020), but skeptics worry that if the monetary authorities were wrong in 2021, they may well be wrong again.

The current state of play does, however, highlight a well-known but occasionally forgotten rule, namely, that monetary policy has its limits, and that poor coordination between fiscal and monetary policy can be a recipe for high inflation. There is time to avoid some of the dangers that lie ahead for monetary policy, but it would not be surprising if a rethinking of the role and responsibilities of central banks will eventually take place.

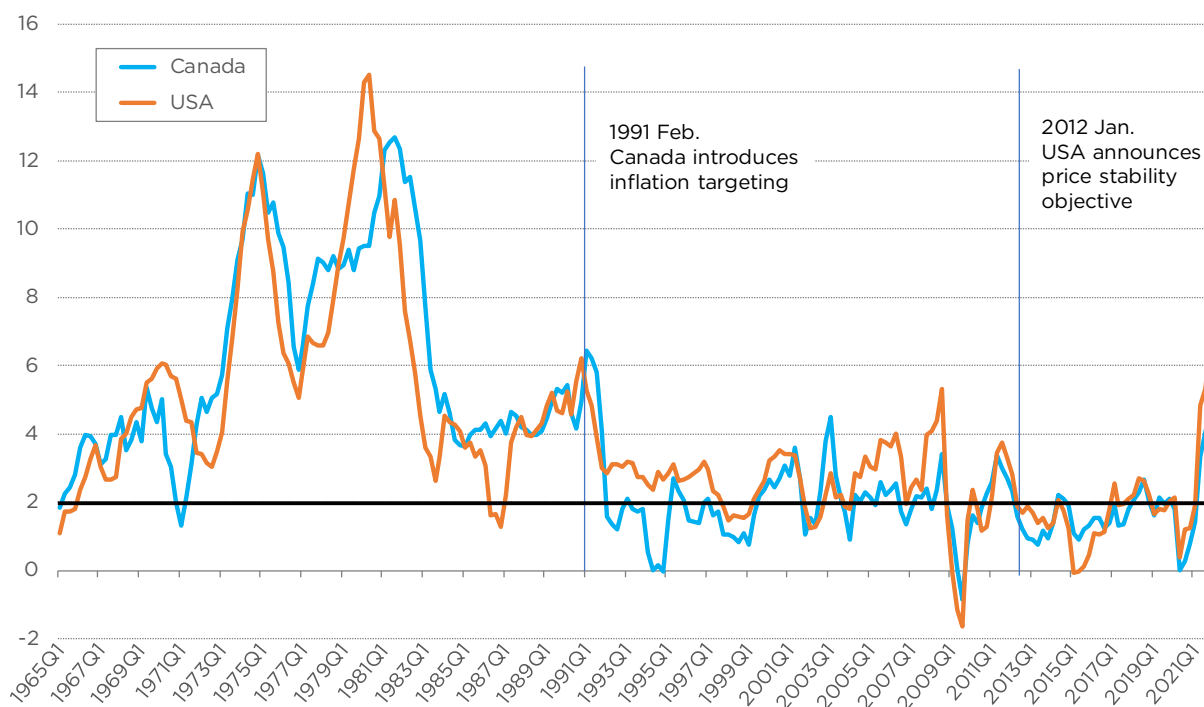
Words and Deeds: Why and How the Conduct of Monetary Policy Changed in the US and Canada

Selected stylized facts

Figure 1 plots inflation in consumer prices in Canada and the United States since the mid-1960s. The 1970s are notable for two oil price shocks (1974 and again in 1979) that contributed to inflation rates that had not been seen since the end of World Wars I and II. As table 1 shows, a rise in inflation typically accompanies a large drop in real economic growth. Indeed, the period between 1970 and the early 1980s is characterized by four recessions with the longest one arguably augmented by the tight policies that central banks applied, with political support, to reduce inflation. It is also notable that the oil price shocks appeared to be associated with at least two of the recessions shown.

At that time, academic thought argued for inflation control as being the primary task of monetary policy. Pre-existing thinking about the existence of a well-established trade-off relationship between inflation and real economic growth or unemployment, encapsulated by the Phillips Curve, held that, in the longer-run, a trade-off was an artifact. Stated differently, monetary policy cannot sustainably generate more economic activity in the longer-term. To ensure that governments did not attempt to exploit any trade-off between the real economy and monetary policy at the expense of higher inflation, policy analysts argued that central banks' remit should be to achieve and maintain low and stable inflation via legislative guarantees of autonomy to tighten or loosen monetary policy as they saw fit (i.e., policy independence).¹⁵ These developments ushered in an era of lower and more stable inflation beginning in the mid-1990s, as again seen

¹⁵ Different strategies would be proposed including appointing a conservative central banker or ensuring that monetary policy was rules-based and not subject to (too much) discretion (see Rogoff, 1985 and Kydland and Prescott, 1977). These developments also spawned a huge literature on the connection between central bank autonomy and inflation (see, for example, Romelli, 2021). For the Canadian experience with the evolution of BoC autonomy over time, see Chant, 2022.

Figure 1: CPI Inflation Rates in the USA and Canada

Sources: Bank of Canada (<https://www.bankofcanada.ca/rates/indicators/key-variables/>) and Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/>). Data are monthly and represent rate of change in Consumer Prices. The vertical shaded areas are NBER recessions according to their chronology (<https://www.nber.org/research/business-cycle-dating>). The solid black line defines the 2 percent inflation objective. Data were collected in May 2022.

in figure 1. Indeed, the concept that low and stable inflation is the appropriate target for monetary policy spread globally, and this may explain the substantial reduction in inflation rates experienced around the globe (eg., see Bordo and Siklos, 2022).

The connection between policy regime changes and inflation in Canada is observed from the timing of the introduction of inflation targeting (IT) in Canada. As table 1 shows, beginning in the 1990s, Canada's inflation rate tended to be lower on average than in the US. Previously, the relationship was the opposite with Canada's inflation rate modestly but persistently higher than that in the US. While inflation rates fell, and remained low, average economic growth in both countries continued to decline as table 1 indicates. Nevertheless, both economies expanded with the US doing significantly better than Canada only during the 1990s. Whether the NICE decade, the expression used by former Bank of England Governor Mervyn

Table 1 Real GDP Growth Rates in the United States and Canada

Period	Canada	United States
1962Q1-1969Q4	5.54	5.02
1970Q1-1979Q4	3.98	3.25
1980Q1-1989Q4	2.8	3.13
1990Q1-1999Q4	2.33	3.23
2000Q1-2009Q4	2.05	1.92
2010Q1-2019Q4	2.23	2.25

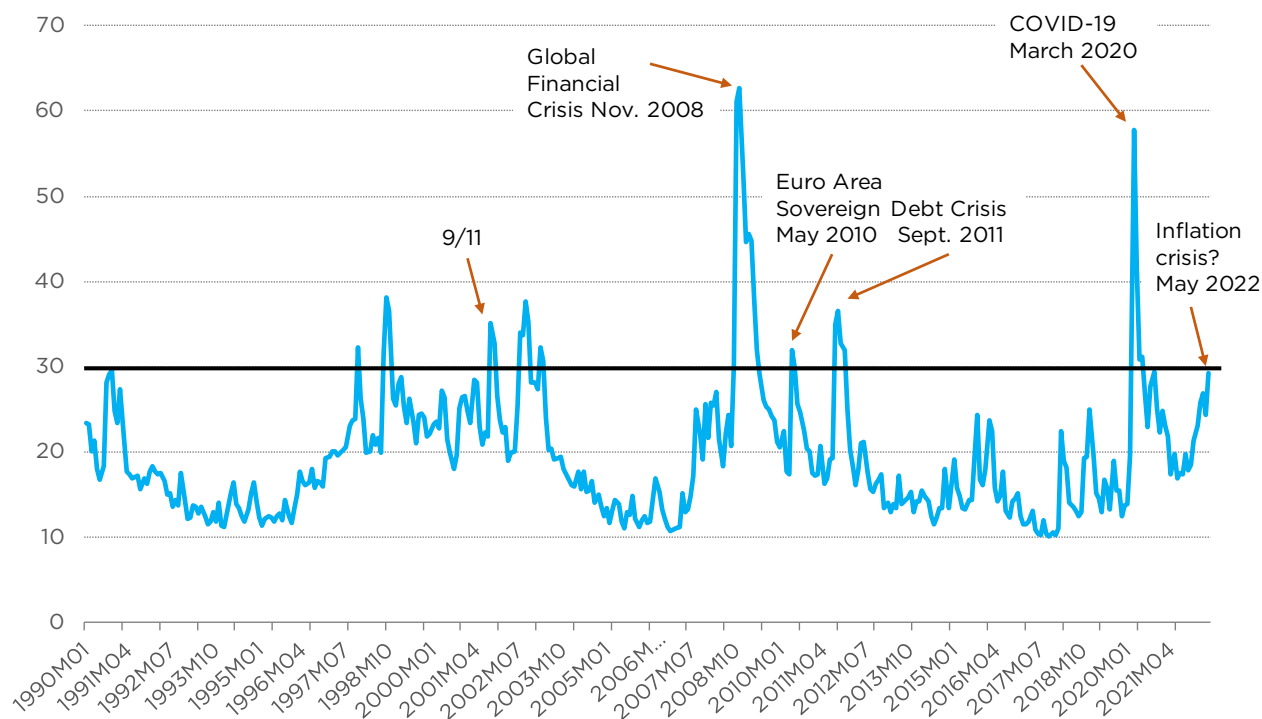
Note: See Figure 1 for data sources. The figures represent mean values for the periods shown. Quarterly data were used in the calculations.

King (2003) to describe a period of non-inflationary and constant expansion, can be explained by good luck or good policy remains unresolved.¹⁶ In any case, the record of inflation alone served to convince policymakers that low and stable inflation is a desirable combination to aim for.

Unfortunately, these conditions did not prevent a financial crisis from brewing. This meant that indicators of the kind discussed in figure 1 and table 1 tell an incomplete story. It is also necessary to appreciate the build-up of risks in financial markets, an important signal that a financial crisis is looming. Indeed, economists began to speak of a financial cycle that operates alongside a business cycle. The evidence suggests that the financial cycle is considerably longer than the business cycle, and the amplitude of the former type of cycle is larger than ones stemming from business cycle fluctuations (Borio, 2012; Chen and Svirydzhenka, 2021).

Beyond the cyclical fluctuations that economies experience, economists also debate the role of institutions in facilitating the emergence of a financial crisis. More precisely, they debate whether low and stable inflation contributed to complacency in regulation and supervision that cre-

¹⁶ Stock and Watson (2003) attributed the outcome in the US mostly to good luck. Hakkio (2013) outlines the case for good policy having also played a role in what came to be known as the Great Moderation (Bernanke, 2004). Good luck is also thought to represent the beneficial impact of changing technology on productivity. Ravenna and Molbak Ingholt (2021) use a stylized model to investigate the good luck hypothesis for Canada and conclude that the adoption of IT changed perceptions of how monetary policy could be carried out. Hence, good policy explains Canada's inflation control policy.

Figure 2: Evolution of the VIX Over Time

Source: FRED, see Figure 1. VIX is the Chicago Board Options Exchange Volatility Index (series VIXCLS). Data are monthly. The horizontal line at 30 is the approximate threshold that marks the dividing line between periods of financial stability, and potential instability in financial markets. Data were collected in May 2022.

ated conditions for a near collapse in financial markets in 2008, especially in the US. In any case, policymakers concluded that conventional monetary policy was no longer adequate to cushion the economic fallout from the effects of a loss of financial stability on macroeconomic performance.

Figure 2 highlights how the first financial crisis of the century, which came to be called the GFC, prompted the US Federal Reserve to launch UMP in 2008. The VIX, often called the “fear index,” is a widely used indicator of short-term (i.e., 30 days ahead) expected volatility in equity markets (i.e., the Standard and Poor’s 500 index or S&P500), since it is estimated from options to buy or sell equities based on the performance of the S&P500.¹⁷ The higher is the value of the VIX, the greater the scope for stock market volatility, which is considered a symptom of financial

¹⁷ There exists a Canadian equivalent called the TSE60 VIX index. However, the data only go back to April 2021 and, in any case, is far less watched than its US-based cousin.

instability. If we adopt a frequently used threshold of 30, then values of the VIX that exceed that threshold signal that the risk of financial stress or crisis is high.

Figure 2 shows two notable peaks in the data where the threshold of 30 is easily exceeded. The first is November 2008, a few months after the VIX began to increase very rapidly, and this parallels the period of the GFC. A second peak is in March 2020, again shortly after a sharp rise beginning in February of that year associated with the COVID-19 crisis. The terrorist attacks of 9/11 and the euro area sovereign debt crisis in 2010 and 2011 also exceed the selected threshold for the VIX. Notice also that the recent inflation surge is also showing early signs of the VIX approaching the “crisis” threshold.

Other, far less prominent breaches of the VIX 30 barrier include the Russian financial crisis of 1998 and the Asian Financial Crisis of 1997. The rising inflation rates in 1990 (see figure 1), although nowhere nearly as serious as in the 1970s and early 1980s, also had an impact on the VIX. Hence, while not all large increases in the VIX are necessarily followed by a financial crisis, they do signal rising stress in the financial system which can lead to financial instability. More importantly, the emergence of twin financial crises in an era of low and stable inflation (i.e., the GFC and the euro area sovereign debt crisis) together with sluggish growth led the monetary authorities to revisit how to set and influence the stance of monetary policy by making allowances for the role of the financial cycle in determining macroeconomic outcomes. It no longer sufficed for them to use only the policy interest rate, as that rate had begun to decline in both Canada and the US beginning in 2007 (not shown) when both countries were just beginning to feel the tremors of a looming crisis. Furthermore, policy rates were near the ZLB when the VIX reached its peak in November 2008. Hence, central banks felt it was time to adopt new instruments of monetary policy.

UMP in practice: The fed and its balance sheet

As the introduction noted, UMP is distinguished from conventional monetary policy because it affects the central bank’s balance sheet. It is perhaps most convenient to think of UMP as consisting of traditional and novel forms of monetary policy instruments. Traditionally, monetary policy was often described as operating via open market operations. Thus, the central bank would purchase or sell short-term (i.e., 90 days or less) government bonds (typically Treasury bills). Since these are considered riskless assets and are held until maturity so that no capital losses (or gains) are incurred, the impact is effectively to change the composition of the central bank’s

balance sheet via the substitution of cash (that the central bank creates) for bonds when these are sold, or the reverse, in which case bonds are added and paid for by cash. In this instance cash represents the issue of notes to pay for the bonds or the receipt of notes when bonds mature. The acquisition of bonds appears as an asset to the central bank and the issue of notes to pay for the bonds is the offsetting liability. The critical element in this transaction is that the quantity of bonds available in financial markets changes. Hence, when there is either a change in bonds supplied or demanded, the price of the asset, or its inverse, which is the interest rate, also changes.

There were at least two sets of interventions by the Fed that have had unconventional or novel elements. The first, like the examples given above, involve changes in the composition of the balance sheet. These are briefly described below. The second is verbal and represents attempts by central banks to guide markets' expectations about the future course of monetary policy through what is known as forward guidance. I will devote separate attention later on in this paper to this form of central bank policymaking.

Ostensibly, the GFC had its origins in developments in the housing market which had experienced spectacular price rises that, when combined with "deficits in the U.S. financial regulatory structure" (Federal Reserve Bank of St. Louis, 2015), led to mortgage defaults. Ultimately, however, the crisis was triggered by benign neglect in the face of excesses in financial markets. Negative sentiment in financial markets was contagious and, in attempting to forestall the moral hazard problem, the failure of Lehman Brothers in September 2008 ushered in a near collapse of the US financial system.

Trying to face the challenges generated by the mounting financial crisis, the Fed reduced the fed funds rate by 425 basis points¹⁸ between August 2007 and November 2008, when the VIX (figure 2) peaked.¹⁹ Yet the financial crisis showed no sign of letting up. Once the Fed reduced the policy rate to a range between 0 and 0.25 percent in December 2008 it could make no further reductions in the policy rate to provide additional stimulus. The Fed had reached the ZLB.²⁰ The Fed, however, was also

¹⁸ Interest rates are expressed either in percent or in basis points. For example, a 1 percent interest rate is equivalent to 100 basis points.

¹⁹ The BoC's policy rate also declined, but by 225 basis points over the same period.

²⁰ The BoC's policy interest rate would also reach the ZLB by April 2009. Note that both the BoC and the Fed decided early on to avoid introducing negative policy rates unlike their counterparts in Japan and the euro area, to give two prominent examples. In theory, negative interest rates are supposed to promote bank lending by creating more incentives to lend instead of maintaining reserves subject to the penalty rate. In practice, however, there is no guarantee this will happen and the precise manner in

initially constrained by a tradition that goes back to the nineteenth century based on Walter Bagehot's concept of the central bank as a lender of last resort. More precisely, Bagehot's advice was to lend at a penalty rate but against high quality collateral. This effectively limited the Fed to rely on short-term government securities. However, since the scope for easing monetary conditions using traditional means had essentially been exhausted, the Fed was able to invoke section 13(3) of the Federal Reserve Act giving it the ability to lend to the private sector as long as the loans could be secured to the "satisfaction of the Federal Reserve Bank[s]" (Sastry, 2018).

As the financial crisis deepened in 2009, the Fed created an alphabet soup of programs (see Potter and Smets, 2019, Annex 2) to lend to banks, corporations, money market mutual funds, insurers, and others (see Board of Governors of the Federal Reserve System, 2020a). The significant broadening of the scope of lending to various sectors of the economy and the types of borrowers were both novel when first introduced. This led to the labelling of such policies as novel or unconventional. Nevertheless, the speed and expansion of facilities to lend to the private sector led to an inevitable political reaction. Hence, in 2010, new legislation (Dodd-Frank Act of 2010) curtailed the Fed's power to resort to UMP to lend to firms that are insolvent, and it requires approval of the Secretary of the Treasury and protection of taxpayers from losses (Congressional Budget Office, 2021). The additional restrictions were likely intended to mitigate any political risk associated with financial losses that the Fed might incur and not a concern about whether the Fed could become insolvent in the event of a large negative financial shock.

In addition, given the US dollar's position as the dominant reserve currency held globally, the Fed also eventually broadened an existing facility that permitted it to swap US dollars for currencies of other countries (see Board of Governors of the Federal Reserve System, 2020b). Initially, this was limited to a select few countries (Canada was one) but the program was expanded to add many others in order to facilitate access to US dollars required to fund international transactions. The latter are often denominated in US dollars since, for example, commodity prices are generally expressed in that currency. Although the existence of swap line facilities is not novel, the expansion to a much larger number of central banks was.

As the GFC worsened, the Fed began to buy large quantities of longer-term government securities since the impact of the purchase or sale of short-term Treasuries would only be felt at the short end of the maturity

which these rates were enforced was subject to many loopholes, thereby rendering a proper assessment of negative rates less than straightforward. Additionally, financial institutions now raise considerably more income via fees than through lending, which also blunts the potential impact of negative interest rates.

structure. By intervening to buy longer-term securities the Fed hoped to reduce other longer-term yields to stimulate capital expenditures. The risk of such an action for the Fed is that if it decides to sell the bonds they before mature, it might incur a loss since, when monetary policy is tightened and interest rates across the term structure increase, as happened in 2022, the price of bonds will decline. To avoid such losses, some central banks, including the Fed and the Bank of Canada, successfully negotiated indemnification agreements with their governments to remove the risk of loss.²¹ In theory, and unless investors have strong preferences for holding short versus long-term bonds, reducing the amount of cash on the Fed's balance sheet and replacing it with an equivalent amount of longer-term debt²² should have no impact. However, as former Fed Chair Ben Bernanke once quipped: "The problem with QE is it works in practice, but it doesn't work in theory" (Yu, 2016).

Originally, UMP was defined as credit easing (Bernanke, 2015) because the policy was intended to ease credit conditions and help financial and other institutions ride out the financial stress associated with the GFC. In contrast, the more traditional forms of open market operations increase the quantity of money in circulation and, hence, represent quantitative easing (QE), which is the umbrella term that all observers came eventually to use.²³ A possible reason for this turn of events is that UMP eventu-

²¹ The relevance and importance of these agreements is clear. For example, the Reserve Bank of New Zealand began to receive payments in July from the New Zealand Treasury for bond sale losses incurred when the RBNZ's implemented its own UMP (see Withers, 2022, July 25). A similar set of losses on asset purchases by the Bank of England is generating transfers from the Treasury to the bank (see, for example, Nangle, 2022). That said, not all losses are necessarily indemnified. Indeed, the Bank of Canada is expected to incur losses in the billions due to interest costs that are not covered by existing agreements (see Rendell, 2022, November 15).

²² Cash is a form of long-term debt since it has no expiration date. Long-term bonds do mature. However, maturities are considered 10 years or longer. For the US case, English and Kohn (2022) present a useful discussion of the treatment of losses the Fed might incur under UMP. For the indemnification against losses at the Bank of Canada see <https://www.bankofcanada.ca/markets/market-operations-liquidity-provision/covid-19-actions-support-economy-financial-system/>. The issue has emerged again when the Bank of England decided to buy long term bonds "on whatever scale is necessary" (<https://www.bankofengland.co.uk/news/2022/september/bank-of-england-announces-gilt-market-operation>) in response to a change in fiscal policy announced in late September 2022. Observers also noted that the policy shift stood at cross-purposes with the bank's earlier decision to proceed with quantitative tightening (QT) in response to soaring inflation. QT was temporarily postponed.

²³ The Federal Reserve Bank of Cleveland soldiers on by making the distinction between credit and quantitative easing. See <https://www.clevelandfed.org/our-research/indicators-and-data/credit-easing.aspx>.

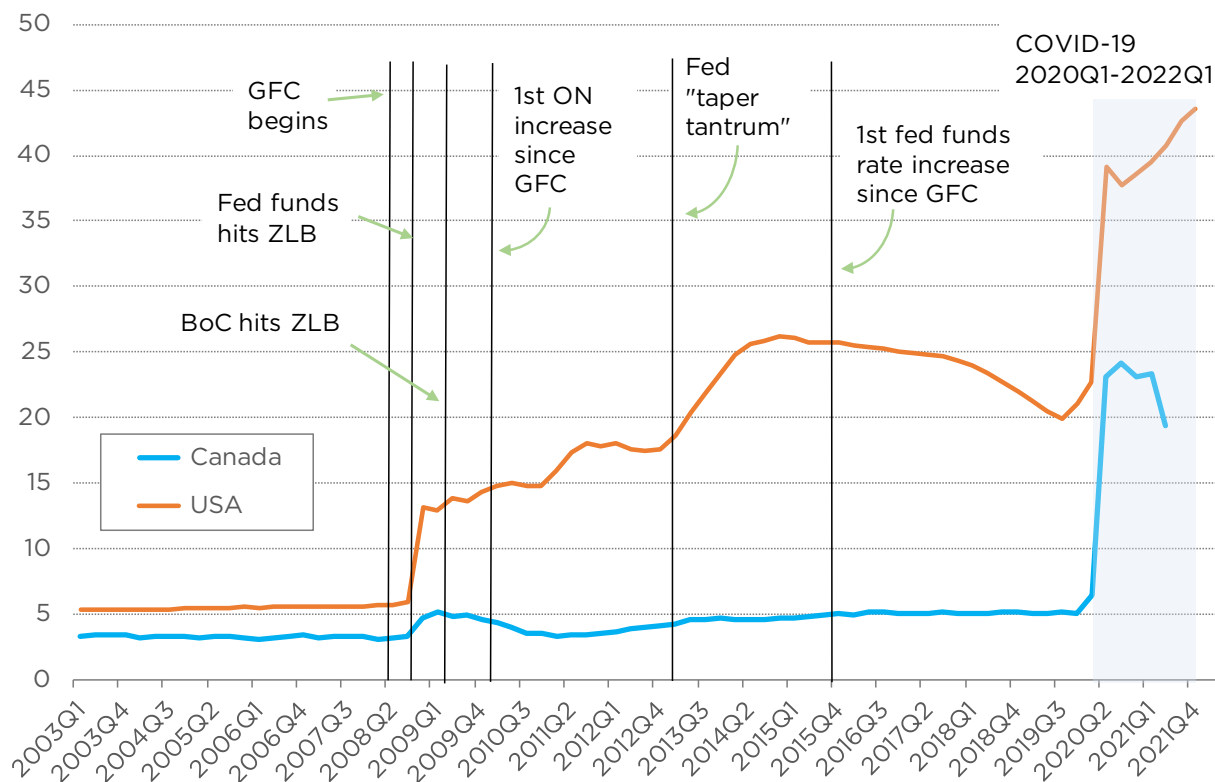
ally had a dual aim, namely, to ensure the smooth functioning of financial markets and to serve as a vehicle to provide economic stimulus in an effort to recover from the GFC.

UMP in the pandemic era: The Canadian and US experiences

Canada avoided having to launch UMP in 2008-9 and again during the euro area sovereign debt crisis. However, the Bank of Canada deemed it necessary to introduce QE-style policies when the pandemic struck in early 2020. At the BoC, the QE strategy followed the one adopted by the Fed in 2008-9, ie., buying bonds besides those of the federal government including provincial, corporate, and mortgage bonds.

Similarly, the Fed, which was beginning to gradually wind down QE in 2018, would also resume UMP in a very aggressive fashion in March 2020. Some actions were backed by fiscal measures put into place during COVID-19 (see Siklos, 2021) while others were not (Congressional Budget Office, 2021). The Fed quickly returned to the playbook of the GFC and re-introduced some of the previously used unconventional policy measures, notably the purchase of mortgage-backed securities and state and local government bonds. Indeed, for a time, the Fed even became a lender to small and medium-sized businesses.²⁴ By late summer 2019, the fed funds rate had gradually risen to 2.5 percent from the ZLB where it had been in December 2015. Even before the pandemic hit, the Fed was changing course as the economic outlook turned negative in late 2019. Then, in March 2020, the fed funds rate fell back to the ZLB. Given that large portions of the business sector could not operate in person, and health conditions required to forestall the spread of the corona virus drastically reduced mobility, it is not surprising that observers would subsequently ask why monetary policy was more stimulative, especially when fiscal policy also stepped in with considerable support. This element of the Fed's reaction would later be used, alongside the policy of a lower-for-longer policy rate, to suggest that inflation would increase once the US economy began to recover from the pandemic (Summers, 2021, February 4; Blanchard, 2021). As the fallout from the pandemic persisted, including continuing supply chain problems, policymakers hoped that inflationary pressures would be transitory. However, in December 2021, the Fed Chair "retired" the transitory expression. The Fed waited until April 2022 to implement an initial increase in the fed funds rate, which was followed by successive

²⁴ This is the Fed's so-called Main Street Lending Program (see, for example, Clarida et al., 2021).

Figure 3: The Size of Central Bank Balance Sheets, 2003-2022

Sources: FRED for the US (see Figure 1), Bank of Canada (see Figure 1) and CANSIM for nominal GDP for Canada. Total assets of each central bank are divided by nominal GDP to arrive at the figures shown. The vertical lines highlight key events over the sample covered. Raw US balance sheet data are weekly, Canadian data are monthly. Arithmetic averaging is used to construct the quarterly figures since GDP data are quarterly. Data end with the 2022Q1 observation.]

aggressive increases in the policy rate starting in the summer of 2022. By then, the impact from the war in the Ukraine that began in February 2022 was also starting to have global economic effects. Nevertheless, critics argued that the Fed was “behind the curve.”²⁵

Figure 3 shows the consequences of UMP for the total assets held by the Fed and BoC as a percent of the size of their respective economies as measured by nominal GDP. While the BoC’s assets increased by a negligible amount in 2008-09, there is a sudden jump at the time of the GFC in the Fed’s assets and a steady rise thereafter. The Fed did not, of course, introduce the menu of programs associated with UMP all at once. Instead, we observe a steady rise in the size of the Fed’s balance sheet following three rounds of QE interventions appropriately labelled QE1, QE2, and

²⁵ See, for example, Miller (2021, December 1) and Bordo and Levy (2022).

Table 2: Composition of Central Bank Assets**Federal Reserve: January 3, 2007 – May 25, 2022**

Item	Percent of Total Assets			
	MAX	MIN	MEAN	LAST
Federal Agency Debt and Mortgage-Backed Securities	55.2	0	32	30.6
Lending to Financial Institutions	77.3	4.8	11.3	5.1
Liquidity to Credit Markets	47.6	0	32.4	47.1
Long-term Treasury Purchases	21.6	0	1.7	0.4
Traditional Securities Holdings	91.4	8	21.9	17.1

Bank of Canada: March 2020 – February 2022

Item	Percent of Total Assets			
	MAX	MIN	MEAN	LAST
Government of Canada Bonds	87.2	27.1	63.2	86.8
Provincial Bonds	4	0	2.7	3.2
Bankers' Acceptances	7.5	0	0.5	0
Commercial Paper	0.8	0	0.1	0
Corporate Paper	0.04	0.005	0.03	0.03
Mortgage Bonds	2	1	1.7	1.9
Real Return Bonds	1.1	0	0.7	1

Sources: Federal Reserve Bank of Cleveland, clevelandfed.org/our-research/indicators-and-data/credit-easing.aspx; cansim series numbers, V36654 (Govt Can. Bonds, V1160914548 (Prov. Bonds), V1146067266 (Bankers' accept.), V1146067267 (Comm. paper), v1160914549 (Corp. paper), V1038100657 (Mtge bonds), V1160914547 (real ret. Bonds). Original figures were divided by total assets (V36651) to arrive at fractions shown in the Table. Bank of Canada: <https://www.bankofcanada.ca/about/governance-documents/bank-of-canada-statement-financial-position/>.

QE3. Each involved slightly different forms of central bank intervention. However, all had in common the feature that the balance sheet composition of the Fed was altered. Next, Figure 3 highlights the COVID-19 era, which saw the BoC's balance sheet increasing sharply at the onset of the pandemic in early 2021. The Fed's balance sheet experienced a similar upward surge in 2021. Arguably this balance sheet expansion has played a part in the current inflationary predicament in which the US and the Canadian economies find themselves, particularly as the Fed's balance sheet continued to expand throughout 2021.²⁶

Table 2 presents similar data but at a more granular level. Specifically, the principal asset items in the balance sheets of both central banks are reported as a percent of total assets. Also shown are the maximum, minimum, mean, and the latest available values at the time of writing (June 2022) for the periods shown. The Fed distinguishes between "traditional" and other types of assets. Differences between pre- and post-GFC levels in the holdings of traditional assets, namely short-term government securities, is striking. Three quarters of the Fed's assets are non-traditional. Although the central bank announced in 2022 that it would shrink its balance sheet by passively allowing assets purchased under its UMP to mature over time, it clearly has a long way to go to return to pre-GFC levels.²⁷

If the reduction in the size of the balance sheet is passive, the stance of monetary policy is effectively becoming tighter, since financial market support is falling. If, in retrospect, the withdrawal of support via QE is seen as too aggressive, financial markets will become more volatile and economic sentiment will be adversely affected. Regardless of how the central bank shrinks its balance sheet, doing so is the reverse of QE. Hence, unsurprisingly, the policy has been referred to as quantitative tightening, or QT. In any case, it is likely that the Fed will retain some assets "to implement monetary policy efficiently and effectively" (Board of Governors of the Federal Reserve System, 2022). Hence, the size of the Fed's balance sheet is expected to become smaller, but it is highly unlikely that it will return to levels seen prior to the financial crisis of 2008-9. Finally, any reductions in the size of the balance sheet are conditional on "economic

²⁶ Data are quarterly since GDP is published quarterly and, therefore, the last observation is 2022Q1 based on preliminary data. At the time of writing, weekly dollar values for balance sheet items for the US were available until May 26, 2022; for Canada the last available monthly observation was for February 2022. The Bank of Canada regularly updates the composition of its assets and liabilities at <https://www.bankofcanada.ca/2021/09/bank-canada-balance-sheet/>.

²⁷ The Fed's plans for reducing the size of its balance sheet were published in May 2022. See <https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504b.htm>.

and financial developments” (Board of Governors of the Federal Reserve System, 2022).

The situation is markedly different at the Bank of Canada. By February 2022, holdings of government of Canada bonds, as a percent of total assets of the Bank of Canada, were still much higher than in March 2020 before QE was introduced in response to COVID-19. In contrast, the non-traditional assets on the BoC’s balance sheet have largely disappeared. Even at the height of the pandemic response (the column labelled MAX), UMP-related assets amounted to only about 15 percent of the total assets of the BoC.²⁸

UMP communication: verbal interventions and forward guidance

Paralleling QE, both central banks enhanced their verbal communication since the GFC by providing additional guidance to financial markets and the public in order to influence their expectations about the future stance of monetary policy. Once again, economic theory led the way in persuading central banks to adopt this approach. Woodford argued that “it is the *expected future path* of short-term rates over coming months and even years that should matter for the determination of these other asset prices... the expectations theory of the term structure implies that these should be determined by expected future short-term rates” (2001b: 308).²⁹

Stated somewhat differently, the aim of providing signals about the possible future course of monetary policy, most notably the future outlook for the central bank’s policy rate, is to reduce the uncertainty households, firms, and investors face when decisions are taken today. Until the GFC,

²⁸ One interesting element is the presence of real return bonds on the balance sheet. These are government instruments that promise to maintain the real return to holders. Admittedly, the relative size of its holdings of this instrument is small. Nevertheless, if the BoC is committed to a 2 percent inflation target, it gives the impression that the Bank is betting against itself by trying to protect the purchasing power of the capital invested. Moreover, for the most part, holding them to maturity is akin to holding a long-term bond, but the BoC is already indemnified for capital losses on bond transactions. A description of the indemnity agreements can be found at <https://www.bankofcanada.ca/2021/09/bank-canada-balance-sheet/>. Gains or losses under indemnity agreements are listed as “derivatives” on the bank’s balance sheet and market value adjustments of the indemnified assets in a negative position exceeded ones in a positive position, implying that losses have to be made up by the government of Canada.

²⁹ As Alan Blinder (1999), former vice-chair of the Fed points out, the theory does not stand up to scrutiny once it is confronted with the data.

the principal tool of monetary policy was the policy rate. Hence, forward guidance (hereafter FG) as it came to be known, centres on providing the public with the monetary authority's assessment of how it plans to respond to changes in its outlook for the macroeconomy. FG also assists the central bank in providing more transparency about any future course of action it may take. Moreover, if successful, FG can also be viewed as a tool to ensure that inflation expectations are anchored around the central banks' inflation objective.

Because FG is an expression about possible future courses of action, it is expressed in language and not in the decisions taken. Hence, it is not surprising that observers in both the US and Canada began to parse every word or announcement made by the Fed for clues about the future course of policy rates. Since the future is, of course, uncertain, any hint about the future stance of monetary policy must be conditioned either on the economic outlook, or changes in incoming economic data. The latter phenomenon gave rise to the frequent uttering of "data dependence" as a means of expressing the view that, as information changes, so might the policy position of the central bank (e.g., see Powell, 2019; Poloz, 2017). The critical point, however, is that if Woodford (2001b) is correct, then promises about future courses of action, conditional or otherwise, have the potential to influence consumption and investment decisions today.

Although the Fed pioneered FG,³⁰ the strategy only became explicit beginning with the GFC in 2008. Table 3 provides a selection of FG narratives the Fed and the BoC delivered based on policy statement extracts. One immediately observes that some FG announcements are time dependent while others are state contingent. The former is illustrated by the BoC's statement issued in April 2009 that it would hold the policy rate constant for over a year, conditional on changes in the inflation outlook. In contrast, the Fed's statement in December 2012 tied the stance of monetary policy to the level of the unemployment rate and the rate of inflation.³¹

³⁰ A useful history of FG is found in Nelson (2021) who argues that the concept, if not the term, was understood by Fed policymakers since the 1950s. Campbell et al. (2016) suggest that the success of FG in the US is mixed at best. Kool and Thornton (2015) offer a largely negative assessment of FG in a cross-section of countries, including the US. He (2010) studies Canada's calendar-dependent experience with FG in 2009-10. While the policy was apparently successful in reducing yields by more than if the policy had not been introduced, the author also admits that the results are not statistically strong and are subject to many caveats.

³¹ The motivation has to do with the Fed's dual mandate to keep inflation low and stable and to strive for maximum employment. Since there is a cyclical and a structural element to unemployment, this has led to the estimation of another unobservable, namely the NAIRU (non-accelerating inflation rate of unemployment) or the unemployment rate that does not generate an acceleration in inflation. As we

Table 3: Selected Forward Guidance Narratives

Federal Reserve	
Date	Narrative
August 12, 2003	“... the Committee believes that policy accommodation can be maintained for a considerable period...” https://www.federalreserve.gov/boarddocs/press/monetary/2003/20030812/default.htm
December 16, 2008	“... are likely to warrant exceptionally low levels of the federal funds rate for some time.” https://www.federalreserve.gov/newsevents/pressreleases/monetary20081216b.htm
December 11-12, 2012	“... at least as long as the unemployment rate remains above 6½ percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee’s 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored.” https://www.federalreserve.gov/newsevents/pressreleases/monetary20121212a.htm
July 28, 2021	“The Committee... expects it will be appropriate to maintain the target range until labor market conditions have reached levels consistent with the Committee’s assessments of maximum employment and inflation has risen to 2 percent and is on track to moderately exceed 2 percent for some time.” https://www.federalreserve.gov/newsevents/pressreleases/monetary20210728a.htm
June 26, 2022	“With inflation well above 2 percent and a strong labor market, the Committee expects it will soon be appropriate to raise the target range for the federal funds rate.” https://www.federalreserve.gov/newsevents/pressreleases/monetary20220126a.htm
Bank of Canada	
Date	Narrative
April 21, 2009	“... conditional on the inflation outlook, commits to hold the current policy rate until the end of the second quarter of 2010.” https://www.bankofcanada.ca/2009/04/fad-press-release-2009-04-21/
April 20, 2010	“With recent improvements in the economic outlook, the need for such extraordinary policy is now passing, and it is appropriate to lessen the degree of monetary stimulus. The extent and timing will depend on the outlook for economic activity and inflation and will be consistent with achieving the 2 percent inflation target.” https://www.bankofcanada.ca/2010/04/fad-press-release-2010-04-20/
July 15, 2020	“The Governing Council will hold the policy interest rate at the effective lower bound until economic slack is absorbed so that the 2 percent inflation target is sustainably achieved.” https://www.bankofcanada.ca/2020/07/fad-press-release-2020-07-15/
June 9, 2021	“The Governing Council judges that there remains considerable excess capacity in the Canadian economy and that the recovery continues to require extraordinary more policy support.” https://www.bankofcanada.ca/2021/06/fad-press-release-2021-06-09/
January 26, 2022	“The Governing Council therefore decided to end its extraordinary commitment to hold its policy rate at the effective lower bound. Looking ahead, the Governing Council expects interest rates will need to increase...” https://www.bankofcanada.ca/2022/01/fad-press-release-2022-01-26/
June 1, 2022	“With the economy in excess demand, and inflation persisting well above target and expected to move higher in the near term, Governing Council continues to judge that interest rates will need to rise further.” https://www.bankofcanada.ca/2022/06/fad-press-release-2022-06-01/

Sources: Federal Reserve, <https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm>; Bank of Canada, <https://www.bankofcanada.ca/core-functions/monetary-policy/key-interest-rate/>. Links to individual press releases provided in the table.

Therefore, while the BoC set a time horizon for its commitment, the Fed instead set a goal to maintain the existing stance of monetary policy as long as the numerical objectives outlined in their statement were met.

Two other characteristics about FG are immediately visible. First, both forms of FG were eventually abandoned. Second, any FG raises questions about the conditionality of the guidance. For example, in Canada's case, the condition was the BoC's outlook for inflation. The same can be said for the Fed's FG in 2012. Of course, the outlook represents a mix of model- and judgment-based decisions. Hence, it is unclear how much of a constraint this poses for the central bank making the promise. For this reason, economists labelled this kind of FG the Odyssean variety, because, as in the Greek legend of Odysseus, the central bank intends to remain bound by the goals it has announced. FG that is less restrictive because it is implied but, other than for the inflation objective, leaves out precise metrics for the timing or other macroeconomic conditions to be met is called Delphic. Therefore, while the central bank publishes and discusses its macroeconomic outlook, it makes no promises about the future level of the policy rate. Stated differently, this kind of FG aims to make a prophetic announcement about reaching an inflation objective in future, but leaves unclear the timing for reaching the goal. It will not surprise readers that almost all forms of FG are of the Delphic variety.³²

What seemed like a good idea, namely, providing helpful guidance to the public ostensibly to enhance the effectiveness of monetary policy, proved inappropriate when, in 2021, inflation rates began to soar. Previously published outlooks from central banks around the world were unduly optimistic about the level of inflation that might be expected in the near future. Hence, monetary authorities in the US and Canada began to pivot to an emphasis on the need to tighten quickly in order to ensure that the inflation rate would return to an acceptable target range. Indeed, both the Fed and the Bank of Canada gave the impression that they were relying almost entirely on data dependence. Yet, simultaneously, the two central banks also acknowledged that “monetary policy actions take time to work their way through the economy,”³³ an indication that good practice in delivering monetary policy requires it to be forward-looking. The BoC

shall soon see, its movement parallels the movement of another unobservable variable that has been driving how monetary policy is set.

³² In reality it is likely that FG contains Delphic and Odyssean elements that are difficult to identify from the data (eg., see Campbell et al., 2016).

³³ The quote is from Bank of Canada's (2022) description of its inflation-control strategy. The quote reflects Milton Friedman's view expressed over 60 years ago that monetary policy acts with “long and variable” lags, usually thought to be approximately up to two years in length.

abandoned its “exceptional forward guidance on its policy rate” in January 2022,³⁴ while the Fed would only state that it “anticipates that ongoing increases in the target range will be appropriate.”³⁵

The ability of FG to improve the effectiveness of monetary policy depends on the credibility of the central bank’s outlook and a reasonable likelihood that it will deliver the kind of future policy rates that are implied by the verbal guidance it is providing to markets. In the event that the anticipated future rates are not realized as originally planned, the central bank is expected to explain why its plans went awry.

UMP and the stance of monetary policy: the critical role of unobservables

A common feature of UMP since its introduction, whether QE or forward guidance, is the goal of easing and maintaining a sufficiently loose monetary policy stance. Theory posits that when inflation is too high relative to some target, the central bank should tighten policy and loosen it when inflation rates are persistently below a target that has been set by the authorities. Similarly, a tightening of policy is expected when the economy is in a state of excess demand. It is these scenarios that inspired Taylor’s (1993) now famous policy rule which gives pride of place to inflation and output (or unemployment) relative to benchmarks in recommending how to set the policy interest rate.³⁶

While inflation and, ordinarily, the inflation target are observable, whether the economy is generating output above or below trend or potential is unobserved and must be estimated. Equally important, however, is another unobservable variable, namely, what is referred to as the neutral real interest rate (hereafter R^*). This is the level of the real policy rate consistent with a monetary policy stance that is neither easing nor tightening borrowing conditions. Such a condition is best thought of as taking place when the economy is at full employment and inflation is at target.³⁷ The

³⁴ As part of the January 26, 2022 policy rate announcement. See <https://www.bankofcanada.ca/2022/01/fad-press-release-2022-01-26/>.

³⁵ Fed’s FOMC statement of July 27, 2022. See <https://www.federalreserve.gov/newsevents/pressreleases/monetary20220727a.htm>.

³⁶ The so-called Taylor rule has occasionally been treated as a strict rule. In practice, the rule is intended to provide guidance and was not to be taken literally. The challenge for monetary policy is to thread the needle between too little and too much discretion.

³⁷ There are other, not entirely incompatible, ways of defining R^* . For example, one can think of trend economic growth as the sum of population and productivity growth. We observe the former with a lag while the latter has proven to be difficult to

neutral real rate concept represents one of the starting points for explaining whether current monetary policy is too loose or too tight.

This neutral real interest rate metric has become a critically important indicator of overall monetary conditions and is now identified by the label R^* (or R star), although, as noted earlier, the Fed in particular has begun to downplay precise estimates. Nevertheless, because it is unobserved, it must be estimated, and the concept remains important to understanding how the monetary policy stance is set. Therein lies the difficulty, since estimates can differ greatly and there will be uncertainty surrounding those estimates. Indeed, despite Bernanke's spirited defense of UMP, he acknowledged that "An especially important qualification to my results is the uncertainty about the level of the neutral interest rate" (2020: 974). Complicating matters still further is that, whereas two decades ago there was little disagreement that it was around 2 percent reflecting estimates of the long-run average real interest rate, the emergence of secular stagnation led many to argue that R^* had fallen. If true, it is conceivable that past policy interest rates, based on an R^* believed to be 2 percent when, in fact, it is considerably below this value, could have been set at inappropriate levels.

Figure 4 plots one estimate of R^* that policymakers have used widely to gauge the stance of monetary policy (Holston, et al., 2017).³⁸ To deal with uncertainty, I have added ± 2 percent around estimates of R^* to illustrate the implications of the uncertainty of such estimates.³⁹ Until the hypotheses linking demographic developments and a decline in productivity (ie., secular stagnation) to real returns was fleshed out, it was commonly assumed that R^* was about 2 percent. As figure 4 clearly shows, the period since the GFC reveals estimates of R^* persistently below 2 percent. Note, however, this interpretation is based on the point estimates. If one allows for uncertainty around the point estimates, a value for R^* equal to 2 percent remains within the bounds shown in the figure.

Of course, we do not observe the real rate but rather the nominal interest rate. If a central bank targets a 2 percent inflation rate, and assuming expected inflation remains anchored at 2 percent and the output gap is zero, the nominal policy rate would be 4 percent. Clearly, this ideal state is highly unlikely to occur. Hence, anytime expected inflation exceeds the target, the policy rate ought to rise.⁴⁰ Similarly, a negative output gap,

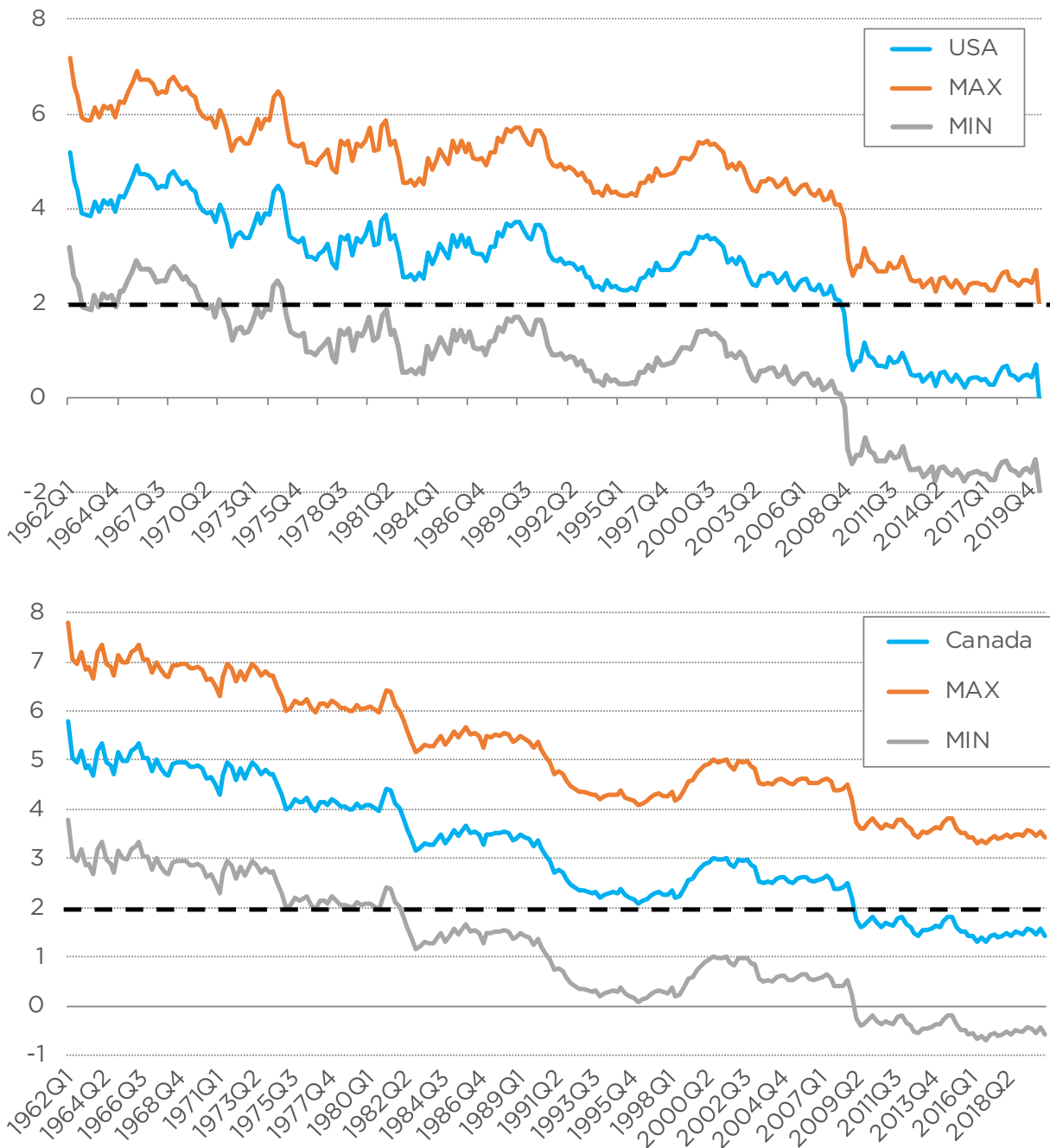
measure for reasons that are outside the scope of this study.

³⁸ Unfortunately, observers (eg., Ng and Wessel, 2018, October 22) often downplay the uncertainty around existing estimates.

³⁹ Technically, one might estimate uncertainty of existing estimates into the future in which case the bands shown would become wider over time.

⁴⁰ The so-called Taylor principle, derived from the policy rule of the same name,

Figure 4: The Evolution of R* Over Time



Source: Holston et. al. (2016) for estimates of R*.

Note: The upper and lower bounds for R* are obtained by adding and subtracting 2 percent from each estimate values of R*. The dashed line drawn at 2 percent represents a hypothetical value for R* often assumed in studies of monetary policy prior to more recent evidence that points to a decline in R*. The vertical shaded areas are the NBER recession dates (see Figure 1) for the US and the C.D. Howe Institute Business Council dates (<https://www.cdhowe.org/council/business-cycle-council>). Holston et al. (2020) did not update estimates after 2020Q2.

such as in a recession, should reduce the nominal policy rate. In theory, the response of the policy rate is symmetric, so that a lower policy rate follows when inflation expectations are below the inflation target, and a higher policy rate is required when the output gap is positive.

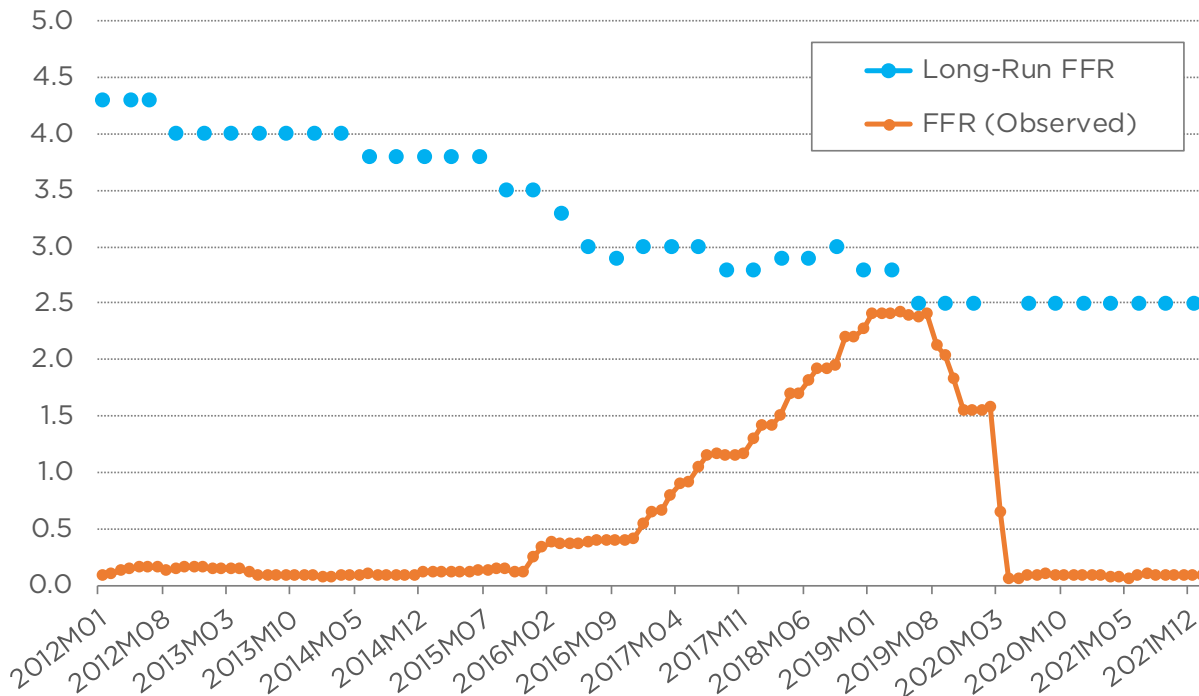
The observed nominal fed funds rate or the BoC's overnight rate (not shown) were considerably above any reasonable estimate of R^* during the late 1970s through to the early 1990s when inflation targets were not in place and inflation was much higher than over the preceding two decades. Once inflation targets were in place, there is more evidence that nominal policy rates violate the Taylor rule recommendation and are too low, especially in the run-up to the GFC. Indeed, John Taylor (2007) argued that policy rates were too low in the early 2000s and contributed to creating the conditions that produced the GFC. Bernanke (2010) offered a vigorous defense of Fed policy arguing that some of Taylor's assumptions about inflation and inflation expectations were misplaced. It was only after the GFC that policymakers began to argue that R^* had been in decline and, combined with inflation rates persistently below target, justified lower-for-longer nominal policy rates.

R^* is not observable, and central bank decision makers must make their own judgments about the level of R^* in order to set the appropriate level for the policy rate.⁴¹ Instead of estimating its value, one could ask the decision makers themselves to take a stand. This is effectively what has been done since 2012 when the Fed introduced the so-called "dot plots."⁴² Although the value provided by the Federal Open Market Committee, or FOMC members, is for the nominal equivalent of R^* , it is straightforward to estimate the real equivalent. For example, if the central bank believes that the neutral *nominal* rate is 2.5 percent, and expected inflation is 2 percent, then the implied R^* is 0.5 percent. Estimates of R^* for the US shown in figure 4 have been around this value since 2012. For Canada, estimates of R^* have ranged between 1.3 to 1.5 percent also since 2012.

recommends that the policy rate should rise by more than the change in expected inflation. Of course, this translates into a rise in the real interest rate, that is, a tighter monetary policy.

⁴¹ The Fed defines appropriate as "the future path of policy that each participant deems most likely to foster outcomes for economic activity and inflation that best satisfy his or her individual interpretation of the statutory mandate to promote maximum employment and price stability" (<https://www.federalreserve.gov/monetarypolicy/2022-02-mpr-part3.htm>).

⁴² These are part of the "Summary of Economic Projections" that the Fed publishes twice a year. For the February 2022 edition, for example, go to <https://www.federalreserve.gov/monetarypolicy/2022-02-mpr-part3.htm>.

Figure 5: The Fed’s Dot Plot and the Federal Funds Rate

Sources: Summary of Economic Projections, Board of Governors of the Federal Reserve System, and FRED (see Figure 1). Both interest rates are in nominal terms.

Figure 5 plots the median values of estimates of the level of the nominal US federal funds rate in the “long-run” based on the median view inside the Fed’s policymaking committee (FOMC), that is, when the US economy is in equilibrium and the nominal policy rate should reflect members’ views about R^* including expected inflation. If $R^*=2$ percent and inflation is expected to remain at its target level of 2 percent over the “longer-run” (approximately a 3- to 5-year horizon), then the appropriate nominal fed funds rate, also shown in the figure, would be 4 percent assuming there is no economic slack. As figure 5 shows, and given the foregoing assumptions, the median voter inside the FOMC effectively believed that R^* was around 2 percent until 2015. R^* then began a gradual decline until the last available observation (February 2022). This implies that the median FOMC member now thinks R^* is approximately 0.5 percent.⁴³

⁴³ The actual R^* FOMC members may have in mind may be somewhat vaguer since the Fed, in 2020, adopted a looser version of inflation targeting called “average inflation targeting,” which permits inflation to “moderately exceed 2 percent for some time” (see table 3).

Indeed, some members of the FOMC, including former vice-chair Richard Clarida, judged policy at the time based on an assumption that the neutral *nominal* rate is 2.5 percent (2 percent inflation plus 0.5 percent for R^* ; see Clarida, 2022). Since the dot plot was introduced, monetary policy has been extremely loose, and FOMC members arguably have been persuaded that the neutral real rate of interest has declined considerably over time from the previously widely used 2 percent norm.

The Governing Council of the Bank of Canada does not publish a dot plot, but it does provide an estimate of the neutral *nominal* policy rate. The bank's most recent assessment, published in the April 2022 edition of the *Monetary Policy Report* (MPR), sets it at 2.5 percent, that is, at the same level as in the US.⁴⁴

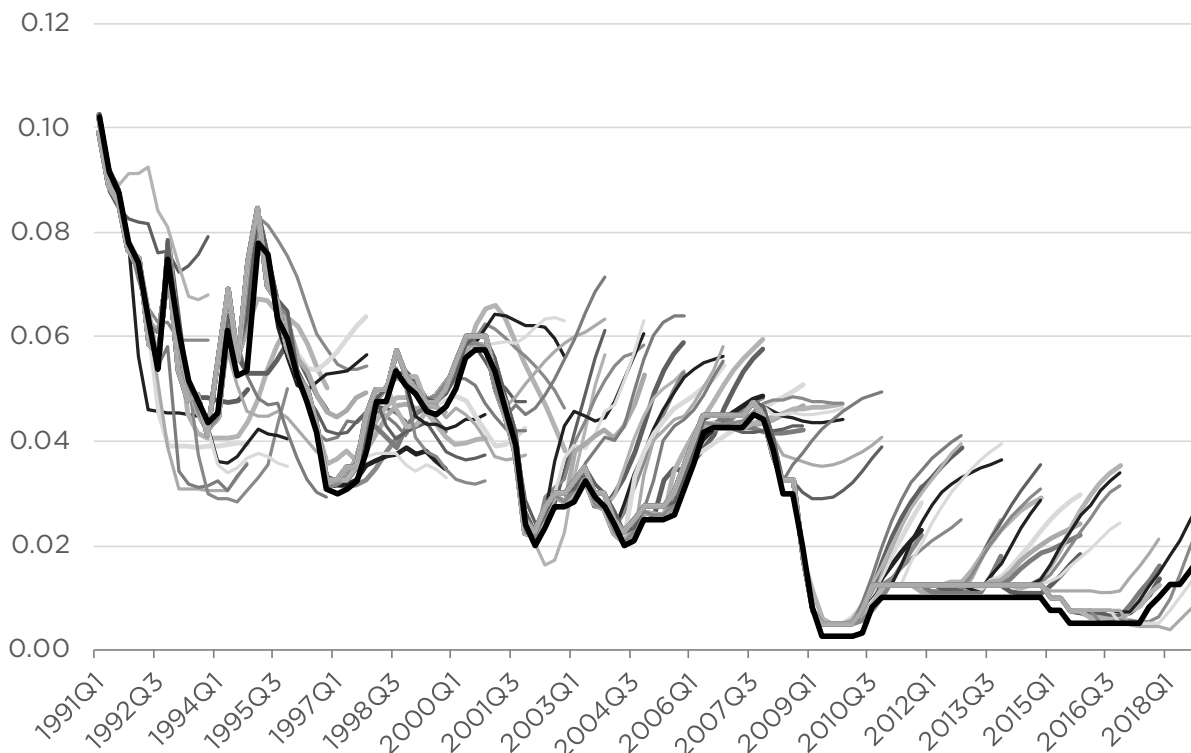
Another related piece of evidence we have about estimates of R^* are BoC staff forecasts of future levels of the nominal policy rate as shown in figure 6. Two features of the plot are notable. First, after 2000, staff consistently expect the BoC to increase the policy rate over time as the whiskers in the figure rising above the observed overnight rate make clear. Other things held constant, this translates into an expectation that monetary policy would be tightened.

In contrast, during the early years of inflation targeting, that is, until around 1999, actual policy rates were persistently above the ones forecast by the bank staff.⁴⁵ Therefore, during those years, if we assume a 2 percent neutral real interest rate, monetary policy was tighter than bank staff anticipated. Either the staff was too optimistic about how quickly inflation would decline in the early years of IT or the BoC felt it necessary to maintain a monetary stance tighter than models recommended in order to burnish the central bank's inflation-fighting credentials. Of course, some allowance must also be made for the fact that hindsight is 100 percent perfect.

⁴⁴ Estimates have been published since the October 2014 edition of the MPR, although early published estimates were for R^* . It is only recently that estimates of the neutral nominal policy rate are discussed in every MPR. Estimates of the neutral nominal policy rate in Canada have not always been the same as for the US.

⁴⁵ Interestingly, the same is not true of inflation (not shown). From the late 1990s, at least until the end of 2015 (subsequent data have not yet been released as this is written), inflation forecast errors were small, although there have been periods where bank staff persistently under- or over-estimated future inflation. In contrast, forecast errors early in the inflation targeting regime were very large with observed inflation consistently well below expected inflation. Whether this translated into poorer economic outcomes due to how the monetary policy stance was set at the time was the subject of a vigorous debate between the BoC and academics. Not surprisingly, the bank defended its conduct (Freedman and Macklem, 1998), while the recession of the early 1990s was blamed by some academics on the conduct of monetary policy (Fortin, 1996).

Figure 6: Bank of Canada Staff Forecasts of the Policy Rate by Vintage for Canada



Source: Bank of Canada, Staff Economic Projections, <https://www.bankofcanada.ca/rates/staff-economic-projections/>. Also, see Figure 1.

Note: the solid black line is the observed overnight rate target. The whiskers are forecasts for different vintages of data since 1991. The last vintage is 2016Q4. Forecasts are for up to 3 years ahead.

Second, and assuming a 2 percent inflation target, the staff struggled to forecast a 4 percent overnight rate over the approximately two-year horizon of the forecasts. This is further evidence that the governing council of the BoC also believes that R^* is below 2 percent and that it has fallen over time.

The essay turns next to a brief assessment of the record of monetary policy since the GFC of 2008-9.

Assessing the (Mixed) Record of UMP

Any assessment of UMP ought to consider the global experience with it. Space limitations prevent me from doing so, but see Bhattarai and Neely (2022), Lombardi et al. (2018), and Johnson et al. (2020) for evidence of the international experience with UMP. Hence, in what follows, I will highlight the US and Canadian experiences.

Bhattarai and Neely (2022) is the most comprehensive survey and assessment of US QE-style monetary policy to date, while Bernanke (2020) provides a defense of the Fed's policies during his time as Fed chair. As should be clear from the discussion in the previous section, the Canadian experience is brief and is dominated by the unusual environment surrounding the COVID-19 experience.

An empirical assessment of the impact of UMP is complicated by at least three considerations. First, the application of non-standard policy interventions was expected to be temporary. Indeed, the Fed published a plan to exit UMP as early as in 2010. Second, assessments of UMP are sensitive to where, along the entire term structure of interest rates, attention is paid with regard to the Fed's interventions or the macroeconomy more generally. Finally, and perhaps the least well understood issue given the duration of UMP-style policies, is how the unwinding of policies, namely QT, would affect financial markets and the macroeconomy more generally.

We do have some understanding about the potential risks of exit from UMP in the form of the "taper tantrum" episode of 2013, as well as the Fed's hesitation to end QE because of dissatisfaction with overall macroeconomic performance of the US economy (see table 1). In the case of the taper tantrum, then Fed Chair Ben Bernanke gave a form of FG suggestive of a gradual removal of QE. When markets over-reacted or misunderstood the intentions of the Fed as signalling that policy tightening was imminent, the central bank reversed course. In the future, the strategy for tapering would be conducted differently. Since, as this is written, we are only in the early stages of this phase, which may well be interrupted by some unknown shock, it is a matter of speculation as to what will happen

to interest rates, inflation, and economic growth. However, the possibility that a reduction in the size of central bank balance sheets will trigger another “tantrum” cannot be entirely excluded. Indeed, as seems clear from figure 2, more volatility in financial markets is possible.

First, I consider the literature on the interest rate effects of the Fed’s UMP. Since there are potentially many news items that can take place simultaneously along with the announcement of a UMP action, isolating the impact of, for example, the launch of a QE program is not straightforward. In part for this reason a growing number of studies rely on ultra-high-frequency data (intra-daily or even tick-by-tick; for example, Rogers et al., 2014). The finely chosen timing of events underestimates the real possibility that financial markets may, at times, be inattentive to policy changes. As a result, estimates of UMP’s impact from even the most careful event studies are subject to some bias.⁴⁶

Empirical event studies in this vein include Acharya et al. (2017) and Chen et al. (2014). The methodology used assumes policy announcements and/or interventions are separate and that the accumulated response to events can be treated as capturing the policy’s total impact. There is considerable focus on the impact of QE on long-term bond yields, since this is a principal target of the large-scale asset purchases that central banks make. That said, many studies also consider other parts of the term structure of interest rates as fair game for asking whether UMP had any impact. For example, Swanson and Williams (2014a, 2014b) argue that UMP can be effective at the ZLB if financial markets are responsive to policy surprises. The authors compare the market’s response during the GFC with the pre-crisis period. If macroeconomic news surprises don’t have an impact on interest rates along the yield curve, monetary policy loses its effectiveness. The authors conclude for the US (also for the UK and Germany) that market responsiveness diminished at the short end of the yield curve but remained effective at the longer end. Lombardi et al. (2017) concur while also controlling for central bank communication, a feature left out of the Swanson-Williams studies. Measuring the impact of central bank communication is important because this strategy is also at the core of the FG approach to monetary policy.

Of course, some scholars are unconvinced about the effectiveness of FG beyond the near-term (eg., Filardo and Hofmann, 2014). Moessner et al. (2017) suggest that central banks do not make commitments of the kind discussed in theory. Precisely because of the conditionality of the language that central banks use, there have been concerns that UMP may impair any hard-won credibility that central banks had prior to the GFC. For

⁴⁶ MacKinlay (1997) provides a wide-ranging survey of the advantages and limitations of event studies.

example, event studies do not consider the extent to which there was any loss of trust or credibility in central banks in the lead-up to these policy announcements.

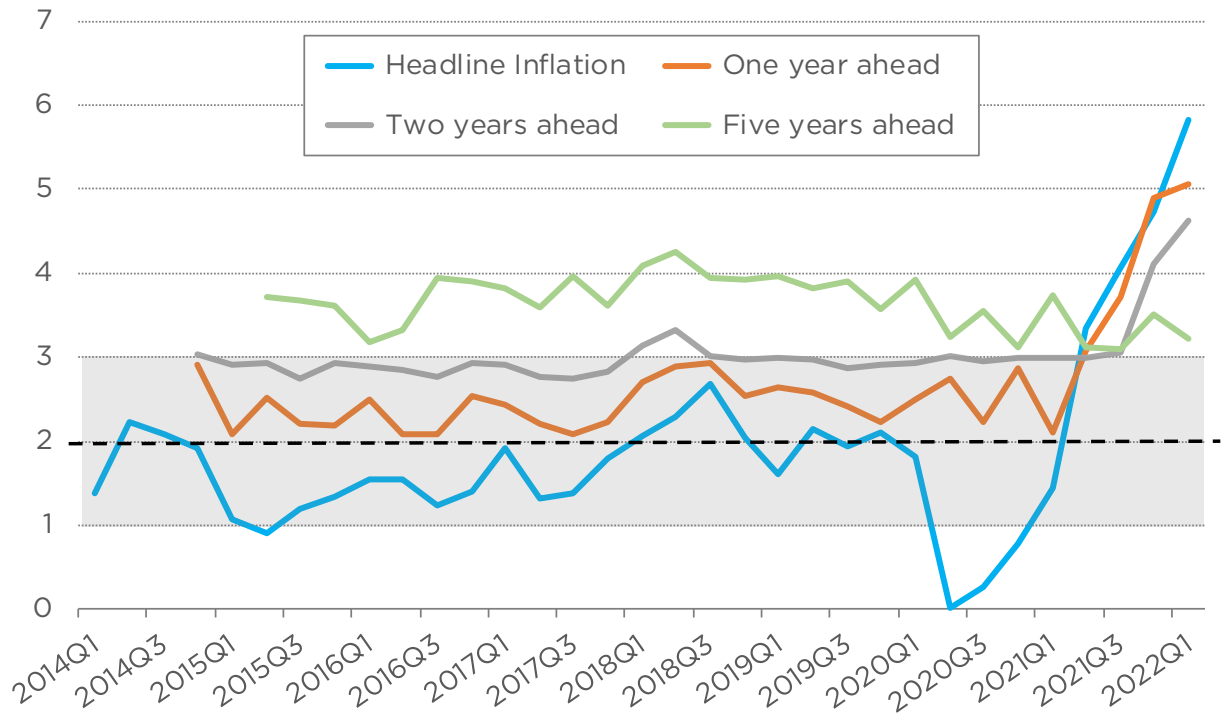
Many tests of the impact of UMP on output and inflation rely on some variant of a vector autoregressive (VAR) model, a statistical approach where the variables considered are simultaneously determined.⁴⁷ Empirical applications generally ask whether and how monetary policy surprises, or shocks, in the UMP era changed any of the assumed relationships under investigation (eg., Weale and Wieladek, 2016). Other studies consider how real GDP growth and inflation responded to QE (Altavilla et al., 2016).

Neely (2014) expresses serious reservations about the reliability of estimates based on these kinds of econometric models because economic responses to QE are likely to change over time. Generally, the empirical evidence to date suggests that UMPs have real economic effects, but that these are limited in size and occur with a significant lag. Johnson et al. (2020) acknowledge that the macroeconomic effects of QE are, at best, mixed. Another illustration of the VAR approach to examining the effects of QE is Haldane et al. (2016) who rely on the size of a central bank's balance sheet (as a percent of GDP) to capture the impact of UMP. They find that UMP effects are nation-dependent but spill over significantly into other advanced economies.

The ability of monetary policy to influence inflation expectations is addressed, for example, by Engen et al. (2015). While the Fed's FOMC was found to successfully influence inflation expectations, the continued delay in the economic recovery tempered the potential real economic impact of QE. Orphanides (2015) claims that the Fed "procrastinated" when it reversed course away from continuing to implement an ultra-loose monetary policy. These policy errors are likely to have damaged Fed credibility.

Unfortunately, economists have yet to reach a consensus on how best to measure credibility. Nevertheless, most would agree that credibility has something to do with how closely observed headline inflation follows earlier forecasts of inflation. After all, if the task of the central bank is to maintain inflation close to target, then the public must believe the target and the central bank's forecasts that ensure that the monetary policy stance is consistent with reaching the agreed-upon objective. And when the objective is not met, then a public explanation for misses is expected

⁴⁷ A different approach relies on microeconomic data (eg., individual bank lending) to investigate the real effects of UMP (Acharya et al., 2017). Other macroeconomic models are also employed but space limitations prevent further discussion (see, however, Lombardi et al., 2018).

Figure 7: Bank of Canada Household Inflation Forecasts for Canada

Source: Bank of Canada, Staff Economic Projections, <https://www.bankofcanada.ca/rates/staff-economic-projections/> and Figure 1.

and corrective measures explained to fulfill accountability requirements.⁴⁸ There is now mounting evidence suggesting a loss of credibility in the US Fed (eg., Wessel, 2022, March 9; Reis, 2022), although it is likely too early to conclude whether any change is permanent, especially since no firm consensus exists.

Another complication is that the adoption of the average inflation targeting regime policy regime in 2020 makes credibility more difficult to gauge since it explicitly allows for a “temporary” surge in inflation without clearly defining its size or duration. Of course, the sheer size of the rise in inflation since 2021 is very difficult to square with a regime that promises 2 percent inflation in the medium term. Indeed, as Miller (2022, May 13)

⁴⁸ For example, the governor of the Bank of England is required to write a letter to the chancellor of the Exchequer (Finance Minister) advising of misses of the inflation target ranges and correctives to be implemented to return inflation to target. Neither the US Fed nor the Bank of Canada have to satisfy such a requirement.

visually demonstrates for the US case, economists' expectations of inflation, as communicated via Bloomberg's survey of inflation forecasts in 2021 and 2022, have risen sharply in the space of only a few months. This does not augur well for the Fed's credibility.

The evidence from Canada is broadly similar. Indeed, as figure 7 shows, household inflation expectations up to two years into the future suggest that Canadians no longer believe the Bank of Canada can keep inflation at target over the normal horizon over which recent monetary policy actions have their effect. Of course, this is also true more generally of longer-term forecasts which, given the actual record of headline inflation, also routinely exceed the 1 to 3 percent target range even if, at least until 2021, headline inflation was mostly inside the target range. Either the public is inattentive to what the central bank does or there are doubts about the BoC's ability to meet the inflation target objective (see, for example, Sutherland, 2022). It does not help that the BoC's staff has a poor record of forecasting the policy rate two years ahead as figure 6, discussed above, clearly reveals.

What, then, is the bottom line of the foregoing survey? For the US, there is some evidence that QE reduced interest rates along the term structure, although the impact became smaller over time and with each successive effort at persisting with QE-style policies and FG. There is equally some evidence of the beneficial impact, though short-lived, of Canada's relatively brief experiment with QE introduced during the pandemic era (Arora et al., 2021). Specifically, the authors found that government bond yields were reduced when the program was announced, although the impact was seen to be larger at the shorter end of the maturity structure (ie., bonds with 2 years or less to maturity). It is worth reminding readers that while in principle the impact of QE (ie., asset purchases) on bond yields and the macroeconomy more generally can be separated from the effects of FG, these two sets of policies are usually in effect simultaneously. Even if statistical techniques are applied that permit the separate identification of these two forms of UMP, they ordinarily assume that the central bank implements them in a perfectly credible manner. This is questionable, although there are no easy remedies to relax this assumption and measure with precision the relative impact of QE versus FG. Zhang (2021) does make such an attempt using Canadian data and, while the findings of that study are broadly consistent with those of Arora et al. (2021), Zhang (2021) reports that QE has a larger macroeconomic impact (ie., on inflation and growth) than FG alone.

It is curious that much of the research has sought to defend UMP by focusing on the size of the impact of various forms of QE on interest rates, inflation, and output, but rarely asks what would have been the economic

consequences of benign neglect (ie., no UMP) (Lombardi, et al., 2018, and Ravenna and Molbak Ingholt, 2021, are exceptions), or reliance on fiscal policy alone to deal with the fallout from the GFC, Europe's sovereign debt crisis, and COVID-19 shocks. This may be explained, in no order of importance, by (a) the preponderance of research that originates from central banks; (b) the relatively passive state of fiscal policy prior to the GFC until the pandemic of 2020; (c) the belief that monetary policy alone had the necessary tools to control inflation and create conditions that would ensure that output remains close to its potential; and (d) the difficulty of establishing which channels of monetary policy transmission were most important or successful.⁴⁹ The pandemic revived another neglected question, namely, how fiscal and monetary policy interact once it became clear that governments can and do act quickly to prevent a serious downturn or stimulate economic activity.

An arguably cautionary tale is provided by Fabo et al. (2021) who examine 54 peer-reviewed central bank- and academic-authored studies of the impact of UMP on inflation and output. They conclude that central bank studies tend to take a more favourable view of the ability of QE to increase inflation and promote aggregate demand than do studies that academics produce. While the authors are careful not to point too many fingers at either group of studies, they suggest that “whose findings are closer to the truth remains unclear” (Fabo et al., 2021: 19). A survey of central bankers and academics that complements their statistical analysis concludes that careerism and other forms of psychological bias may be to blame. However, this can leave the impression of “a pox on both houses,” even if there is little dispute that UMP had some impact on financial markets and the real economy. What remains unclear is whether central bank interventions were on too big a scale and carried out for too long.

One final comment is in order. Historically, economists were fairly adept at identifying whether the source of some large economic shock was of the aggregate demand or aggregate supply variety, even if there continues to be considerable disagreement about how best to disentangle the two types of shocks empirically (e.g., see Ramey, 2015). However, the pandemic, followed by the ongoing war in Ukraine, created a situation where both shocks occurred if not simultaneously, then closely following each other. Since policy prescriptions, especially in the case of monetary policy, differ as between the two kinds of shock, identifying whether

⁴⁹ There are so many channels that have been proposed to explain whether QE had real and financial effects on the aggregate economy that they cannot be discussed here. See, for example, Filardo and Siklos (2020), and references therein, for a partial list of these channels.

demand or supply pressures explain the inflation surge of 2021-22 became contentious.⁵⁰

⁵⁰ Standard textbook discussion suggests that a positive demand shock raises prices and quantities; in contrast, a negative supply shock also raises prices but at the expense of lower quantities. It is this insight that prompted Shapiro (2022) to estimate that in the US roughly two-thirds of the inflation shock originated with supply-side effects (the balance is closer to 50-50 when core inflation is considered). Nevertheless, even he acknowledges the difficulty in identifying demand and supply shocks and that these can change significantly over time. The data breakdown is available from <https://www.frbsf.org/economic-research/indicators-data/supply-and-demand-driven-pce-inflation/> and is updated monthly.

Conclusions: The Challenges that Lie Ahead

If an economy can be likened to a patient suffering from repeated health crises and being treated with strong medication for a decade and a half, complications are to be expected. Arguably, the first complication is the impact of repeated crises on the trust the public has in the central banking institution. Hartwell and Siklos (2022) evaluate the resilience of central banks to a variety of shocks and institutional factors. Resilience is measured according to the institutional capacity of central banks to respond to economic shocks, and it is derived from a combination of macroeconomic, financial, and institutional performance indicators. Based on their results, both the Fed and the BoC ought to be able to weather the current storm, but only if they are successful in bringing inflation down in the medium-term (say two years) and there is better fiscal-monetary coordination than at present with historically high deficits and rising private debt. The current aggressive tightening that both central banks are carrying out to quell inflation will not produce quick results given that monetary policy acts with long and variable lags. However, a mere few months since policy rates began to increase sharply there is impatience with the apparent slow response of inflation to monetary tightening and concern that inflation expectations have become sufficiently unmoored so that only even more severe policy rate rises will bring inflation back to the target range.

Communicating the transition from high inflation back to the target as well as ensuring that the landing is of the soft rather than of the hard variety will also be essential. After all, central banks have gone from communicating their success in controlling inflation to a tacit admission that, beginning in 2021, they fell “behind the curve.” The coming years will likely see debate about how belatedly the necessary correctives relying on monetary policy were put in place to stabilize the economy and whether fiscal policy will assist rather than undo the impact of monetary policy tightening.

Many forget that the last time central banks were faced with such problems (ie., the late 1980s and early 1990s) communicating with the public was thought to be of secondary importance. Moreover, we have

learned more than once not only the power of communicating clearly⁵¹ but the turbulence that follows incomplete, vague, or unintentional communication (eg., the taper tantrum mentioned earlier).⁵²

Sadly, other dangers lie ahead that will be more difficult to navigate. Central banks in the largest and most systemically important economies, especially in the US, have intervened in financial markets for a long time and across many maturities of government debt. The resulting market distortions (BIS, 2022) will be hard to unravel unless the conditions under which this is accomplished maintain financial stability once monetary policy has normalized.⁵³

What is less obvious is how to define “normal” after a series of crises. Central banks may have concluded that price stability alone is not enough and that best practice in the conduct of monetary policy will require more flexibility to achieve an inflation target. This implies that the pre-GFC era, where a policy rate alone provided a signal of the stance of monetary policy, will not return. The toolkit of policy instruments must include interventions in financial markets via changes in the composition of the central bank’s balance sheet. As a result, balance sheets will remain higher in economic terms than before the GFC while central banks will also seek to minimize the distortionary impact of large-scale asset purchases. However, there is little indication about what optimal levels of intervention might look like.

Johnson et al. (2020) prefer the expression “extended” over UMP tools, although their survey suggests a multitude of open questions about their macroeconomic effectiveness. The notion that these policies affect financial markets is on more solid ground even if the authors also caution that the “legacy” effects of UMP, interpreted here as distortionary, have yet to be understood. Since a complete exit from UMP has yet to take place, it is premature to define the new normal to include the panoply of tools the

⁵¹ Think of the former president of the European Central Bank, Mario Draghi, when he uttered his famous “whatever it takes” in July 2012 to extinguish worries over the survival of the single European currency, the euro.

⁵² Although the focus here is on who delivers the communication, some responsibility also rests with those who translate or interpret the communications. Bernanke, who was FOMC chair and delivered the comments that produced the tantrum, complains that the media seized on the taper part of his comments while ignoring the qualification (Bernanke, 2022: 191).

⁵³ One source of distortion is the size of holdings of government debt on central bank balance sheets. The Bank of Japan, for example, holds almost half of government debt and, in some cases, virtually all at certain maturities (Lewis et al., 2022, November 3). Withdrawal from these conditions does potentially impose significant risks to financial stability.

monetary authorities introduced since 2008 (or even earlier as in Japan). Garton Ash (2022, November 14) warns us that, in the political sphere, we should be wary of new norms that are portrayed as normal when, historically, they are not. The same thinking ought to apply to the tools of monetary policy. Indeed, the ongoing revival of the policy rate as the principal, albeit blunt, instrument of monetary policy suggests that the gradual withdrawal of UMP is not enough.

If the 1990s brought about much higher levels of transparency on the part of the monetary authorities globally, then the next decade should see further increases in transparency, but this time focused on the connection between balance sheet policies, inflation, and economic activity more generally. Stated differently, banks will need to make more effort to explain to financial markets and the public changes in the transmission of monetary policy in the “new normal.” The pre-GFC flowcharts where a change in the policy rate worked its way through to the economy to guarantee inflation control must be redrawn to persuade the public that multiple policy instruments can achieve low and stable inflation, still the preferred outcome of most policymakers.

There is, however, an increasing danger that monetary and fiscal policies will come into conflict with each other. As central banks around the world are quickly tightening monetary policy, at times some have also continued to buy government bonds to forestall financial instability.⁵⁴ The difficulty is that there is no consensus about how to define financial instability and even less ability to predict when it might happen. Moreover, if preventing financial instability translates into a loosening of monetary policy, then this makes the task of returning to price stability in an era of high and rising inflation that much more of a challenge.

Finally, the coming years will also clarify whether it was wise for major central banks, including the BoC, to tolerate greater flexibility in their inflation control regimes as they did in the midst of a pandemic. Whereas the pre-GFC era made it clear, at least in Canada, that an inflation target range represented a zone of tolerance, the pandemic era experience suggests that the target range can be breached under exceptional circumstances. Defining those circumstances may be more important than previously thought.

In the US case, there is an inflation objective (2 percent) but no explicit zone of tolerance. Nevertheless, the aim was to “mitigate deviations of inflation from its longer-run goal inflation and deviations of employment from the Committee’s assessments of its maximum level” (Board of Governors of the Federal Reserve System, 2012). The Fed’s adoption

⁵⁴ As noted previously, the Bank of England and the ECB were both placed in such a position during the summer and early fall of 2022.

of average inflation targeting relaxes the strategy announced in 2012 by allowing inflation to drift higher to make up for periods of below target inflation. This may have suited an environment where the concern was inflation persistently below target. However, recent inflation rates are far above what central banks themselves consider excessive, and the Fed will struggle to explain how fast and how far policy must be tightened to bring inflation back to acceptable norms. Moreover, central banks more generally will have to contend with the admission that, in the presence of supply shocks of the kind that emerged before and in the aftermath of the pandemic, there is uncertainty about the way back to low and stable inflation.

In Canada's case, the 2021 renewal of the 1 to 3 percent inflation targeting range framework brought about the caveat asking, among other considerations, that the BoC "consider a broad range of labour market indicators... on how labour market outcomes have factored into its monetary policy decisions" (Bank of Canada, 2021b). There also appears to be agreement with the government that there is a need to "address the challenges of structurally low interest rates... including holding its policy interest rate at a low level for longer than usual" (Bank of Canada, 2021b). Both of these changes appear innocuous but may create even greater difficulties for the BoC if it aims to keep inflation inside the target range. Central banks have long been fond of looking at everything when deciding the stance of monetary policy. By singling out the labour market one must ask why other considerations, such as external factors or the state of productivity, are not explicitly mentioned, particularly when there continues to be a debate about the nature of the changing trade-off between inflation and labour market conditions.

The so-called challenges posed by low neutral interest rates presupposes that this unobservable indicator is known with precision and is assumed to remain low for the foreseeable future. There is little evidence to support either assumption. Finally, the focus on the possibility of keeping the policy rate lower for longer suggests an excessive concern over inflation that was too low for too long. There is apparently no comparable strategy for how fast or how far to tighten when inflation is surging. A symmetric inflation targeting regime requires both eventualities to be taken equally seriously. Many have written about the great inflation of the 1970s and early 1980s and the public's distaste for that state of economic affairs. Despite decades of low and stable inflation, one should consider it as good news that, once again, the public, governments, and central banks are united in their disapproval of the current inflation spike.

It is certainly possible that the foregoing dangers will be effectively managed and that an economic crisis will be avoided. Clearly this is the preferred course. Looking forward, it is reasonable to look to reforms

that circumscribe the scope of central bank tasks, and that lead to better cooperation, if not actual coordination with other institutions tasked with the maintenance of a sustainable fiscal policy and financial system stability.

References

- Acharya, V.V., T. Eisert, C. Eufinger, and C. Hirsch. (2017). Whatever It Takes: The Real Effects of Unconventional Monetary Policy. *Sustainable Architecture for Finance in Europe Working Paper* 152.
- Altavilla, C., D. Giannone, and M. Lenza. (2016). The Financial and Macroeconomic Effects of the OMT Announcements. *International Journal of Central Banking* 12, 3: 29-57.
- Arora, R., S. Gungor, J. Nesrallah, G. Ouellet Lebalnc, and J. Witmer (2021). *The Impact of the Bank of Canada's Government Bond Purchase Program*. Staff Analytical Note 2021-23 (October). Bank of Canada.
- Bank for International Settlements [BIS] (2022). *Market Disfunction and Central Bank Tools*. Markets Committee Paper (May 11). BIS. <https://www.bis.org/publ/mc_insights.htm>, as of January 31, 2023.
- Bank of Canada (2021a). *Monetary Policy Report, 2021 – October*. Bank of Canada. <<https://www.bankofcanada.ca/2021/10/mpr-2021-10-27/>>, as of January 29, 2023.
- Bank of Canada (2021b). Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Monetary Policy Framework. Press Release (December 13). Bank of Canada. <<https://www.bankofcanada.ca/2021/12/joint-statement-of-the-government-of-canada-and-the-bank-of-canada-on-the-renewal-of-the-monetary-policy-framework/>>, as of January 31, 2023.
- Bank of Canada (2022). *Monetary Policy Report – October*. Bank of Canada. <<https://www.bankofcanada.ca/2022/10/mpr-2022-10-26/>>, as of January 31, 2023.
- Bernanke, B. (2010). Monetary Policy and the Housing Bubble. Speech to the Annual Meeting of the American Economic Association (January 3). Board of Governmors of the Federal Reserve System. <<https://www.federalreserve.gov/newsevents/speech/bernanke20100103a.htm>>, as of January 31, 2023.
- Bernanke, B. (2004). The Great Moderation. Remarks at the Meetings of the Eastern Economic Association, Washington, DC, February 20. Federal Reserve Board. <<https://www.federalreserve.gov/boarddocs/speeches/2004/20040220/>>, as of January 31, 2023.

- Bernanke, B. (2015). *The Courage to Act*. W.W. Norton and Co.
- Bernanke, B. (2020). The New Tools of Monetary Policy. *American Economic Review* 110 (April): 943-983.
- Bernanke, B. (2022). *21st Century Monetary Policy*. W.W. Norton.
- Bhattarai, S., and C.J. Neely (2022). An Analysis of the Literature on International Unconventional Monetary Policy. *Journal of Economic Literature* 60, 2: 527-597.
- Blanchard, O. (2021). In Defense of Concerns Over the \$1.9 Trillion Relief Plan. *Realtime Economics* (February 18). Peterson Institute of International Economics. <<https://www.piie.com/blogs/realtime-economic-issues-watch/defense-concerns-over-19-trillion-relief-plan>>, as of January 31, 2023.
- Blinder, A. (1999). *Central Banking in Theory and Practice*. The MIT Press.
- Boar, C., L. Gambacorta, G. Lombardo, and L. Pereira da Silva (2017). What Are the Effects of Macroprudential Policies on Macroeconomic Performance? *BIS Quarterly Review* (September): 71-88.
- Board of Governors of the Federal Reserve System (2012). *Federal Reserve Issues FOMC Statement of Longer-Run Goals and Policy Strategy*. Press release. [United States] Federal Reserve. <https://www.federalreserve.gov/monetarypolicy/bst_lendingprimary.htm>, as of January 29, 2023.
- Board of Governors of the Federal Reserve System (2020a). Lending to Primary Dealers. *Credit and Liquidity Programs and the Balance Sheet*. [United States] Federal Reserve. <https://www.federalreserve.gov/monetarypolicy/bst_lendingprimary.htm>, as of January 29, 2023.
- Board of Governors of the Federal Reserve System (2020b). Central Bank Liquidity Swaps. *Credit and Liquidity Programs and the Balance Sheet*. [United States] Federal Reserve. <https://www.federalreserve.gov/monetarypolicy/bst_lendingprimary.htm>, as of January 29, 2023.
- Board of Governors of the Federal Reserve System (2022). Plans for Reducing the Size of the Federal Reserve's Balance Sheet. Press release. [United States] Federal Reserve. <<https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504b.htm>>, as of February 2, 2023.
- Bordo, M., and M. Levy (2022). *The Fed's Monetary Policy Exit Once Again Behind the Curve*. Working Paper (May). Hoover Institution, Stanford University.

Bordo, M., and P. Siklos (2022). The Transformation and Performance of Emerging Market Economies Across the Great Divide of the Global Financial Crisis. In Ernesto Pastén and Ricardo Reis (eds.), *Independence, Credibility and Communication of Central Banking* (Central Bank of Chile): 1-65.

Borio, C. (2012). The Financial Cycle and Macroeconomics: What Have We Learnt? Working Paper Number 395 (December). Bank for International Settlements.

Campbell, J.R., J.D.M. Fisher, A. Justiniano, and L. Melosi (2016). Forward Guidance and Macroeconomic Outcomes Since the Financial Crisis. In M. Eichenbaum and J. A. Parker (eds.), *NBER Macroeconomics Annual*, vol. 31 (MIT Press): 283-357.

Chant, J.F. (2022). *The Ebb and Flow of Bank of Canada Independence*. The Fraser Institute. <<https://www.fraserinstitute.org/sites/default/files/ebb-and-flow-of-bank-of-canada-independence.pdf>>, as of January 31, 2023.

Chen, S., and K. Svirydzenka (2021). Financial Cycles – Early Warning Indicators of Banking Crises? Working Paper 21/116 (April). International Monetary Fund [IMF].

Chen, J., T. Mancini-Griffoli, and R. Sahay (2014). *Spillover from United States Monetary Policy on Emerging Markets: Different This Time?* Working Paper 14/240. International Monetary Fund [IMF].

Clarida, R. (2022). Perspectives on US Monetary Policy. In M.D. Bordo, J.H. Cochrane, and J.B. Taylor (eds.), *How Monetary Policy Got Behind the Curve – and How to Get Back* (Hoover Institution Press): 9-16.

Clarida, R., B. Duygan-Bump, and C. Scotti (2021). *The COVID-19 Crisis and the Federal Reserve's Response*. Finance and Economics Discussion Series 2021-035. Board of Governors of the Federal Reserve System. <<https://doi.org/10.17016/FEDS.2021.035>>, as of January 31, 2023.

Congressional Budget Office (2021). *The Federal Reserve's Response to COVID-19: Policy Issues*. Updated February 8. Report Number R46411. [United States] Congressional Budget Office. <<https://crsreports.congress.gov/product/pdf/R/R46411>>, as of January 31, 2023.

Engen, E. M., Laubach, T.T. and Reifschneider, D. (2015). *The Macroeconomic Effects of the Federal Reserve's Unconventional Monetary Policies*. Finance and Economics Discussion Series 2015-005. Board of Governors of the Federal Reserve System.

English, W.B. and D. Kohn (2022). What if the Federal Reserve Books Losses Because of its Quantitative Easing? Blog (June 1). Brookings Institution. <<https://www.brookings.edu/blog/up-front/2022/06/01/what-if-the-federal-reserve-books-losses-because-of-its-quantitative-easing/>>, as of January 31, 2023.

Fabo, B., M. Jancová, E. Kempf, and L. Pástor (2021). Fifty Shades of QE: Comparing Findings of Central Bankers and Academics. *Journal of Monetary Economics* 120: 1-20.

Federal Reserve Bank of St. Louis (2015). The Origins of Unconventional Monetary Policy in the U.S. *Annual Report* (April 7). Federal Reserve Bank of St. Louis. <<https://www.stlouisfed.org/annual-report/2015/the-origins-of-unconventional-monetary-policy-in-the-us/>>, as of January 31, 2023.

Fortin, P. (1996). The Great Canadian Slump. *Canadian Journal of Economics* 29 (November): 761-787.

Filardo, A., and P. Siklos (2020). The Cross-Border Lending Channel and Lending Standard Surveys. *Journal of International Financial Markets, Institutions and Money*, 101206.

Filardo, A., and B. Hofmann (2014). Forward Guidance at the Zero Lower Bound. *BIS Quarterly Review* (March): 37-53.

Freedman, C., and T. Macklem (1998). A Comment on the “Great Canadian Slump.” *Canadian Journal of Economics* 31 (3): 646-665.

Friedman, M. (1960). *A Program for Monetary Stability*. Fordham University Press.

Garton Ash, T. (2022, November 14). Beware the Creeping Normalization of the Hard Right. *Financial Times*. <<https://www.ft.com/content/02433224-248b-4dc5-b881-95a5d205e8e8>>, as of January 31, 2023 [paywall].

Globerman, S. (2022). *A Primer on Inflation*. Fraser Institute. <<https://www.fraserinstitute.org/studies/primer-on-inflation>>, as of January 31, 2023.

Hakkio, C.S. (2013). The Great Moderation, 1982-2007. Federal Reserve History (November). Federal Reserve Bank of Kansas City. <<https://www.federalreservehistory.org/essays/great-moderation>>, as of January 31, 2023.

Haldane, A.G., M. Roberts-Sklar, T. Wieladek, and C. Young (2016). *QE: The Story So Far*. Staff Working Paper No. 624. Bank of England.

Hartwell, C. and P. Siklos (2022). *Central Bank Credibility and Institutional Resilience*. Unpublished Working Paper (March).

He, Z. (2010). Evaluating the Impact of the Bank of Canada's Conditional Commitment Policy. Discussion Paper 2010-11 (August). Bank of Canada.

Hetzl, R.L. (2008). *The Monetary Policy of the Federal Reserve: A History*. Cambridge University Press.

Holston, K., T. Laubach, and J. Williams (2017). Measuring the Natural Rate of Interest: International Trends and Determinants. *Journal of International Economics* 108, Supplement 1 (May): S39-S75.

Johnson, G., S. Kozicki, R. Priftis, L. Suchanek, and J. Yang (2020). *Implementation and Effectiveness of Extended Monetary Tools: Lessons from the Literature*. Staff Discussion Paper 2010-16. Bank of Canada.

King, M. (2003). Speech given by the Governor of the Bank of England at the East Midlands Development Agency/Bank of England Dinner (October 14). Bank of England. <<https://www.bankofengland.co.uk/-/media/boe/files/speech/2003/east-midlands-development-agency-dinner>>, as of January 31, 2023.

Kool, C.J.M., and D.L. Thornton (2015). How Effective is Central Bank Forward Guidance? *Review of the Federal Reserve Bank of St. Louis* 97, 4: 303-322.

Krugman, P. (2022, July 21). I was Wrong About Inflation. *New York Times*.

Kydland, F.E., and E.C. Prescott (1977). Rules Rather than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy* 85 (June): 473-492.

Leeper, E. (1991). Equilibria Under "Active" and "Passive" Monetary and Fiscal Policies. *Journal of Monetary Economics* 27: 129-147.

Lewis, L., K. Inagaki, and T. Stubbington (2022, November 3). How Long Can Japan's Central Bank Defy Global Market Forces? *Financial Times*. <<https://www.ft.com/content/f9aca1c2-50c6-4040-8322-6ddfacda6cd6>>, as of January 31, 2023 [paywall].

Lombardi, D., S. St. Amand, and P.L. Siklos (2018). A Survey of the International Evidence and Lessons Learned About Unconventional Monetary Policies: Is a "New Normal" in Our Future? *Journal of Economic Surveys* 32 (December): 1229-1256.

- Lombardi, D., S. St. Amant, and P.L. Siklos (2019). Government Bond Yields at the Effective Lower Bound: International Evidence. *Contemporary Economic Policy* 37 (January): 102-120.
- Lombardi, D., and P. Siklos (2016). Benchmarking Macroprudential Policies: An Initial Assessment. *Journal of Financial Stability* 27 (December): 35-49.
- MacKinlay, A.C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature* 35, 1: 13-39.
- Macklem, T. (2022, August 16). We're Determined to Eliminate High Inflation and Return to our 2% Target. *National Post*. <<https://nationalpost.com/opinion/tiff-macklem-were-determined-to-eliminate-high-inflation-and-return-to-our-2-target>>, as of January 31, 2023.
- Meltzer, A.H. (2002). *A History of the Federal Reserve, Volume 1: 1913-1951*. University of Chicago Press.
- Meltzer, A.H. (2010). *A History of the Federal Reserve, Volume 2, Book 1: 1951-1969*. University of Chicago Press.
- Meltzer, A.H. (2010). *A History of the Federal Reserve, Volume 2, Book 2: 1970-1986*. University of Chicago Press.
- Miller, R. (2021, December 1). Jerome Powell Ditches "Transitory" Tag, Paves Way for Rate Hike. *Bloomberg*. <<https://www.bloomberg.com/news/articles/2021-11-30/powell-ditches-transitory-inflation-tag-paves-way-for-rate-hike>>, as of January 31, 2023.
- Miller, R. (2022, May 13). Age of Inflation in US Will Last Much Longer than Pandemic Spike. *Bloomberg*. <<https://www.bloomberg.com/news/articles/2022-05-13/age-of-inflation-in-us-will-last-much-longer-than-pandemic-spike#xj4y7vzkg>>, as of January 31, 2023.
- Moessner, R., D.-J. Jansen, and J. de Hann (2017). Communication About Future Policy Rates in Theory and Practice: A Survey. *Journal of Economic Surveys* 31, 3: 678-711.
- Nangle, T. (2022, July 22). How Big a Deal is the Hole in the Bank of England's Balance Sheet? *Financial Times*. <<https://www.ft.com/content/42fde84b-24d7-4b67-81ea-7df4a0a8287c>>, as of January 31, 2023 [paywall].
- Neely, C. (2014). *How Persistent Are Monetary Policy Effects at the Zero Lower Bound?* Working Paper Series No. 2014-004A. Federal Reserve Bank of St. Louis.

Nelson, E. (2021). *The Emergence of Forward Guidance as a Monetary Tool*. Finance and Economics Discussion Series 2021-033 (May). Board of Governors of the Federal Reserve System.

Ng, M., and D. Wessel (2018, October 22). The Hutchins Center Explains: The Neutral Rate of Interest. Blog. Brookings Institution. <<https://www.brookings.edu/blog/up-front/2018/10/22/the-hutchins-center-explains-the-neutral-rate-of-interest/>>, as of January 31, 2023.

Orphanides, A. (2013). *Is Monetary Policy Overburdened?* Working Paper Number 435 (December). Bank for International Settlements.

Orphanides, A. (2015). Fear of Liftoff: Uncertainty, Rules, and Discretion in Monetary Policy Normalization. *Federal Reserve of St. Louis Review* (Third Quarter): 173-196.

Poloz, S. (2017). The Meaning of “Data Dependence”: An Economic Progress Report. Remarks to the St. John’s Board of Trade (September 27). <<https://www.bankofcanada.ca/2017/09/meaning-data-dependence-economic-progress-report/>>, as of January 31, 2023.

Potter, S., and F. Smets (2019). *Unconventional Monetary Policy Tools: A Cross-Country Analysis*. Working Paper Number 63 (October). Bank for International Settlements, Committee on the Global Financial System. <<https://www.bis.org/publ/cgfs63.pdf>>, as of January 31, 2023.

Powell, J.H. (2019). Data-Dependent Monetary Policy in an Evolving Economy. Speech given by the Federal Reserve Chairman at *Trucks and Terabytes: Integrating the “Old” and “New” Economies*, 61st Annual Meeting of the National Association for Business Economics, Denver, Colorado, 8 October. Board of Governors of the Federal Reserve System. <<https://www.federalreserve.gov/newsevents/speech/powell20191008a.htm>>, as of January 31, 2023.

Ramey, V. (2015). Macroeconomic Shocks and Their Propagation. In John B. Taylor and Harald Uhlig (eds.), *Handbook of Macroeconomics*, volume 2, (Elsevier): 71-162.

Ravenna, F., and M. Molbak Ingholt (2021). The Impact of Inflation Targeting: Testing the Good Luck Hypothesis. *Canadian Journal of Economics* 54, 1: 433-470.

Reis, R. (2022). The Burst of High Inflation in 2021-22: How and Why Did We Get There? In M.D. Bordo, J.H. Cochrane, and J.B. Taylor (eds.), *How Monetary Policy Got Behind the Curve – and How to Get Back* (Hoover Institution Press): 203-242.

Rendell, M. (2022, November 15). Bank of Canada Poised to Lose Money For the First Time on Rising Interest Expenses. *Globe and Mail*. <<https://www.theglobeandmail.com/business/article-bank-of-canada-losing-money-interest-rates/>>, as of January 31, 2023.

Rogers J.H., C. Scotti, and J.H. Wright (2014). *Evaluating Asset-Market Effects of Unconventional Monetary Policy: A Cross-Country Comparison*. International Finance Discussion Papers No. 1101. Board of Governors of the Federal Reserve System. <<https://www.federalreserve.gov/pubs/ifdp/2014/1101/ifdp1101.pdf>>, as of January 31, 2023.

Romelli, D. (2022). The Political Economy of Reforms in Central Bank Design: Evidence from a New Dataset. *Economic Policy* 37, 112: 641-688. <<https://doi.org/10.1093/epolic/eiac011>>, as of January 31, 2023.

Rogoff, K. (1985). “The Optimal Degree of Commitment to an Intermediate Monetary Target. *Quarterly Journal of Economics* 100 (November): 1169-1189.

Sastry, P. (2018). The Political Origins of Section 13(3) of the Federal Reserve Act. *Federal Reserve Bank of New York Economic Policy Review* (September): 1-33. <https://www.newyorkfed.org/medialibrary/media/research/epr/2018/epr_2018_political-origins_sastry.pdf>, as of January 31, 2023.

Schwartz, A. (1995). Why Financial Stability Depends on Price Stability. *Economic Affairs* 15 (September): 21-25. <<https://doi.org/10.1111/j.1468-0270.1995.tb00493.x>>, as of January 31, 2023.

Shapiro, A. (2022). Decomposing Supply and Demand Driven Inflation. Working paper 2022-18 (October). Federal Reserve Bank of San Francisco. <<https://www.frbsf.org/economic-research/publications/working-papers/2022/18/>>, as of January 31, 2023.

Shirakawa, M. (2021). *Turbulent Times*. Yale University Press.

Siklos, P.L. (2021). Looking Through and Past COVID-19: Do Spillovers Matter? *Monetary Dialogue Papers* 21 (June). <https://www.europarl.europa.eu/cmsdata/235686/01_CASE_formatted.pdf>, as of January 31, 2023.

Stock, J.H., and M.W. Watson (2003). Has the Business Cycle Changed? Proceedings of the Economic Policy Symposium *Monetary Policy and Uncertainty: Adapting to a Changing Economy* Jackson Hole (Federal Reserve Bank of Kansas City): 9-56.

Summers, L. (2021, February 4). Biden's COVID Stimulus Plan is Admirably Ambitious. But it Brings Home Big Risks, Too. *Washington Post*.

Sutherland, C. (2022). *Forward Guidance and Expectations Formation: A Narrative Approach*. Working Paper Number 1024 (June). Bank for International Settlements.

Swanson, E.T., and J.C. Williams (2014a). Measuring the Effect of the Zero Lower Bound in Yields and Exchange Rates in the U.K. and Germany. *Journal of International Economics* 92, Sup 1: S2-S21.

Swanson, E.T., and J.C. Williams (2014b). Measuring the Effect of the Zero Lower Bound on Medium- and Longer-Term Interest Rates. *American Economic Review* 104, 10: 3154-3185.

Taylor, John B. (2007). Housing and Monetary Policy. NBER Working Paper Series 13682. In *Housing, Housing Finance, and Monetary Policy*, Jackson Hole Economic Policy Symposium (Federal Reserve Bank of Kansas City): 463-476.

Taylor, J. (1993). Discretion Versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy* 39: 195-214.

Timiraos, N. (2018, October 2). Jerome Powell's Effort to Blur "Neutral" Gains a Prominent Supporter. *Wall Street Journal*. <<https://www.wsj.com/articles/jerome-powells-effort-to-blur-neutral-gains-a-prominent-supporter-1538474401>>, as of January 31, 2023 [paywall].

Weale, M., and T. Wieladek (2016). What Are the Macroeconomic Effects of Asset Purchases? *Journal of Monetary Economics* 79: 81-93.

Wessel, D. (2022, March 9). Three Experts on the Monetary Policy Challenges the Fed Now Faces. *Up Front*. Brookings Institution. <<https://www.brookings.edu/blog/up-front/2022/03/09/three-experts-on-the-monetary-policy-challenges-the-fed-now-faces/>>, as of January 31, 2023.

Withers, T. (2022, July 25). New Zealand Treasury Begins Payments to Offset RBNZ QE Losses. *Bloomberg News*. <<https://www.bloomberg.com/news/articles/2022-07-26/new-zealand-treasury-begins-payments-to-offset-rbnz-qe-losses>>, as of January 31, 2023.

Woodford, M. (2021a). *Effective Demand Failures and the Limits of Monetary Stabilization Policy*. Working Paper (September 19). Columbia University.

Woodford, M. (2001b). Monetary Policy in the Information Economy. Proceedings of the Economic Policy Symposium, *Economic Policy for the*

Information Economy, Jackson Hole (Federal Reserve Bank of Kansas City): 297-370.

Yu, E. (2016). Did Quantitative Easing Work? *Federal Reserve Bank of Philadelphia Economic Insights* First Quarter: 5-13. <https://www.philadelphiafed.org/-/media/frbp/assets/economy/articles/economic-insights/2016/q1/eiq116_did-quantitative_easing_work.pdf>, as of January 31, 2023.

Zhang, X. (2021). *Evaluating the Effects of Forward Guidance and Large-Scale Asset Purchases*. Staff Working Paper 2021-54 (November). Bank of Canada.

About the author



Pierre L. Siklos

Pierre L. Siklos, Ph.D., specializes in macroeconomics, with an emphasis on the study of central banks. His research has been published in several international journals. His research has been funded by domestic and international agencies. In 1999, he was an Erskine Fellow at the University of Canterbury in New Zealand, and in 2009 he was a William Evans Fellow at the University of Otago in New Zealand. Pierre was Wilfrid Laurier University's (WLU's) University Research Professor for the academic year 2000–2001, and a member of the Czech National Bank's Research Advisory Committee between 2012 and 2018. In 2008-9, Pierre held the chair of the Bundesbank Foundation of International Monetary Economics at the Freie Universität Berlin in Germany. He is a guest professor at the Westfälische Wilhelms-Universität Münster in Germany, a research fellow at Stellenbosch University in South Africa, and was the Fondation France-Japon/Banque de France Fellow for 2021–2022.

Acknowledgments

The author gratefully acknowledges comments from the editor and three anonymous reviewers for their helpful comments and suggestions. This paper was written at the invitation of the Fraser Institute. As the researcher has worked independently, the views and conclusions expressed in this paper do not necessarily reflect those of the Board of Directors of the Fraser Institute, the staff, or supporters.

Results that could not be included are available as separate figures upon request.

Publishing information

Distribution

These publications are available from <<http://www.fraserinstitute.org>> in Portable Document Format (PDF) and can be read with Adobe Acrobat® or Adobe Reader®, versions 8 or later. Adobe Reader® DC, the most recent version, is available free of charge from Adobe Systems Inc. at <<http://get.adobe.com/reader/>>. Readers having trouble viewing or printing our PDF files using applications from other manufacturers (e.g., Apple's Preview) should use Reader® or Acrobat®.

Ordering publications

To order printed publications from the Fraser Institute, please contact:

- e-mail: sales@fraserinstitute.org
- telephone: 604.688.0221 ext. 580 or, toll free, 1.800.665.3558 ext. 580
- fax: 604.688.8539.

Media

For media enquiries, please contact our Communications Department:

- 604.714.4582
- e-mail: communications@fraserinstitute.org.

Copyright

Copyright © 2023 by the Fraser Institute. All rights reserved. No part of this publication may be reproduced in any manner whatsoever without written permission except in the case of brief passages quoted in critical articles and reviews.

Date of issue

April 2023

ISBN

978-0-88975-724-0

Citation

Pierre L. Siklos (2023). *Central Bank Forays into Unconventional Monetary Policies: Explanation, Assessment, and Implications*. Fraser Institute. <<http://www.fraserinstitute.org>>.

Supporting the Fraser Institute

To learn how to support the Fraser Institute, please contact

- Development Department, Fraser Institute
Fourth Floor, 1770 Burrard Street
Vancouver, British Columbia, V6J 3G7 Canada
- telephone, toll-free: 1.800.665.3558 ext. 548
- e-mail: development@fraserinstitute.org
- website: <<http://www.fraserinstitute.org/donate>>

Purpose, funding, and independence

The Fraser Institute provides a useful public service. We report objective information about the economic and social effects of current public policies, and we offer evidence-based research and education about policy options that can improve the quality of life.

The Institute is a non-profit organization. Our activities are funded by charitable donations, unrestricted grants, ticket sales, and sponsorships from events, the licensing of products for public distribution, and the sale of publications.

All research is subject to rigorous review by external experts, and is conducted and published separately from the Institute's Board of Trustees and its donors.

The opinions expressed by authors are their own, and do not necessarily reflect those of the Institute, its Board of Trustees, its donors and supporters, or its staff. This publication in no way implies that the Fraser Institute, its trustees, or staff are in favour of, or oppose the passage of, any bill; or that they support or oppose any particular political party or candidate.

As a healthy part of public discussion among fellow citizens who desire to improve the lives of people through better public policy, the Institute welcomes evidence-focused scrutiny of the research we publish, including verification of data sources, replication of analytical methods, and intelligent debate about the practical effects of policy recommendations.

About the Fraser Institute

Our mission is to improve the quality of life for Canadians, their families, and future generations by studying, measuring, and broadly communicating the effects of government policies, entrepreneurship, and choice on their well-being.

Notre mission consiste à améliorer la qualité de vie des Canadiens et des générations à venir en étudiant, en mesurant et en diffusant les effets des politiques gouvernementales, de l'entrepreneuriat et des choix sur leur bien-être.

Peer review—validating the accuracy of our research

The Fraser Institute maintains a rigorous peer review process for its research. New research, major research projects, and substantively modified research conducted by the Fraser Institute are reviewed by experts with a recognized expertise in the topic area being addressed. Whenever possible, external review is a blind process. Updates to previously reviewed research or new editions of previously reviewed research are not reviewed unless the update includes substantive or material changes in the methodology.

The review process is overseen by the directors of the Institute's research departments who are responsible for ensuring all research published by the Institute passes through the appropriate peer review. If a dispute about the recommendations of the reviewers should arise during the Institute's peer review process, the Institute has an Editorial Advisory Board, a panel of scholars from Canada, the United States, and Europe to whom it can turn for help in resolving the dispute.

Editorial Advisory Board

Members

Prof. Terry L. Anderson

Prof. Robert Barro

Prof. Jean-Pierre Centi

Prof. John Chant

Prof. Bev Dahlby

Prof. Erwin Diewert

Prof. Stephen Easton

Prof. J.C. Herbert Emery

Prof. Jack L. Granatstein

Prof. Herbert G. Grubel

Prof. James Gwartney

Prof. Ronald W. Jones

Dr. Jerry Jordan

Prof. Ross McKittrick

Prof. Michael Parkin

Prof. Friedrich Schneider

Prof. Lawrence B. Smith

Dr. Vito Tanzi

Past members

Prof. Armen Alchian*

Prof. Michael Bliss*

Prof. James M. Buchanan*†

Prof. Friedrich A. Hayek*†

Prof. H.G. Johnson*

Prof. F.G. Pennance*

Prof. George Stigler*†

Sir Alan Walters*

Prof. Edwin G. West*

* deceased; † Nobel Laureate