

A PRIMER ON INFLATION

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Executive Summary

Somewhat over 40 percent of Canada's current population was born after 1988. Therefore, a substantial proportion of Canadians did not personally experience the prolonged episode of global inflation running from the mid-1970s to the mid-1980s. Indeed, the media has basically ignored inflation over the past 30 years, decades that, until recently, have been marked by low and relatively stable inflation. The sharp increase in the rate of inflation over the past year has brought this public policy issue back to the public's attention.

While dramatic increases in housing prices across Canada over the past two years have arguably received the lion's share of media attention to economic issues, rising prices for food, automobiles, and gasoline have also captured public attention and raised awareness among Canadians of the broad-based nature of recent price increases. In response to the recent and persistent rise in inflation, the Bank of Canada raised its policy interest rate in March 2022 by 25 basis points or a quarter of one percent. It also announced other measures to tighten domestic credit conditions as steps toward restoring relative price stability. A large percentage of Canadians have not faced a prolonged period of rising interest rates, including mortgage rates, which reached double-digit levels in the late 1970s and early 1980s. The possibility that economic conditions might repeat those of the 1970s and 1980s is a cause for genuine concern as current inflation conditions prove to be much worse than monetary authorities and private sector economists foresaw at the start of the COVID-19 epidemic.

As participants in the economy as consumers, investors, labour force participants, and voters, Canadians should be adequately informed about the important issues surrounding inflation, particularly as it emerges as a public policy issue of pressing concern. These issues include the accuracy and reliability of standard measures of inflation, the causes and consequences of inflation, and the monetary and fiscal policy instruments used to moderate inflation. This primer is meant to provide an overview and analysis of these important issues, hopefully in a manner accessible to non-technical readers.

Inflation refers to a general increase in the prices of goods and services in an economy. The principal measure of inflation is the Consumer

Price Index (CPI). Controversy has surrounded the accuracy of the CPI, including concerns about excluded services such as government-funded health care, as well as the need to adjust for changes over time in the quality of the goods and services it includes. However, available studies tend to conclude that corrections made to adjust for quality changes succeed in mitigating any significant upward or downward bias in the CPI measure.

Inflation in Canada averaged 8.1 percent per year from 1971 to 1980 and 6 percent per year from 1981 to 1990. It then averaged 1.88 percent per annum from 1991 to 2020 only to increase to 3.4 percent in 2021. More recently, the annualized rate of inflation reached 5.1 percent in January 2022, the highest rate since 1991.

Inflation occurs when the aggregate demand for goods and services in the economy exceeds the capacity of the economy to meet that demand at the current price level. Aggregate demand is a function of the outstanding money supply and the rate at which the money supply turns over, i.e., the velocity of money. To illustrate, if the outstanding money supply equals \$1,000 and the velocity of money equals 2, aggregate demand (or aggregate spending) will equal \$2,000. Other things constant, an increase in the money supply contributes to an increase in aggregate demand, as does an increase in the velocity of money.

The potential output of an economy is a function of the total number of hours worked and the real output produced per hour worked (also called the average productivity of labour). All else constant, a decrease in the total number of hours worked and/or a decrease in the average productivity of labour will contribute to a decrease in an economy's potential output.

Empirical evidence supports the relevance of changes in the money supply, changes in velocity, and changes in potential output as determinants of inflation over time. For example, the sharp spike in the price of crude oil in the mid-1970s was an important spur to inflation, while a marked decline in the velocity of money contributed to relative price stability over the past two decades. The growth of the money supply was also an important contributor to inflation in the 1970s and 1980s, and the very rapid growth of the money supply since the outset of the COVID-19 pandemic has certainly contributed to the current inflation problem.

While most economists believe that a low and stable rate of inflation should be the goal of policymakers, there is no agreed-upon optimal rate of inflation. The Bank of Canada has a target for inflation of 2 percent per annum within a band of 1 percent to 3 percent, and the 2 percent per annum policy target is shared by several other central banks. A relatively low and stable rate of inflation enables the price system to play its role of signaling when the output of specific products should be increased while

others should be decreased. When prices increase broadly because of inflation, “noise” is introduced into the price signaling system, particularly because inflation does not cause prices to rise at the same pace in all product markets. Misleading price signals contribute to reduced economic efficiency.

Modest and steady inflation also minimizes the redistribution of income and wealth that result in windfall gains for some and windfall losses for others. In this regard, governments are typically major financial beneficiaries of inflation given that a significant portion of the tax base is not indexed to the rate of inflation. As a result, productive resources are transferred from the private sector to the public sector, which further harms productivity growth.

Monetary policy has been the traditional policy tool to maintain low and stable inflation. Until recently, concerns about slow economic growth following the 2007-2008 financial crisis and the COVID epidemic of 2020 have encouraged central banks to keep real interest rates near zero and to ensure easy credit conditions for borrowers including governments. As the traditional policy instrument, i.e., the central bank’s lending rate, approached zero, the Bank of Canada and the US Federal Reserve implemented new policy instruments including quantitative easing and forward guidance. The former involves the central bank buying large quantities of government bonds and mortgages to hold on its balance sheet. The latter encompasses regular public announcements by the central bank of its future policy intentions with respect to monetary policy. As it confronts a renewed inflation problem, the Bank of Canada has begun to increase its policy interest rate, while announcing that it is pausing quantitative easing. Whether the measures to be taken will be sufficiently robust to restore relative price stability is a major question for Canadian businesses and households.

Introduction

Recent inflation data have resurrected the salience of inflation as a public policy issue. Specifically, after averaging increases of 1.88 percent per annum from 1991 to 2020 in the most common measure of inflation (the Consumer Price Index or the CPI), Canada's inflation rate increased by 3.4 percent in 2021. After consistently maintaining that inflation increases seen in early 2021 were transitory and primarily the consequence of COVID-related global supply chain disruptions, the Bank of Canada recently signaled that interest rate increases were on the way and that it will begin reducing its holdings of government bonds, which will add to monetary tightening. In response, some economists and business analysts worry about the Bank of Canada responding too aggressively to the recent increase in inflation and pushing the economy into recession (Globerman, 2022).¹

The “appropriate” policy response to the increase in inflation is conditioned by several factors including the underlying determinants of inflation as well as the economic and social consequences of persistent inflation above the 2 percent per annum inflation rate that the Bank of Canada and the federal government have agreed should be the Bank's target.² Given that the increase in the CPI in December 2021 was 4.8 percent compared to the CPI in December 2020, followed by a January 2022 reading of 5.1 percent annualized, the recent rate of inflation is clearly beyond the upper limit of the Bank of Canada's acceptable range.³ Hence, while there is a broad consensus among economists and policymakers that the Bank of Canada should tighten monetary policy to slow inflation, there is

¹ The Bank of Canada raised its policy interest rate in March 2022 by 25 basis points.

² The Bank of Canada and the federal government must agree to a monetary accord every five years that sets out the Bank's monetary policy objectives. In December 2021, the monetary policy framework was renewed for the 2022-2026 period. Under the renewed agreement, the cornerstone of the Bank's monetary policy framework remains an inflation target of 2 percent inside a range of 1 percent to 3 percent (see Bank of Canada, 2021).

³ For current and historical data on Canada's rate of inflation, see Statistics Canada (undated).

less agreement about how quickly and aggressively monetary policy should be tightened and, indeed, about whether reducing the overall demand for goods and services in the economy through higher interest rates and other monetary policy measures will significantly reduce inflation.⁴

Since Canadians have experienced quite moderate inflation over the past three decades, particularly as compared to the 1970s and 1980s, there has not been much discussion in the media about inflation. Hence, much of the emerging debate about whether recent inflation is a serious and durable problem and what, if anything, the policy response should be, is new to most Canadians. This primer is meant to address knowledge gaps about the inflation process that may exist given that sharply rising inflation is a new phenomenon for most Canadians.

The primer proceeds as follows. The next section identifies various measures of inflation. The section after discusses the mechanics of how inflation is measured and the accuracy of the main measure of inflation, i.e., the Consumer Price Index. The paper then presents data summarizing the inflation performance of the Canadian economy and other developed economies from 1971 to the present. A discussion of the conceptual determinants of inflation follows. The next section addresses issues raised by inflation and the notion of an optimal rate of inflation and then identifies and considers the challenges to maintaining a low and stable inflation rate. The final section provides concluding comments.

⁴ Skeptics argue that the recent acceleration of inflation largely reflects bottlenecks in producing and delivering goods and services, i.e., supply-side constraints, which should be addressed by other policy measures such as encouraging more people to participate in the labour market.

What is Inflation?

Inflation refers to a general increase in the prices of goods and services. The principal measure of inflation is the Consumer Price Index (CPI). In Canada, inflation is measured by Statistics Canada, which produces the CPI each month by measuring the prices of a basket of goods and services that consumers purchase. The basket contains quantities of specific goods and services weighted according to how much consumers buy of each item in the basket on average. Statistics Canada periodically changes what is in the basket to reflect evolving consumer purchasing patterns. The goods and services in the CPI basket are divided into eight major components: food; shelter; household operations, furnishings, and equipment; clothing and footwear; transportation; health and personal care; recreation, education and reading; and alcoholic beverages, tobacco products, and recreational cannabis.⁵

While the CPI is the “headline” measure of inflation at the consumer level, the Bank of Canada calculates other measures of consumer inflation to guide the Bank’s monetary policy decisions. These alternative measures are meant to mitigate the volatility of specific components of the CPI, which, in turn, reflect economic developments that are specific to particular products, especially food and energy. In setting monetary policy, the Bank seeks to look through transitory movements in the overall CPI linked primarily to developments in a relatively narrow set of markets in order to focus on so-called core inflation measures that arguably better reflect the underlying trend of inflation.

The Bank of Canada calculates three measures of core consumer inflation. The CPI-trim excludes CPI components whose rates of change in a given month are located in the tails of the distribution of price changes. Specifically, it excludes 20 percent of the weighted monthly price variations at both the bottom and the top of the distribution of price changes. Thus, it removes 40 percent of the total CPI basket. The CPI-median measures core inflation corresponding to the price change located at the

⁵ For a description of the CPI components, see the Consumer Price Index Portal at Statistics Canada (Undated).

50th percentile (in terms of CPI basket weight) of the distribution of price changes in a given month. Finally, the CPI-common index tracks price changes across categories in the overall CPI basket using a statistical procedure to detect common variations and filter out price movements caused by factors specific to certain components.⁶ Since core CPI measures effectively reduce the weightings of components experiencing relatively sharp price increases, they tend to report lower inflation than the overall CPI reports. However, the various CPI measures tend to exhibit broadly similar trends over time (Haubrich and Millington, 2014).

Measures of inflation are also reported at the producer level. Producer prices are the prices at which businesses sell their products or services to those other than final consumers, including government and other businesses. The best-known measure of inflation at the producer level is the Producer Price Index (PPI), which tracks the average change in prices that Canadian producers receive or pay for goods and services over time. In addition to the PPI, there are numerous more specialized price indexes including, for example, those for residential and non-residential building construction, industrial products, and commercial and industrial machinery.⁷

Price changes at the producer level are often taken to be leading indicators of price changes at the consumer level, since increases in prices for goods and services purchased by producers can be expected to be passed along to consumers over time. Nevertheless, since expenditures by households comprised 57.4 percent of Canada's Gross Domestic Product (GDP) in 2020, price changes at the consumer level are the single broadest source of economic inflation. The CPI is also widely used to adjust contracted payments such as wages, rents, leases, and child or spousal support allowances. Private and public pension programs (Old Age Security and the Canada Pension Plan), personal income tax deductions, and some government social payments are also escalated using the CPI.

⁶ These various core CPI indices are described in detail in Statistics Canada (2021b).

⁷ For a description of price indices at the producer level, see Statistics Canada (undated)

The Accuracy of the CPI

Controversy about the accuracy of the CPI has existed for decades. Specifically, arguments continue to be made that the CPI overstates or understates inflation.⁸ To better appreciate the arguments, it is useful to briefly review how the CPI is actually constructed and the issues that intrude into the construction process.⁹

The universe of goods and services that forms the basis for the samples that are chosen to create the broad CPI consists of all consumer goods and services that can be associated with a retail price. Therefore, many public goods and services provided by governments and for which there is no market price are excluded. A prominent example is health care services obtained through provincial health insurance systems. Prices used in the CPI are final prices paid by consumers, after discounts, but inclusive of excise and sales taxes and any other indirect taxes that consumers pay.¹⁰

The CPI price sample is obtained from a selection of geographical areas, representative goods and services, and types and locations of retail outlets. Nearly 700 goods and services represent the price movements in 179 basic categories of goods and services. Almost all prices are collected from retail outlets or from local, regional, or provincial agencies. Rent quotes are collected from tenants. The annual sample for the broad CPI consists of over one million price quotes, a portion of the total priced transactions at the consumer level. Statistics Canada collects the prices of most surveyed goods and services monthly.

Since new goods and services are constantly being introduced and older goods and services are purchased less frequently or disappear entirely, the CPI basket shares are normally updated at two-year intervals. Statistics Canada makes adjustments to the price data it collects to reflect changes in the characteristics of surveyed products such as package sizes and quality changes. The appropriate adjustment for changing qualities

⁸ For an overview of this debate, see Palmer (2021, July 23).

⁹ The discussion of the construction of the broad CPI is taken from Statistics Canada (2022a).

¹⁰ Indirect taxes are taxes that are built into the prices consumers pay for goods and services.

of surveyed goods and services is, perhaps, the greatest challenge to obtaining relative accurate measures of inflation. While changes in packaging size and quantity volumes are relatively straightforward to detect, identifying changes in other attributes such as reliability and performance are more challenging. Nevertheless, available studies tend to conclude that corrections for quality changes do not impart any significant upward or downward bias in the CPI measure (Reed and Rippy, 2012).

Other potential sources of bias in the CPI estimates are sampling error, substitution away from higher priced to lower priced goods, and the appearance of new goods in consumers' baskets. Sampling error is related to the fact that the CPI does not measure the prices of all goods and services that consumers purchase. Hence, the sampling error is the difference between the actual CPI estimate and what the estimate would be if the CPI incorporated all prices. The sampling error for annual changes across the entire sample of surveyed prices is considered to be quite small, although sampling errors are larger for smaller geographic regions and smaller CPI categories (Statistics Canada, 2022).¹¹

The CPI is adjusted to reflect substitution within item categories, e.g., substitution of chicken for red meat by consumers, given changes in relative prices of goods within an item category; however, it does not attempt to adjust for possible substitution across item categories, e.g., chicken for bread. The composition of the surveyed consumer basket is updated regularly to account for new items available to consumers. To be sure, underestimating the substitution of goods and services whose prices are rising relatively slowly for goods and services whose prices are rising relatively rapidly, as well as lags in incorporating new products into the consumer CPI basket, probably result in some secular overestimations of inflation.¹² Notwithstanding that, the general assessment among experts is that the accuracy of Canada's CPI estimates is quite high and certainly sufficiently accurate for most practical purposes (International Monetary Fund, 2003).¹³

¹¹ The CPI is also a more accurate indicator of price change over several months or over a year compared to its accuracy using month-to-month comparisons.

¹² New goods often move down in price after they are introduced (Reed and Rippy, 2012).

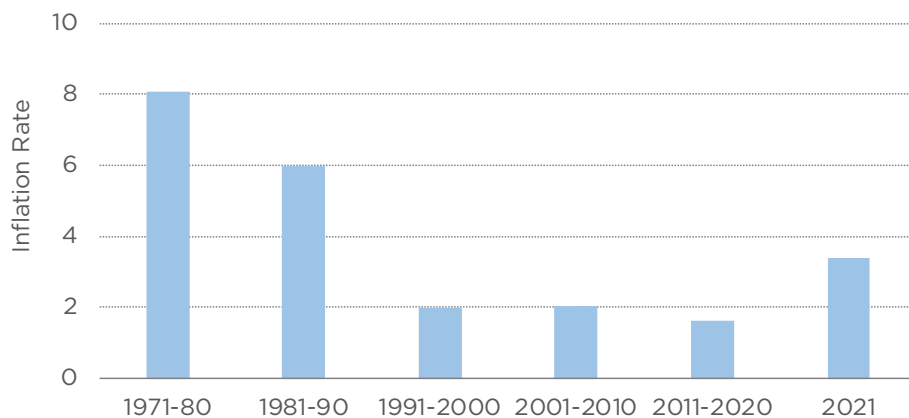
¹³ A more critical assessment of the accuracy of the CPI in the United States is provided in a US-government commissioned report commonly referred to as the Boskin Commission Report. It concluded that the range of plausible upward bias in the US CPI is 0.8 to 1.6 percentage points per year. See United States Senate, Committee on Finance (1996).

Canada's Inflation Performance

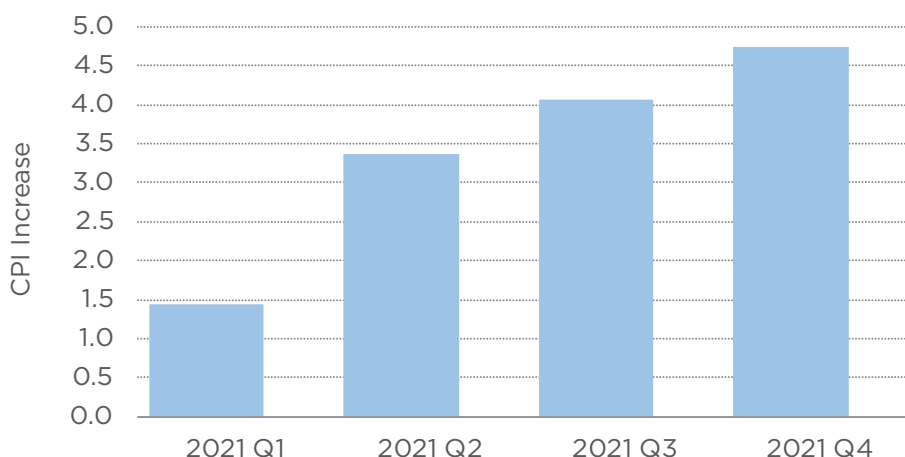
As noted earlier, Canadians born after 1990 have never personally experienced inflation rates significantly above 2 percent per annum prior to 2021, as figure 1 shows. The average annual rate of inflation from 1991 through 2020 was 1.88 percent, a sharp decline from the average annual inflation rates during the 1970s and 1980s. Indeed, the annual rate of inflation of 3.4 percent in 2021 is only modestly above the Bank of Canada's target range of 1 percent to 3 percent, which seems to suggest that current concerns about accelerating inflation are overstated. However, as figure 2 shows, the rate of inflation increased in each quarter of 2021 such that the rates in the second through fourth quarters exceeded the upper limit of the Bank of Canada's target range. This acceleration continued into 2022, as the annualized rate of inflation increased to 5.1 percent in January 2022.

A relevant feature of Canada's inflation experience from 1971 to the present is that it is broadly similar to the inflation experiences of other developed countries. Indeed, Canada has enjoyed a modestly lower inflation

Figure 1: Average Annual Inflation Rate—Canada's CPI



Source: Statistics Canada, 2022a.

Figure 2: Annualized Rates of Inflation, 2021

Source: Statistics Canada, 2022a.

rate than virtually all other developed countries over that period as illustrated by the data reported in table 1. Specifically, while the rate of inflation in the US was lower than in Canada over the 1970s and 1980s, Canada generally had the lowest rate of inflation across all developed countries in the post-2001 period.

The data in table 1 highlight an important feature of inflation. Namely, inflation tends to follow a similar path across developed economies. The potential reasons for this will be touched on in the next section, which deals with the causes of inflation. Briefly put here, disruptions to production stemming from higher raw material prices, most notably a major spike in oil prices from 1974 through the early 1980s, affected all developed economies and contributed to inflation by reducing the capacities of those economies to produce output. As a consequence, increases in the demand for goods and services contributed to greater increases in the prices of goods and services than would have been the case had oil prices not increased so dramatically in the mid-1970s. As well, given the international mobility of capital, monetary policies in developed economies tend to be linked since significant departures from the general international pattern of interest rates by any individual country can be expected

Table 1: Average Annual Inflation Rates (CPI)

	Canada	US	UK	OECD Europe	OECD Total
1971-1980	8.06	7.88	13.8	11.33	9.99
1981-1990	5.99	4.73	6.16	8.36	8.99
1991-2000	1.99	2.8	2.94	6.95	4.83
2001-2010	2.03	2.39	2	2.92	2.45
2011-2020	1.62	1.73	1.92	2.08	1.84
2021	3.4	4.7	2.5	4.1	4

Source: OECD.Stat (Undated).

to result in inflows or outflows of capital that lead, in turn, to substantial upward or downward pressure on that country's exchange rate with accompanying destabilizing macroeconomic impacts.

The Conceptual Determinants of Inflation

While some inflationary shocks, such as a drought that causes sharply higher food prices or disruptions to the supply of crude oil that contribute to upward spikes in the price of crude oil products, are fundamentally unpredictable short-run events, there are longer-run factors influencing inflation that should be identified in any discussion of the determinants of inflation. Notwithstanding the fact that investors and economic researchers have found it difficult to predict inflation rates accurately, the fundamental factors that determine the rate of inflation are well known and are captured in what is called the Equation of Exchange.¹⁴

The Equation is:

$$M \times V = P \times T$$

The variables are defined as follows: M is the money supply; V is the velocity of money; P is the price level; and T represents aggregate transactions in the economy. Rearranging the terms isolates the relationship between the price level and the other variables in the Equation:

$$P = M \times V/T$$

The money supply

There are relatively narrow and relatively broad definitions of the money supply depending upon whether one includes interest-bearing assets such as money market deposits in the definition. For the purposes of this discussion, the precise definition of the money supply is not of particular concern. As a practical matter, most contemporary analyses drawing on the Equation use the M2 definition of the money supply, which includes cash, chequing account balances, and interest-bearing savings, money market account balances, and other time deposits. An increase in the

¹⁴ The Equation of Exchange will henceforth be referred to as the Equation. It is also frequently referred to as the Quantity Theory of Money. The discussion of the Equation is taken largely from Globberman (2021a).

Table 2: Annual Average Percentage Change in M2

	Canada	US
1971-90	31.9	9.8
1981-90	15.3	7.7
1991-2000	3.7	4.9
2001-2010	10.2	6.2
2011-2020	10.5	6.2
2021	7.5	13.1

Source: Author's calculations from Statistics Canada (2022b) and Globerman (2021a).

money supply, other things constant, represents an increase in the financial capacity of households, businesses, and governments to increase their demand for goods and services. If the economy's capacity to provide goods and services does not increase commensurately with an increase in aggregate demand, the price level will increase.

Table 2 reports the percentage increase in Canada's M2 money supply for the decades from 1971 to 2020, as well as for 2021. Given the importance of the US dollar as the world's dominant reserve currency, table 2 also reports the growth of the US M2 money supply over the same period. When comparing the data reported in tables 1 and 2, it is clear that the decades of the 1970s and 1980s experienced both the fastest rates of growth of M2 and the highest average annual rates of inflation in both Canada and the US prior to 2021. The broad correspondence between the rate of growth of the money supply and the rate of inflation supports the insight from the Equation that the rate of growth of the money supply is a potentially important factor conditioning the rate of inflation.

Milton Friedman (1970) famously said that inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in real output. Within the framework of the Equation, a change in M will translate into a commensurate change in P unless the change in M is offset by a change in either V or T. Friedman (1968) emphasized the existence of time lags between changes in M and changes in P. According to Friedman, inflationary consequences of rapid money supply growth will certainly begin to be manifested within one or two years, other factors in the Equation being constant.

Over the approximately five decades since Friedman's assertion of the dominant role of money supply growth in the inflation process, his thesis has been challenged on both theoretical and empirical grounds. While it is beyond the scope of this essay to review the relevant literature in any detail, a major conceptual objection is that changes in M are as likely to be a consequence of changes in P as they are to be a cause of changes in P .¹⁵ For example, Harvey (2011) describes how the sharp increase in the price of oil in the 1970s and early 1980s led to an increase in the money supply by increasing the demand for bank loans on the part of businesses to cover their higher operating costs.

The strong empirical relationship between changes in M and changes in P observed over the 1970s and 1980s seems to have weakened in more recent decades, which has been invoked by Friedman's critics as an additional reason to question the strength and reliability of the linkage between M and P in the Equation.¹⁶ While the balance of empirical evidence supports the relevance of changes in M as a factor influencing inflation, the strength of the relationship will be conditioned by changes in V and T , as well. In this regard, decreases in the velocity of money over the past two decades may help explain why inflation in recent decades has been relatively modest, notwithstanding the acceleration in the growth of the money supply in both Canada and the US from 2001 to 2020 compared to the period from 1991 to 2000.

Velocity of money

Another prominent criticism of Friedman's claim that changes in the money supply are the primary cause of inflation is that he assumes the velocity of money—the rate at which money changes hands—is constant over time. The relevance of this assumption can be shown by the following hypothetical example. Imagine an economy in which the total money supply is fixed at \$100 at the start of year one and that, over the course of the year, \$200 of goods and services are purchased. In this case, each dollar of the money supply supports \$2 of expenditures. Equivalently, the velocity of money equals 2. Now imagine that the money supply at the start of year 2 equals \$200 but that, for whatever reason, total expenditures

¹⁵ See Globberman (2021b) for a more extensive discussion of the challenges to Friedman's thesis.

¹⁶ However, the rapid increase in M coincident with an upturn in inflation following the onset of the COVID-19 pandemic has brought attention back to the importance of changes in the money supply as a major cause of inflation. See, for example, Hanke and Hanlon (2022).

Table 3: Average Annual Inflation (%), Average Annual Growth (%) in M2, and Average Velocity of M2, 1971 to 2021, United States

	Inflation	M2	Velocity
1971-1980	7.88	9.78	1.75
1981-1990	4.73	7.71	1.81
1991-2000	2.8	4.99	2.08
2011-2010	2.39	6.15	1.93
2011-2020	1.73	6.2	1.52
2021Q1/Q2	3.39	25.87	1.12

Source: Globberman (2021a).

in year 2 remain at \$200. In this case, the velocity of money equals one. Consequently, the increase in the money supply was not accompanied by an increase in the aggregate demand for goods and services. Hence, if the aggregate supply of output, i.e., the economy's capacity to produce output, did not change between years one and two, there is no reason for the average price level to change.

Table 3 underscores the secular decline in the velocity of money in the US since 2000. The decline in V has been quite dramatic through the first half of 2021 and arguably has provided a counterforce to the growth of M2 since 2000 in terms of M2's impact on inflation. The rapid annualized rate of growth of M2 in the first half of 2021 can be expected to increase inflation sharply going forward unless velocity continues to decrease sharply as well. This raises the important issue of what determines the velocity of money.

Money is used for several purposes. One is to facilitate transactions, i.e., buying goods and services. A second is to serve as a store of value, i.e., to facilitate future purchases of goods, services, and financial or real assets. To the extent that participants in the economy want to delay consumption into the future, a greater share of the money supply will be used as a store of value rather than to facilitate current transactions. As a consequence, the velocity of money will decline. Conversely, if participants in the economy want to increase current expenditures relative to future expenditures, the velocity of money will increase, other things constant. The issue then turns on the factors that influence the incentives of economic participants to accelerate or delay their purchasing decisions.

Several factors conceptually influence the velocity of money. One is expectations of future rates of inflation. If economic participants believe that prices will increase at a faster rate than previously expected, they can be expected to bring forward purchases of goods and services that they might otherwise have waited to purchase. Such expectations can, in turn, become self-fulfilling if increased spending leads to higher future prices. In other words, expectations of accelerating inflation can be expected to increase the turnover rate of the money supply. The important influence that inflation expectations can have on the velocity of money is a prominent justification for central banks to adopt and defend an explicit inflation target in order to anchor the public's expectations about future rates of inflation.

A second important factor influencing the velocity of money is the cost of holding cash balances in bank accounts or in money market (or equivalent) accounts. Higher rates of interest on those accounts effectively encourage holding money as an asset rather than using it to purchase goods, services, or real assets such as real estate.¹⁷ Higher interest rates therefore reduce the velocity of money.

A third factor influencing velocity is the expected real growth rate of the economy. In particular, if businesses anticipate a faster growing economy, they will spend more on capital equipment and other productive assets at the expense of holding liquid financial assets. Similarly, a growing population will stimulate spending on housing and related assets. Hence, when economic activity and population growth rates decline, the velocity of money can be expected to decline, other things constant.¹⁸

Yet a fourth factor affecting the velocity of money is technological change. Specifically, innovations that facilitate faster payment processing reduce the “float” in the banking system enabling money to change hands faster and thereby expedite transacting.¹⁹

Potential output

Changes in aggregate demand will have stronger or weaker influences on inflation depending upon the potential output of the economy. Thus, if

¹⁷ It should be emphasized that the relevant interest rate is the rate net of expected inflation.

¹⁸ Some portion of the decline in velocity in 2020-2021 is undoubtedly the result of the COVID-19 crisis, which encompassed shutdowns to many service businesses and other public health-related constraints on some components of household spending.

¹⁹ Float is the amount of money in the banking system for which payments have been debited but not yet credited to the intended payees' accounts.

the economy's potential output increases commensurately with increases in aggregate demand, the overall price level should remain stable.²⁰ In the short run the economy's potential output might increase as a result of inflation to the extent that wage increases are more than offset by inflation. In this case, employers will hire more workers as real (i.e., inflation-adjusted) wages decline. The assumed negative relationship between inflation and unemployment is known as the Phillips Curve. However, as Friedman (1968) persuasively argued, if inflation exceeds nominal wages over any significant period of time, workers will eventually anticipate such episodes in the future and bargain for wage increases in advance that offset anticipated future inflation.²¹ Friedman's argument, in effect, is that there is no long-run relationship between inflation and unemployment and, therefore, that an economy's potential output cannot be enhanced by tolerating higher rates of inflation.

The potential output of an economy in the long run is a function of the growth of the supply of labour and the growth of labour productivity.²² The growth of labour productivity, in turn, primarily depends on the rate of technological change, although supply disruptions such as sudden increases in the price of raw materials such as crude oil can lead to production bottlenecks that reduce labour productivity.²³ In this regard, Globberman (2021a) reports that the sharp increase in the price of crude oil followed by a decline in the price covering the period from the mid-1970s to the mid-1990s was mirrored by an increase in the rate of inflation followed by a decrease in the rate over that period of time.²⁴

Summary

Empirical evidence supports the practical relevance of M, V, and T as determinants of the rate of inflation. Over the past 50 years, there have been periods when one variable in the Equation has been a more important

²⁰ Potential output should be thought of as the capacity of the economy to meet the demand for real goods and services without experiencing price increases.

²¹ This phenomenon is frequently referred to by economic journalists as a wage-price spiral.

²² Labour productivity is simply real output per hour of labour input.

²³ Technological change reflects the introduction and adoption of new products, new production methods, and new ways of organizing and managing private and public sector enterprises.

²⁴ The simple correlation coefficient between the US benchmark price for crude oil (WTI) and the rate of inflation was a relatively strong .66 over the period from 1971 to 1990.

influence on inflation than the other two variables. However, if the velocity of money reverses its two-decade decline, while an aging and slower or even a non-growing labour force reduces the growth of potential output, the recent rapid increase in the money supply as reported in table 3 will need to slow dramatically if secular inflation above the Bank of Canada's two percent per year target is to be avoided.

Why Is Inflation a Problem?

As noted earlier in the essay, policymakers and the general public are increasingly seeing the current rate of inflation as a problem. A question that might be asked is why an inflation rate of around 2 percent—the midpoint of the Bank of Canada’s target inflation range—and, as shown in figure 1, the approximate average annual rate of inflation from 2011 to 2020, raises no significant policy concerns while the current annual rate of inflation of around 5 percent (at the time of writing) is considered to be a serious problem. A broader question in this context is whether there is an “optimal” rate of inflation, i.e., a rate of inflation that is better than any other rate in promoting the economic welfare of Canadians.

Expected versus unexpected inflation

The answer to either question requires some discussion of the costs (and alleged benefits) of inflation and how those costs and benefits vary with the inflation rate. Before providing any discussion of the consequences of inflation, it is conceptually useful to distinguish between expected and unexpected inflation.²⁵ The essential feature of expected inflation is that economic agents can make appropriate adjustments in their behaviour, including in the prices and wages they charge, to take into account future changes in the overall price level. Conversely, unanticipated inflation implies that economic agents will not have correctly anticipated future changes in the overall price level when offering their goods, services, and labour in the marketplace.

Imagine that the future rate of inflation is anticipated with perfect accuracy by all participants in the economy. In this case, all prices, including the rate of interest, will be set so as to reflect with perfect accuracy the future behaviour of inflation. In this case, inflation-adjusted (or real) prices and wages will reflect the underlying supply and demand conditions for the individual goods and services (including labour services) on offer in the economy. Equivalently, relative prices and wages will not be artifi-

²⁵ The alternative terminology sometimes used is anticipated and unanticipated inflation.

cially distorted by inflation, e.g., buyers and sellers will not confuse general price increases for changes in underlying demand and supply conditions. As a consequence, production and consumption decisions in individual product and labour markets will not be distorted by changes in the overall average price level.²⁶ In this situation, inflation should not promote “overproduction” in some markets and “underproduction” in other markets.

Of course, perfectly expected (or anticipated) inflation is extremely unlikely. Indeed, the evidence is that economic forecasters and participants in financial markets do a relatively poor job in forecasting inflation, even over relatively short periods of time.²⁷ Furthermore, all prices and wages are unlikely to be adjustable at the same pace. For example, the interest rates on fixed rate mortgages cannot be adjusted until those mortgages mature. Hence, if issuers of those mortgages change their expectations about inflation after the mortgages are issued, the real interest rates on those mortgages will decline with inflation until mortgage lenders can reset interest rates to reflect their revised inflation expectations.

The tax system also confounds the adjustment of prices to reflect anticipated inflation. For one, some interest expenditures are an allowable tax deduction by borrowers, while others such as interest on residential mortgages are not. For another, historic (as opposed to market) values are used for deducting capital depreciation allowances and inventory write-downs from income for purposes of calculating taxes due.

The main point to be made here is that for practical purposes, future rates of inflation will be imperfectly anticipated even when those rates are relatively low. Hence, while the consequences of inflation will certainly depend upon how challenging it is for economic agents to forecast inflation and to adjust their behaviour given those forecasts, the distinction between expected and unexpected inflation as it applies to a consideration of the economic consequences of inflation is purely a matter of degree.

Consequences of inflation

Inflation has consequences for both economic growth and for the distribution of income and wealth. The latter consequences have arguably received more attention than the former in previous episodes of significant inflation, as well as the current episode.

²⁶ This assumes that all prices in the economy are affected equivalently by inflation, an issue we will address below.

²⁷ For a discussion of the difficulties in accurately forecasting inflation, even by central bank economists, see Globberman (2021a). For a discussion of expected versus unexpected inflation, see EconPort (2006).

To the extent that segments of society own assets whose nominal value increases with inflation, while other segments do not, inflation will contribute to a transfer of wealth from the latter to the former. For example, over the past two years, residential housing prices have increased dramatically. Some portion of the increase is due to increased inflation, while some is due to increased demand for owner-occupied homes, particularly outside of urban centres and away from rental apartments in downtown areas of cities.²⁸ In the event, owners of private residences enjoyed gains in nominal wealth and even, in many cases, inflation-adjusted wealth. To the extent that renters of housing accommodations did not invest in assets whose values increased with inflation, either because of a lack of savings or because they chose to hold assets whose values are essentially fixed in nominal terms, e.g., savings accounts, their wealth decreased relative to that of homeowners, other things constant.

In a similar manner, segments of society that have taken on debt whose repayment value is fixed in nominal terms benefit from inflation, since the real value of their outstanding debt decreases with inflation. Hence, homeowners with fixed mortgage payments enjoy inflation-related wealth gains not only from the appreciating value of their homes but also from the decreasing inflation-adjusted values of their outstanding mortgages. Conversely, investors in mortgages, either direct investors or those who invest indirectly through share ownership in mortgage-granting financial institutions, suffer decreases in inflation-adjusted wealth as the money they receive when mortgages are repaid will be worth less than when the mortgages were issued.

To the extent that some segments of society have their nominal incomes directly or indirectly tied to the rate of inflation while other segments do not, inflation will contribute to a redistribution of income. For example, individuals who retire with private pension plans whose distributions are fixed in nominal dollars will find that the values of the stream of benefits from their pensions in terms of the goods and services they can buy will erode over time. The erosion can be significant even at relatively low inflation rates. For example, an individual receiving a fixed pension of \$10,000 per year can expect to accumulate an inflation-adjusted sum of \$100,00 after 10 years with zero inflation.²⁹ The total received shrinks to

²⁸ The ability, indeed, the necessity in some cases to work remotely has undoubtedly been an important factor contributing to the increase in demand for owner-occupied residential housing compared to the demand for rental apartment units in cities. Dudi (2022) reports a record number of sales of homes in Canada in 2021 with the national MLS Home Price Index increasing by 25.3 percent in 2021 compared to 2020.

²⁹ For simplicity, a zero real rate of interest is assumed. It is also assumed that the pension is received in a lump sum at year's end.

\$85,302 with three percent per year inflation. In other words, the pensioner loses about \$15,000 of purchasing power over 10 years due to inflation. In this case, the redistribution is from pensioners to the insurance companies and other financial institutions that are the pension fiduciaries.³⁰

Governments are perhaps the single greatest beneficiary of inflation. Since income tax rates are based on nominal incomes rather than real (inflation adjusted) incomes, inflation by itself will move taxpayers into higher tax brackets.³¹ As well, since asset values that are subject to capital gains taxes are not generally indexed to inflation, the appreciated value of capital assets due to inflation will subject taxpayers to greater capital gains tax obligations even though their real net wealth has not necessarily increased. Wealth transfers to government from households and businesses are also likely due to the fact that governments are large net borrowers. To the extent that inflation results in lower real interest rates because the nominal interest rates at the time of debt issuance did not adequately compensate for future inflation, government debt holders will effectively transfer a portion of their income streams from their government debt holdings—in the form of reduced purchasing power from those income streams—to the government that issued the debt.³²

To be sure, some portion of the wealth transfer from households and businesses to government will be directly or indirectly transferred back from government to the private sector in the form of increased transfer payments and (perhaps) increased and improved government services. For example, government pension programs such as the Canada Pension Plan and US Social Security index payments to inflation. Furthermore, government spending on prominent policy envelopes such as health care and education increase with growing government tax revenues. Consequently, there is an indirect redistribution of wealth back from government to segments of society such as retirees and intensive users of public services.

The discussion to this point should make it clear that it is difficult to identify with any precision which segments of society enjoy wealth gains and which suffer wealth losses from inflation on net balance. The conventional wisdom is that inflation is a regressive tax in that lower income individuals generally have limited real assets that can be expected to appreci-

³⁰ Since the wealth value of an asset is essentially the present value of the net income generated by the asset, one can characterize the pension example as a wealth transfer from pensioners to the fiduciaries responsible for distributing the pensions, since the latter will pay out less in inflation-adjusted dollars than they contracted to pay out when their clients paid into the relevant pension plans.

³¹ The personal income tax and most government benefit amounts are indexed to inflation by the federal government, although not by all provinces in Canada.

³² For a discussion of how inflation affects government revenues, see Kupec (2021).

ate in nominal value with inflation, whereas wealthier individuals are more likely to own real estate, equities, and other assets that should increase in nominal value with inflation. While this is undoubtedly the case to some extent, many older and wealthy individuals also hold a substantial share of their assets in bonds and other savings vehicles, either directly or through defined contribution pensions, whose real values will depreciate with inflation as discussed earlier, while young, middle-class households with fixed-rate mortgage debt enjoy real wealth increases from inflation (Doepke and Schneider, 2006).

Even if inflation (implausibly) redistributes income, on balance, from wealthier to poorer individuals and households, it is arguably an inefficient policy instrument by which to achieve a more equal distribution of income and wealth in society.³³ For one thing, it is not a targeted “tax and transfer” program, so that there will be substantial randomness in the redistribution outcomes. More importantly, inflation is a highly distortionary tax compared to other taxes that fund government-mandated redistribution programs. All taxes (including inflation) reduce private sector efficiency by directly transferring resources from the private sector to the public sector and by indirectly reducing incentives to invest. However, inflation is arguably a particularly inefficient tax as it reduces the efficacy of the price system to signal where in the economy productive resources are most beneficially used, and also by diverting the time and attention of economic agents away from productive activities such as innovation and towards identifying and acquiring “inflation-protected” assets, as well substituting relatively high costs methods of carrying out transactions in place of holding and using traditional money balances.³⁴

Arguments have been made that a modest but positive rate of inflation might be economically beneficial.³⁵ One argument is that if a portion of a sovereign government’s debt is held by foreign bondholders, the reduction in wealth associated with a decline in the real value of the debt held by foreigners is a wealth transfer to domestic taxpayers. Of course, one can expect that foreign investors having suffered inflation-related wealth losses in the past will assign higher risk premia to future issues of the relevant government’s debt. This means the sovereign government will

³³ Inflation is also not an explicit and legislated policy instrument to redistribute income or wealth, which is a serious political concern in a democratic society.

³⁴ Concerns about the stability and reliability of sovereign currencies have arguably contributed to the growing usage of crypto currencies which are arguably more costly to produce and use for transactions than is conventional money. For a discussion of the costs of societal efforts to economize on the use of fiat currency in response to inflation, see Cogley (1997).

³⁵ See Schmitt-Grohe and Uribe (2010) for a discussion of these arguments.

need to offer higher interest rates in the future on the debt it issues, other things constant. Indeed, if foreign bondholders become especially suspect of the sovereign government's commitment to relative price stability, the associated higher interest rates over time might well exceed any short-run gains from the devaluation of the inflation-adjusted principal and interest on the outstanding government debt.³⁶

A second argument is that many prices and wages in an economy are “sticky” in that there is a reluctance to lower prices even when supply and demand conditions in specific markets argue for lower prices in order to balance supply and demand. If nominal prices are “fixed,” inflation effectively lowers real prices, thereby substituting for the reductions in nominal prices that should occur if markets were operating efficiently. The degree to which prices are sticky is a debatable issue and will vary across markets for goods, services, and labour. Moreover, to the extent that government regulations, minimum wages, and other indirect price controls contribute to sticky prices, a preferred economic solution is arguably to remove the restrictions to enable the relevant market to better respond to changes in underlying supply and demand conditions in specific markets.

A third argument is that if the overall price level declines, i.e., if there is deflation rather than inflation, consumers and businesses would delay making purchases in anticipation of the relevant goods and services becoming cheaper in the future. The result might be an increase in unemployment and wasteful idle capacity in machinery and equipment. In this narrative, a modest amount of inflation “greases the wheels” of commerce. A challenge to this argument is that if the overall price level declines, the money balances held by economic agents will increase in real value, i.e., the purchasing power of money increases. This real wealth effect should encourage increased spending. A related challenge is that if, for whatever reason, the demand for money in an economy increases, the central bank can (and arguably will) increase the supply of money through expansionary monetary policy to satisfy any temporary increase in the demand for money on the part of economic agents.

A fourth argument for the supposed benefits of “some” inflation appeals to the notion that quality improvements are an ongoing feature of developed economies and that quality improvements (if not matched by higher prices that reflect improved quality) effectively contribute to deflation. If policymakers want price stability, quality improvements that are not passed through in higher prices must be offset by an “appropriate” rate of inflation. However, since quality improvements do not take place at the

³⁶ In a small open economy, such as Canada's, any significant reduction in foreign demand for sovereign debt would contribute to a decrease in the value of the country's currency, which translates into higher costs for imported foreign goods.

same time and to the same degree for all goods and services, an increase in the overall rate of inflation might contribute to “inflation-adjusted price stability” in a relatively small number of markets, while distorting relative prices in large portions of the economy.

A final claimed benefit of rising price levels is that some inflation with accompanying positive interest rates provides the central bank some scope to cut its policy interest rate to stimulate the economy in the event that the unemployment rate increases to an undesirable level.³⁷ While its policy interest rate might be the central bank’s preferred policy tool, any short run reduction in unemployment that directly or indirectly relies upon sustained inflation for success arguably represents an inefficient policy outcome.

The foregoing discussion raises the following question: given the claimed benefits versus costs of inflation, is there some optimal rate of inflation? Put differently, does the Bank of Canada’s target of an average annual rate of 2 percent represent an optimal rate of inflation from the perspective of Canada’s citizenry? The short answer is that most economists favour price stability, although not necessarily absolute price stability, i.e., a zero rate of inflation in perpetuity.³⁸ Economists’ overall more general consensus is that low, stable, and—perhaps most importantly—relatively predictable inflation is good for the economy (Oner, Undated).

In fact, low and stable inflation makes inflation a more predictable (if imperfectly) predictable phenomenon. By way of illustration, when inflation in Canada averaged 6.95 percent annually from 1970 to 1989, the standard deviation of annual inflation was 3.1 percent over that period. By comparison, when inflation averaged 1.99 percent annually from 1990 to 2020, the standard deviation was only 1.01 percent (Globerman, 2022). The lower standard deviation suggests that prediction errors for future inflation are also likely to be smaller. A low rate of inflation is likely to be accompanied by a lower standard deviation simply because of arithmetic, i.e., a series of small numbers will likely have lower absolute variation than a series of large numbers. However, even a series of small numbers can have a relatively large standard deviation as exhibited by recent Canadian inflation. From 1990 to 2020, the standard deviation of inflation was 51 percent of the average annual rate of inflation, whereas it was 45 percent

³⁷ As short-term interest rates approached a zero lower-bound value in 2020, central banks in developed countries, including the Bank of Canada, began buying newly issued government bonds directly from the government to prevent a COVID-induced recession, although the European Central Bank also used negative interest rates to address the economic slowdown.

³⁸ For overall assessments of whether there is an optimal rate of inflation, see Cogley (1997) and Schmitt-Grohe and Uribe (2010).

of the average annual rate of inflation from 1970 to 1989. The point here is that targeting and achieving a stable rate of inflation is economically beneficial, even at relatively low rates of inflation.

In short, a low and stable rate of inflation is an appropriate policy goal primarily because it minimizes distortions to the price system that can have unintended and undesirable impacts on economic growth. As well, low, and stable inflation mitigates windfall transfers of wealth, hence the imperative of the central bank to maintain a low and stable inflation rate in order to anchor public expectations of future inflation to the central bank's target rate.

Challenges to Maintaining a Low and Stable Inflation Rate

The earlier discussion of the determinants of inflation highlights the challenges to maintaining low and stable inflation. In particular, short-term disruptions to potential output, such as the production shutdowns and transportation disruptions during the COVID-19 epidemic, can cause departures from the target inflation rate, particularly if they are accompanied by fiscal policies meant to offset short-run increases in unemployment or other financial hardships to households and businesses. Unanticipated changes in macroeconomic conditions, including shifts in consumer and business confidence, are inevitable, and the goal of the central bank is to signal in a credible manner its commitment to restoring the long-run target rate of inflation, even at the cost of short-run unemployment and excess capacity in the economy in order to maintain well-anchored inflation expectations.

In recent years, central banks have relied on what is known as forward guidance as a tool to anchor inflation expectations (Jackson and Curry, 2022, January 12). Forward guidance has traditionally involved communication by the central bank about the likely path of interest rates, although it also increasingly involves communication about the central bank's plans to either buy or sell government securities, i.e., quantitative easing or tightening.³⁹ By providing information regarding their likely response to economic developments, central banks hope to anchor expectations about the path of interest rates and thereby reduce uncertainty about future rates of inflation (Ehrmann, Gaballo, Hoffman, and Strasser, 2019).

There is controversy surrounding the extent to which forward guidance is a reliable monetary policy tool to anchor inflation expectations and, consequently, to steer economic agents away from behaviour that would promote unwanted changes in the overall price level. Jacobs (2020) asserts that forward guidance by central banks doesn't work because economic agents don't understand the signal that the central bank is giv-

³⁹ The Bank of New Zealand was the first to implement forward guidance by publishing its projections of its policy rate in 1997. Other major central banks implemented forward guidance during the recession of 2007-2008. See de la Barrera, Falath, Henricot, and Vaglio (2017).

ing about the path of future interest rates. For example, not everyone can follow the logic chain that leads from a central banker predicting future decreases in the bank's policy interest rate, to lowering borrowing costs, to higher inflation, and ultimately to the benefit of buying sooner rather than later. In this case, signaling lower interest rates in the future might not stimulate spending, as the signal is intended to do.

A more nuanced view is that specific forms of forward guidance can actually increase uncertainty, particularly if it impairs the aggregation of private information in financial markets. However, if "done right," forward guidance can be a powerful tool to move the behaviour of economic agents in a way to stabilize inflation expectations and, consequently, future rates of inflation. For example, Ehrmann, Gaballo, Hoffman, and Strasser (2019) distinguish between three forms of forward guidance: 1) Open-ended forward guidance when the central bank issues purely qualitative statements about its policy path, e.g., key bank interest rates will remain at lower levels for an extended period of time; 2) Data-based forward guidance where the bank's policy path is conditional on economic outcomes, e.g., policy rates are expected to remain at present levels as long as inflation remains at or near the inflation target; and 3) Calendar-based forward guidance whereby the central bank sets out a policy path with explicit reference to calendar dates, i.e., the central bank's key policy rate will increase by 25 basis points in each of the next 6 months. They conclude that calendar-based forward guidance with a relatively long time horizon has the strongest effect on anchoring inflation expectations.⁴⁰

Obviously, if monetary policy is to be effective in maintaining a low and stable inflation rate, central banks must be willing and able to employ effective monetary policy tools. Evidence that forward guidance regarding monetary policy can help stabilize inflation expectations is, therefore, reassuring. However, one or two caveats might be raised in this regard. Most important, perhaps, is that the evidence regarding forward guidance is drawn largely from a period when central banks were more concerned about declining inflation expectations than about rising inflation expectations, which is the main focus of concern today. A promise to decrease interest rates is reasonably credible to private sector economic agents, particularly since the central government will benefit from cheaper borrowing costs. In the current situation when the Bank of Canada and other central banks are concerned about dampening rising inflation expectations, for-

⁴⁰ De la Barrera, Falath, Henricot, and Vaglio (2017) provide additional empirical evidence that a forward guidance-driven 1 percent increase in the two-year nominal European Central Bank (ECB) bank rate translates to a 33-basis-point decrease in inflation expectations five years forward. They also document a strong impact of ECB announcements about quantitative easing.

ward guidance pledges to increase interest rates may be less credible and, therefore, less effective at anchoring inflation expectations given a growing political constituency—including governments and heavily mortgage-indebted households—that would benefit from lower real interest rates.

Another concern about the continued efficacy of forward guidance as a tool to stabilize inflation expectations and inflation itself is the prospect of the increasing use of financial regulations as opposed to interest rates as policy tools to influence borrowing and lending activity in the economy. For example, changing equity-to-loan ratios on home mortgages and invoking ESG performance as a criterion for the capital requirements imposed on banks would provide more credence to the argument that signals from the central bank about the likely course of future interest rates will fail to provide intelligible information to economic agents and therefore will be less effective instruments to manage inflation expectations.⁴¹

Proponents of modern monetary theory (MMT) argue that monetary policy is an ineffective counter-cyclical stabilization tool, and that fiscal policy should be used to counter inflationary pressures in the unlikely event (in the minds of many MMT proponents) that desirable increases in government spending financed by central bank purchases of government bonds lead to inflation. A critique of this position is beyond the scope of this essay.⁴² Suffice to say that most economists view monetary policy as a more practical instrument for addressing inflation given the longer lags in changing fiscal policy compared to monetary policy, as well as the incompatible incentives governments have with respect to low and steady inflation as discussed earlier.

The degree to which monetary policy has been a prominent contributor to the relatively low inflation rates experienced from 1990 to 2020 is debatable since other factors were also arguably shifting the economy to a lower inflation path. These factors include the expansion of international trade and investment, and particularly the emergence and growth of China as a low-cost hub for many manufacturing supply chains. In effect, globalization indirectly increased the output capacity of developed countries, thereby mitigating the inflationary impact of increases in aggregate

⁴¹ ESG stands for environmental, social, and governance criteria used to evaluate the degree to which private sector organizations are behaving in a “socially responsible” manner. ESG-related financial regulations might include requiring banks to hold larger capital reserves on loans made to fossil fuel companies. Obviously, the credibility of forward guidance is also undermined by faulty predictions by the central bank regarding future economic conditions.

⁴² For a detailed evaluation of the arguments made for MMT, see Globberman (2021b). MMTers would favour tax increases rather than reductions in government spending as a way to tamp down inflation by reducing aggregate demand.

demand due to increased government spending and increased household spending on residential housing. An increase in global savings, primarily in Asian countries with much of this invested in North American and European financial markets, kept real interest rates in the 1990s and 2000s relatively low which, in turn, might help explain the decline in the velocity of money in developed countries over the past three decades. The recent balkanization of markets for goods, services, and financial capital, which is only being exacerbated by the recent western government sanctions against Russia following its invasion of Ukraine and the escalating tensions between China and several western countries might well reverse these important factors in the Equation that have arguably contributed to the benign inflation environment from 1990 to 2020. If so, managing the rate of growth of the money supply will arguably become a more important focus of central bank policy than has been the case over the past few decades if central banks remain committed to low and stable inflation in the future.

Concluding Comments

Recent inflation reports have raised the prospect that developed economies are at risk of repeating the inflationary episodes of the 1970s and 1980s. An accompanying disturbing parallel is the recent spike in the prices of oil and other commodities in part related to the prospects of major reductions in oil, natural gas, and other commodity exports from Russia.

Officials of the central banks in both Canada and the US have embarked on interest rate increases and have signaled that they are intent on returning inflation back to its target rate by the end of 2022. A coordinated effort to address inflation concerns is appropriate given the fact that inflation tends to be a global phenomenon, and the burden on a relatively small open economy such as Canada's to deal with inflation on its own would be difficult to bear. Still, a floating exchange rate gives Canada the policy flexibility to raise interest rates—at the cost of an appreciating Canadian dollar with possible adverse impacts on the volume of real exports.⁴³

Initiatives by governments at all levels to expand the potential output capacity of the Canadian economy could also mitigate inflation pressures over time. In this regard, there are a host of policies that should be considered including a major reduction in regulatory red tape, removing restrictions on foreign competition in numerous industries from banking to telecommunications, reducing the costs and delays imposed by zoning and other local government policies that affect housing construction, disbanding agricultural marketing boards, and promoting freer inter-provincial trade and labour market mobility.

⁴³ If an appreciating Canadian dollar fully reflects lower domestic prices relative to domestic prices for Canada's major trading partners, Canadian export prices may remain relatively unchanged. Specifically, a higher Canadian dollar exchange rate would be exactly offset by lower Canadian dollar prices for Canada's exports. However, such a quick and complete offsetting match between domestic price changes and changes in a country's exchange rate is unlikely.

References

Bank of Canada (2021). *Monetary Policy Framework Renewal*. Bank of Canada. <<https://www.bankofcanada.ca/wp-content/uploads/2021/12/Monetary-Policy-Framework-Renewal-December-2021.pdf>>, as of April 12, 2022.

de la Barrera, Marc, Juraj Falath, Dorian Henricot, and Jean-Alexandre Vaglio (2017). *The Impact of Forward Guidance on Inflation Expectations: Evidence from the ECB*. BSE Working Paper 1010 (December). Barcelona School of Economics. <<https://bse.eu/research/working-papers/impact-forward-guidance-inflation-expectations-evidence-ecb>>, as of April 11, 2022.

Cogley, Timothy (1997, September 19). What is the Optimal Rate of Inflation? *FRBSF Economic Letter*. Federal Reserve Bank of San Francisco. <<https://www.frbsf.org/economic-research/publications/economic-letter/1997/september/what-is-the-optimal-rate-of-inflation/>>, as of April 11, 2022.

Doepke, Matthias, and Martin Schneider (2006). Inflation and the Redistribution of Nominal Wealth. *Journal of Political Economy* 114, 6: 1069-1097. <https://faculty.wcas.northwestern.edu/mdo738/research/Doepke_Schneider_JPE_06.pdf>, as of April 11, 2022.

Dudi, Cassandra (2022, February 16). Canada's Housing Market Is Breaking Records at an Alarming Rate. *Pivot Magazine*. CPA Canada. <<https://www.cpacanada.ca/en/news/pivot-magazine/2022-02-16-housing-market>>, as of April 11, 2022.

Ehrmann, Michael, Gaetano Gaballo, Peter Hoffman, and Georg Strasser (2019). How to Signal the Future Path of Interest Rates? The International Evidence on Forward Guidance. Research Bulletin, European Central Bank, 61. <<https://ideas.repec.org/a/ecb/ecbrbu/20190061.html>>, as of April 11, 2022.

EconPort. 2006. Costs of Inflation. EconPort.
<<http://www.econport.org/content/handbook/Inflation/Costs.html>>, as of April 11, 2022.

Friedman, Milton (1968). The Role of Monetary Policy. *American Economic Review* 58, 1: 1-17. <<https://www.aeaweb.org/aer/top20/58.1.1-17.pdf>>, as of March 30, 2022.

Friedman, Milton (1970). *The Counter-Revolution in Monetary Theory*. Wincott Memorial Lecture. Occasional Paper 33. Institute of Economic Affairs. <<https://miltonfriedman.hoover.org/objects/56983/the-counter-revolution-in-monetary-theory>>, as of March 30, 2022.

Globerman, Steven (2021a). *The Outlook for Inflation and Its Links to Monetary Policy*. The Fraser Institute. <<https://www.fraserinstitute.org/sites/default/files/outlook-for-inflation-and-its-links-to-monetary-policy.pdf>>, as of April 11, 2022.

Globerman Steven (2021b). *A Primer on Modern Monetary Theory*. The Fraser Institute. <<https://www.fraserinstitute.org/sites/default/files/primer-on-modern-monetary-theory.pdf>>, as of April 11, 2022.

Globerman, Steven (2022, February 2). Bank of Canada Could Muddy Price Signals with Aggressive Monetary Policy. *Epoch Times*. <<https://www.fraserinstitute.org/article/bank-of-canada-could-muddy-price-signals-with-aggressive-monetary-policy>>, as of April 11, 2022.

Hanke, Steve, and Nicholas Hanlon (2022, February 23). Jerome Powell is Wrong, Printing Money Causes Inflation. *Wall Street Journal*.

Harvey, John (2011, May 14). Money Growth Does Not Cause Inflation! *Forbes*. <https://www.youtube.com/watch?v=M8StR1EKg_Q>, as of April 11, 2022.

Haubrich, Joseph, and Sara Millington (2014). *PCE and CPI Inflation: What's the Difference?* Federal Reserve Bank of Cleveland. <<https://www.clevelandfed.org/newsroom-and-events/publications/economic-trends/2014-economic-trends/et-20140417-pce-and-cpi-inflation-whats-the-difference.aspx>>, as of April 11, 2022.

International Monetary Fund [IMF] (2003). *Report on the Observance of Standards and Codes- Data Module, Response by the Authorities and Detailed Assessments Using Data Quality Assessment Framework*. IMF.

<<http://www.imf.org/external/pubs/ft/scr/2003/cr03328.pdf>>, as of March 29, 2022.

Jacobs, Rose (2020, December 4). How Central Bankers Misjudge Forward Guidance. *Chicago Booth Review*. <<https://www.chicagobooth.edu/review/how-central-bankers-misjudge-forward-guidance>>, as of April 11, 2022.

Jackson, Anna-Louise, and Benjamin Curry (2022, January 12). Quantitative Easing Explained. *Forbes Advisor*. <<https://www.forbes.com/advisor/investing/quantitative-easing-qe/>>, as of April 11, 2022.

Kupec, Paul (2021, November 4). The Inflation Tax Is Not Only Real, It's Massive. *The Hill*. <<https://thehill.com/opinion/finance/580043-the-inflation-tax-is-not-only-real-its-massive>>, as of April 11, 2022.

OECD Stat (Undated). *Consumer price indices (CPIs), Complete database*. OECD Stat. <https://stats.oecd.org/index.aspx?queryid=82174>

Oner, Ceyda (Undated). Inflation: Prices on the Rise. *Finance and Development*. International Monetary Fund. <<https://www.imf.org/external/pubs/ft/fandd/basics/30-inflation.htm>>, as of April 11, 2022.

Palmer, Barclay (2021, July 23). Why Is the Consumer Price Index Controversial? *Investopedia*. <<https://www.investopedia.com/articles/07/consumer-priceindex.asp>>, as of March 28, 2022.

Reed Stephen, and Darren Rippy (2012). Consumer Price Index Data Quality: How Accurate Is the U.S. CPI? US Bureau of Labor Statistics. <https://www.bls.gov/opub/btn/volume-1/consumer-price-index-data-quality-how-accurate-is-the-US-cpi.htm>>, as of March 29, 2022.

Statistics Canada (Undated). *Consumer Price Index Portal*. *Statistics Canada*. <https://www.statcan.gc.ca/en/subjects-start/prices_and_price_indexes/consumer_price_indexes>, as of March 28, 2022.

Statistics Canada (2021a). Table 17-10-005-01: Population Estimates on July 1st, by age and sex. Statistics Canada. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501>>, as of March 28, 2022.

Statistics Canada (2021b). *Consumer Price Index: The Bank of Canada's Preferred Measures of Core Inflation Methodology Document*. Statistics Canada. <https://www.statcan.gc.ca/en/statistical-programs/document/2301_D64_T9_V2>, as of March 28, 2022.

Statistics Canada (2022a). Consumer Price Index Portal. Statistics Canada. <https://www.statcan.gc.ca/en/subjects-start/prices_and_price_indexes/consumer_price_indexes>, as of April 11, 2022.

Statistics Canada (2022b). Table 10-10-0116-01: Chartered Bank Assets and Liabilities and Monetary Aggregates, Month-end, Seasonally Adjusted, Bank of Canada (x1,000,000). Statistics Canada. <<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1010011601>>, as of April 11, 2022.

Schmitt-Grohe, Stephanie, and Martin Uribe (2010). *The Optimal Rate of Inflation*. Working Paper 16054. National Bureau of Economic Research. <https://www.nber.org/system/files/working_papers/w16054/w16054.pdf>, as of March 28, 2022.

United States Senate, Committee on Finance (1996). *Final Report of the Advisory Commission to Study the Consumer Price Index*. United States Senate. <<https://www.finance.senate.gov/download/final-report-of-the-advisory-commission-to-study-the-consumer-price-index-print-104-72>>, as of April 12, 2022.

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