

The Outlook for Inflation and Its Links to Monetary Policy

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FRASER
INSTITUTE

2021

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Executive Summary

The recent increase in the rate of inflation in Canada and other developed economies has raised a concern among business executives and some policy makers that the increases may not be as transitory as central bankers have proclaimed. Specifically, the position of central bankers is that recent inflation rates above the typical 2%-per-annum target are the consequence of supply-chain disruptions related to COVID-19 and that, once production and distribution activities embedded in global supply chains regain their pre-COVID efficiency levels, inflationary pressures will be attenuated.

Bank of Canada Governor, Tiff Macklem, has assured Canadians that the Bank of Canada will prevent the cost of living from becoming a problem for Canadians, while the Chair of the US Federal Reserve has also claimed that the recent increase in the rate of inflation will prove transitory. While the precise time frame that defines “transitory” has not been made explicit by either central bank, statements by officials of the central banks suggest that they believe inflation will fall back to the pre-COVID rate of around 2% per annum by mid-2022. Conversely, a number of corporate executives and some private-sector economists have argued that monetary authorities are underestimating the potential for sustained inflation if central banks do not reverse the substantial monetary easing they have implemented over the past year or so.

This study assesses the potential for the rate of inflation to remain well above the annual 1.9% (for Canada) and 2.3% (for the United States) average rates that prevailed over the period from 1991 to 2020. In particular, it posits that the potential output of developed economies is likely to grow at a significantly slower rate over the next 10 years than it has over the previous decade. One reason is that the aging of populations in developed economies, including Canada, will contribute to slower growth of the labour force. Another is that increased corporate taxes and government regulations appear increasingly likely political initiatives that will discourage corporate investment, thereby slowing the growth of labour productivity. A third is that Green Energy mandates, however well-intentioned as an antidote to climate change, will necessarily divert resources away from more privately productive investments and raise energy costs over the next decade above what they would otherwise be.

Slower growth of potential output increases the possibility that aggregate demand for goods and services will outstrip the ability of an economy to meet that demand without price increases ensuing. Aggregate demand, in turn, is a function of the amount of money in the economy and of the velocity of money—the rate at which money balances are “turned over” through spending. Following the housing crisis of 2007/08 and the ensuing onset of a significant recession, central banks implemented quantitative easing to promote lending on the part of banks and increased borrowing and spending by

households and businesses. However, the decline in household wealth tied to lower housing and stock-market prices, as well as increased risk aversion on the part of lenders seeing a higher probability of defaults by borrowers, kept aggregate demand from expanding as policy makers intended. In effect, households and businesses hoarded their cash savings, which manifested in a dramatic decline in the velocity of money from 2010 to 2020. Furthermore, the reluctance of banks to lend, and of households and businesses to borrow, resulted in relatively slow growth of the money supply given the expansionary policy efforts of central banks.

While the rate at which money balances are changing hands has yet to register a noticeable pickup over the past year, the rate of growth of the money supply has accelerated dramatically. If the velocity of money does start to return to its much higher historical average value, the accelerated growth of the money supply will result in a substantial increase in aggregate demand. Combined with a more constrained ability to expand output, a sustained increase in aggregate demand will put significant upward pressure on prices going forward. Increases in the rate of inflation will, in turn, encourage increases in the velocity of money as businesses and households increase spending in anticipation of higher prices in the future. The potential for an inflationary spiral would become increasingly plausible.

Under these circumstances, if central banks want to ensure that inflationary pressures are indeed transitory, they need to reverse recent monetary policies that have featured unprecedented amounts of direct buying of government bonds and private-sector mortgages. Given the high levels of current public- and private-sector indebtedness and prospects of larger government deficits in the future, central banks will likely face increasing political pressure to suppress increases in nominal interest rates in order to accommodate growing financial requirements driven by expanding government spending. Central bank officials may well find themselves squeezed between the “rock” of government financing needs and the “hard place” of sustained inflation.

1 Introduction

The average annualized rate of inflation in Canada, the United States, and other developed countries in the first eight months of 2021 was higher than it has been in three decades. This development has sparked a heated policy debate about whether this recent increase is transitory or whether it is a prelude to a sustained period of inflation. Officials of central banks, as well as those at the International Monetary Fund (IMF), have weighed into the debate with statements indicating their belief that the recent increase in inflation is transitory. For example, Bank of Canada Governor Tiff Macklem said in a column for the *Financial Post* newspaper that Canadians can be confident that the cost of living will not rise out of control as the Canadian economy reopens from the COVID-19 pandemic (PMM Politics, 2021). The IMF expects inflation to return to its pre-pandemic ranges in most countries in 2022, although it did caution that there is a risk that inflation will be more than transitory (Amaro, 2021). The US Federal Reserve also sees inflation moderating into 2022, although many private-sector economists and corporate executives have expressed strong concerns that monetary authorities are underestimating the potential for sustained inflation (La Monica, 2021; Hunt, 2021). This concern has become marked in the wake of central banks in North America and Europe becoming the predominant buyers of newly issued government debt, particularly since the onset of the COVID-19 pandemic, as well as a breathtaking increase in the money supply that will be discussed in a later section of this publication.

What has been largely absent so far from the debate is a clear statement on the part of central bank policy makers as to what constitutes “transitory inflation” for purposes of making changes to monetary policy. To the extent that both the Bank of Canada and the US Federal Reserve see inflation moderating into 2022, the statements made to this effect at various points in July and August of 2021 imply that transitory for central bank policymakers is six to nine months of above-target inflation (La Monica, 2021). Also complicating the debate is the lack of clarity about what the Federal Reserve’s hard target is for inflation given its newly expressed willingness to accept a rate of inflation above 2% for some period of time to compensate for below-2% inflation per annum over the period from 2011 to 2020.¹ While the Bank of Canada’s mandate is to target a rate of inflation of 2% per annum, that mandate is set in negotiations with the federal government and, therefore, could also be subject to change.²

1. For a discussion of recent stated changes to the Federal Reserve’s policy targets, see Cox, 2020.

2. The Joint Inflation Control Statement between the Bank of Canada and the Government of Canada, which specifies the goal of monetary policy, is renewed every five years. It was renewed in 2016 and expires at the end of 2021. It had not yet been officially renewed at the time of writing of this paper.

A survey in July 2021 of economists carried out by the *Wall Street Journal* forecast an average annual increase in the Federal Reserve's preferred measure of inflation of approximately 2.6% from 2021 to 2023, putting inflation at levels last seen in the United States in 1993.³ Survey respondents describe a generational shift from the lower inflation of the past two decades. However, survey forecasts of inflation are notoriously inaccurate; market-based forecasts are also inaccurate, albeit more accurate than survey forecasts (Kliessen, 2015). Hence, any debate about the outlook for inflation would arguably be better informed by a careful consideration of the underlying factors that will influence inflation in the future rather than forecasts of central bankers, economists, or even bond-market participants.⁴

While some price shocks resulting from a drought that causes higher food prices or disruptions to the supply of crude oil that cause higher energy prices are fundamentally unpredictable short-run events, there are longer-run factors influencing inflation that are worth discussing in any consideration of the outlook for inflation over, say, the next decade. This study identifies and assesses a set of factors that will condition inflation going forward and discusses their possible links to monetary policy.

The study proceeds as follows. Section 2 discusses the Equation of Exchange as a framework for assessing the outlook for inflation. Section 3 outlines and assesses various challenges to implementing the Equation of Exchange as a forecasting instrument, including complications to incorporating monetary policy into the framework. Section 4 provides an outlook for inflation drawing on assessments of the future behaviour of the main variables in the Equation of Exchange. Section 5 identifies and evaluates arguments that monetary policy is an increasingly ineffective policy tool. Concluding comments are provided in the final section.

3. The Federal reserve's preferred measure of inflation excludes food and energy prices. See Guilford and de Barros, 2021.

4. Market-based forecasts of inflation typically rely on differences between the yields on inflation-protected government bonds and bonds not protected from inflation.

2 A Simple Conceptual Framework for Assessing the Outlook for Inflation

As noted above, future rates of inflation have been difficult for investors and economic researchers to predict accurately. However, the fundamental factors that influence the rate of inflation are captured in what is known as the Equation of Exchange, initially proposed by the American economist, Irving Fisher.⁵ The Equation is specified as follows:

$$M \times V = P \times T \quad [1]$$

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. Rearranging terms isolates the relationship between the price level and the other variables:

$$P = M \times V/T \quad [2]$$

There are relatively narrow and relatively broad definitions of money depending upon whether one includes interest-bearing assets such as money-market deposits in the definition. For purposes of the discussion in this section, 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, checking account balances and interest-bearing savings, and money market and other time deposits.

The velocity of money (V) is conceptually the frequency at which one unit of the money supply is used to purchase real output in the domestic economy. It essentially measures how quickly the money supply turns over. The price level (P) also has various definitions depending upon the specific goods and services that make up the “basket” used to create an average price index. The most frequently referenced index of average prices is the Consumer Price Index (CPI), which is a weighted average of prices of a basket of consumer goods and services.⁶ T is conceptually the aggregate number of transactions that take place in the domestic economy. To be sure, one cannot simply add the number of separate transactions involving many different commodities and services. A more practical approach to measuring T is to use real output as a proxy measure.

5. See Munro (undated) for a detailed discussion of the Equation of Exchange (henceforth, simply Equation). The Equation is also often referenced as the Quantity Theory of Money.

6. Again, this conceptual discussion is not dependent upon how P is measured.

It should be explicitly acknowledged that the Equation is an identity. While it is a useful conceptual framework for understanding the structural determinants of inflation, one is obliged to forecast changes on the right-hand side of Equation 2 in order to forecast changes in P . Specifically, future changes in P , that is, inflation, are positively related to future changes in M and V and negatively related to future changes in T .⁷ Expectations about future changes in M , V , and T should, in turn, be guided by expected changes in the underlying determinants of these variables. Before discussing the underlying determinants and considering how the individual determinants of P are likely to behave going forward, it is useful to summarize the historical inflation experiences of Canada, the United States, the United Kingdom, and the OECD countries.

Inflation from 1971 to 2021 Q2

Table 1 reports average annual rates of inflation for the decades spanning the period from 1971 through 2020, as well as annualized rates of inflation for the first and second quarters of 2021. Several inferences can be drawn from the data in table 1. One is that inflation was quite pronounced in the first two decades (1971–1980 and 1981–1990) of the period. Thus, while the rate of inflation in the first half of 2021 has raised concerns among many economists and business executives, recent inflation rates in the countries identified in table 1 are much closer to the rates experienced from 1991 to 2020 than they are to the rates experienced from 1971 to 1990. This might suggest that current concerns about inflation are either premature or exaggerated. However, it is relevant to note that the rate of inflation in Canada in 1971 was 2.7%, which is below the annualized rate of 3.37% for 2021 Q2. Likewise, the rate of inflation in the United States in 1971 was 4.3%, which is below the annualized rate of 4.87% for 2021 Q2. Hence, the most recently reported inflation rates are even higher than they were in the “takeoff” year of 1971. To be sure, the foregoing observations do not mean that inflation rates in Canada and the United States are necessarily on a course to repeating the inflationary experience of the 1970s and 1980s. However, it is a caution that seemingly transitory episodes of inflation can evolve relatively quickly into more sustained and more rapid inflation if appropriate policy measures, particularly monetary policies, are not implemented.

A second observation is the synchronous nature of inflation across developed economies. While average rates of inflation differed across countries within each of the time periods covered in table 1, the pattern over time is similar. In particular, the highest rates of inflation were uniformly experienced during the period from 1971 to 1990, while the lowest rates were uniformly experienced from 2011 to 2020. Indeed, there is a very high

7. This characterization of the determinants of future inflation ignores the lagged effects of earlier changes in the variables on the right-hand side of equation 2, particularly changes in M . Put simply, the relationship between changes in M and changes in P is more reliable the longer the time period in question. Again, the purpose of the discussion of the Equation is to set out a conceptual framework for identifying the variables of interest when considering whether the recent increase in inflation is likely to be transitory.

Table 1: Average annual inflation rates (%), 1971–2021

	Canada	United States	United Kingdom	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	8.89
1991–2000	1.99	2.80	2.94	6.95	4.83
2001–2010	2.03	2.39	2.00	2.92	2.45
2011–2020	1.62	1.73	1.92	2.08	1.84
2021 Q1	1.43	1.90	0.60	2.30	1.87
2021 Q2	3.37	4.87	2.03	3.30	3.80

Source: Data reported in OECD, 2021b; author's calculations.

correlation across countries in rates of inflation even on a year-to-year basis. For example, the simple correlation coefficient between the annual rates of inflation in Canada and the United States from 1971 to 2020 was .899, while the correlation coefficient between the annual rates of inflation in Canada and the OECD was .892 over that period.⁸

One possible explanation for the high correlation in inflation rates across countries is global supply-side shocks such as the dramatic increase in the price of crude oil from 1973 to 1980.⁹ A second possible explanation is inflation pass-through across countries. If prices in country A increase relative to prices in country B, exports from country A to country B should decline as traded goods produced in country A become less competitive in country B's domestic market. If nothing else changes, the price of country B's currency should increase relative to country A's currency. However, if this adjustment to the exchange rate does not take place for one or another reason, import prices in country B will increase, thereby contributing to higher domestic prices in country B.¹⁰

Having identified some historical features of inflation, the study now turns to a consideration of the structural variables affecting inflation as specified in equation 2. We first consider the underlying determinants of changes in M , V , and T , and the interrelationships between these variables and inflation. We then discuss how these determinants are likely to behave over the foreseeable future.¹¹

8. Both correlation coefficients are statistically significant at the .01 level.

9. The price of West Texas Intermediate (WTI) crude oil, the benchmark US price for crude oil, increased from \$23.09 per barrel in 1973 to \$124.53 per barrel in 1980 (Macrotrends, 2021).

10. One possible reason for a divergence between actual exchange rates and exchange rates that would create equal purchasing power across countries is the reaction of central banks to an appreciating domestic currency, which might conflict with efforts to reduce unemployment. An appreciating currency makes a country's exports more expensive and its imports less expensive, other things constant, which might create short-term increases in unemployment rates.

11. While any specific definition of "foreseeable future" would be arbitrary, we have in mind a period of years rather than months.

3 Money Supply and Other Equation Factors as Determinants 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 an equivalent change in P unless somehow offset by changes in V and T .¹² Friedman (1968) emphasized the existence of time lags between changes in monetary policy and changes in M , and even longer lags between changes in M and changes in P . Hence, the recent sharp growth in the money supply in the United States, to be discussed further in a later section, even if sustained, might not cause a substantial increase in inflation in the short run. However, according to Friedman, inflationary consequences will certainly begin to be manifested within one to 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, an enormous literature emerged both supporting and challenging the linkage between money supply growth and inflation. While it is beyond the scope of this essay to review the literature in any detail, critics of Friedman's argument have challenged the assumptions underlying his argument and highlighted what they deem is a lack of convincing empirical evidence supporting his argument.

Endogeneity of the money supply

One ubiquitous criticism of Friedman's argument is that changes in the money supply are endogenous to changes in nominal economic activity, that is, $P \times T$. In other words, changes in P and/or T can influence changes in M , thereby potentially confounding any predictable linkage from changes in M to changes in P . For example, an increase in nominal economic activity should increase the demand for bank loans and other forms of debt to finance increased nominal spending.¹³ Increases in loans extended by commercial banks and other financial intermediaries, in turn, result in increased deposits in checking and savings accounts. Hence, changes in P and/or T cause changes in M rather than the other way around.¹⁴ This criticism suggests, in effect, that monetary policy is

12. Implicitly, Friedman's assertion assumes that the velocity of money is relatively constant.

13. Nominal domestic economic activity is usually measured as nominal Gross Domestic Product (GDP). This, in turn, equals real domestic output multiplied by the average price level.

14. However, monetary policy can affect the extent to which changes in P and/or T influence changes in M .

not reliably linked to inflation, since the main direct source of the growth of the money supply, that is, lending by financial intermediaries, is not necessarily closely linked to traditional central bank policies.

Former President of the Federal Reserve Bank of San Francisco, John Williams (2012), discusses a recent weakening of the linkage between a central bank's monetary policy and growth of the money supply. He notes that conventional monetary policy works by the central bank adjusting the amount of reserves in the commercial banking system through the central bank's open market operations; that is, the central bank buys or sells interest bearing securities held by financial institutions, causing, in turn, increases or decreases of the reserves in the commercial banking system.¹⁵ An increase in bank reserves allows commercial banks to make more loans to businesses and households, which, in turn, increases the money supply. However, if banks prefer to hold increased reserves rather than use them to extend loans to the private sector, the linkage between central bank monetary policy and the growth of the money supply is weakened.

Williams' argument does not necessarily obviate the claim that significant increases in the money supply are a major source of inflation over time. Indeed, empirical studies, on balance, identify a statistically significant long-run relationship between money-supply growth and inflation.¹⁶ However, his argument identifies a difficulty in tying forecasts of inflation to a central bank's monetary policy. Namely, the creation of additional reserves in the financial system through actions such as quantitative easing, and even the direct purchases of government securities by the central bank will not necessarily lead to an increase in the money supply and, therefore, to an increase in the rate of inflation.¹⁷ This would be true, for example, if households and businesses did not increase their direct and indirect bank borrowing because they did not want to increase consumption and investment. In this circumstance, there would be no significant linkage between changes in the creation of bank reserves and the growth of the money supply. The absence of a reliable linkage between changes in bank reserves and changes in the money supply would augment the uncertain impact of the central bank's monetary policy on inflation created by the potential endogeneity between changes in the money supply and changes in nominal spending.¹⁸

15. Reserves are simply deposits that commercial banks hold at the central bank.

16. See, for example, Dwyer, Jr. and Hafer, 1999; and Robener, 2021.

17. This caveat is invoked by proponents of Modern Monetary Theory to counter arguments that direct purchases of government bonds by the central bank will necessarily lead to higher inflation.

18. 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.

Changes in the velocity of money

A second prominent criticism of Friedman's claim that changes in the money supply are the essential cause of inflation is that he assumed the velocity of money—the rate at which money changes hands—is constant over time.¹⁹ The velocity of money can also be thought of as how frequently a unit of currency is used to purchase goods and services during a given period of time. As a simple illustration, imagine an economy in which the total money supply is fixed at \$100 at the start of the year and that, over the course of the year, \$200 of goods and services are purchased. In this case, each dollar supports \$2 of economic transactions. Equivalently, the velocity of money equals two.

If money is used exclusively for transactions purposes and if there are no significant changes in financial technology that enable a greater volume of transactions to be financed by the same amount of money, the velocity of money should be relatively constant over time. However, if businesses and households use money as reserves against future contingencies such as becoming unemployed and/or as a temporary asset holding in anticipation of future changes in the prices of goods, services, or other assets, velocity need not be constant.²⁰ Hence, expectations about future economic conditions can affect velocity. Interest rates are also a determinant of velocity, since interest rates reflect the opportunity cost of holding money rather than using it to buy products or other financial assets.

Wen and Arias (2014) discuss the dramatic increase in the hoarding of money between 2008 and 2013. Over that period, they estimate that the actual decline in velocity was 69 times larger than expected based on the historical relationship between velocity and the interest rate on the 10-year US government bond. They ascribe this unprecedented decline in velocity primarily to extreme pessimism about future economic prospects on the part of households and businesses following the housing collapse of 2007/08 and the subsequent recession.²¹

Changes in expectations about future economic conditions can arise from multiple phenomena in markets for financial assets, as well as in markets for goods and services, including public perceptions about the commitment of central banks to maintain relatively stable inflation. To the extent that changes in velocity are substantially independent of changes in the money supply, a consistent linkage between monetary policy and inflation would be further attenuated.

By way of additional background, **table 2** reports the average annual US rate of inflation, the average annual rate of growth in the M2 money supply, and the velocity

19. See, for example, Harvey, 2011.

20. These latter two motives for holding money balances were identified by Keynes as precautionary and speculative motives.

21. Wen and Arias (2014) also highlight a sharp decrease in interest rates as contributing to increased hoarding of money.

Table 2: Average annual inflation (%), average annual rate of growth (%) in M2 money supply, and average velocity of M2 money stock, 1971–2021

	Inflation	Growth of M2 supply	Velocity		Inflation	Growth of M2 supply	Velocity
1971–1980	7.88	9.76	1.75	2001–2010	2.39	6.15	1.93
1981–1990	4.73	7.71	1.81	2011–2020	1.73	6.20	1.52
1991–2000	2.80	4.99	2.08	2021 Q1/Q2	3.39	25.87	1.12

Note: Velocity is the ratio of quarterly nominal GDP to the quarterly average of M2 money stock.

Sources: Federal Reserve Economic Data [FRED], 2021a, 2021b; OECD, 2021b; author's calculations.

of the M2 money stock in the United States for ten-year periods commencing in 1971 and including the first two quarters of 2021. Readily noticeable is the fact that the two periods of highest average annual inflation—1971–1980 and 1981–1990—were also the two periods when the M2 money supply grew most rapidly.²² However, from 1991 to 2020 the average annual rate of inflation declined, while the annual average rate of growth of the M2 money supply increased over that period. Also readily noticeable is that the velocity of the M2 money stock declined consistently over the period from 1991 to 2020.

The remarkably rapid growth rate of M2 in the first two quarters of 2021 has been a major source of concern for some business economists gauging the outlook for inflation. While the average annual rate of inflation in the first two quarters of 2021 is higher than at any time since 1991, it is below the annual inflation rate over the 1971-to-1990 period, notwithstanding the much faster rate of growth of M2 in the first half of 2021 compared to earlier periods. Part of the explanation for why recent inflation was relatively subdued given the massive increase in the money supply is that increases in the money supply affect inflation with a lag. Another part of the explanation might be related to the relatively and absolutely low velocity of money in the first half of 2021.

Correlation analysis

Correlation analysis supports the view that the link between the growth of the money supply and inflation is quite modest on a year-to-year basis. Specifically, the correlation coefficient between the annual rate of inflation and the annual rate of growth of M2 for the years encompassing 1971 and 2020 is .199. The correlation coefficient between the

22. The annual rates of growth of M2 reported in table 2 were calculated by the author from the M2 values reported for January of each sample year. The velocity estimates were calculated by the author from the quarterly values of M2 velocity reported in each sample year. While the M2 and velocity estimates are certainly affected by seasonal factors, there is no reason to believe that seasonal factors vary from year to year or from decade to decade.

average annual rate of inflation and the velocity of money over the period from 1971 to 2020 is an even weaker: .077.²³ What these correlation coefficients suggest is that there is, at best, a weak relationship between the annual rate of growth of the M2 money supply and the annual rate of inflation over the 50 years from 1971 to 2020, while there is essentially no relationship between inflation and the velocity of money over that period.

It should be noted explicitly that the simple correlation of annual values of M2 and P reported above does not address the potential for lags in the impact of annual changes in M2 on annual inflation. However, there is substantial persistence in the rate of growth of M2 from year to year, so that incorporating lags into the correlation analysis is unlikely to cause significant changes to the results.²⁴ Another caveat is that the correlation between velocity and inflation varies substantially over the 1971-to-2020 period. For example, the correlation between the two variables is a robust .586 over the period from 2000 to 2020.

Potential output

A third criticism focuses on the T variable in Equations 1 and 2. In the context of the outlook for inflation, T is best understood as the potential of an economy to meet the demand for real goods and services without experiencing price increases. In effect, T represents the “output potential” of an economy. If an economy is operating with excess capacity (for example, unemployed labour), an increase in spending on goods and services can, in principle, be accommodated without increases in the average price level if underused resources can be mobilized at relatively low cost. At this point, one could segue into a discussion of the nature of any short-run trade-off between inflation and unemployment (the Phillips Curve) or whether there can be structural underemployment of productive inputs. The Phillips Curve implies that, at least in the short run, increases in inflation can promote increased employment (and output) to the extent that the increase in inflation exceeds any increase in nominal wages paid to workers. In effect, the Phillips Curve argues that, in the short-run, causation can run from changes in P to changes in T , as well as the reverse. We choose not to engage in such discussions, since a concern about sustained inflation implies a concern about the longer-run capacity of an economy to supply increased real output. As Friedman (1968) persuasively argued, if inflation exceeds nominal wages over any significant period of time, workers will come to anticipate future such episodes and demand wage increases in advance to offset anticipated future inflation. In effect, Friedman argues that inflation cannot induce increases in an economy’s potential to produce output in the longer run.

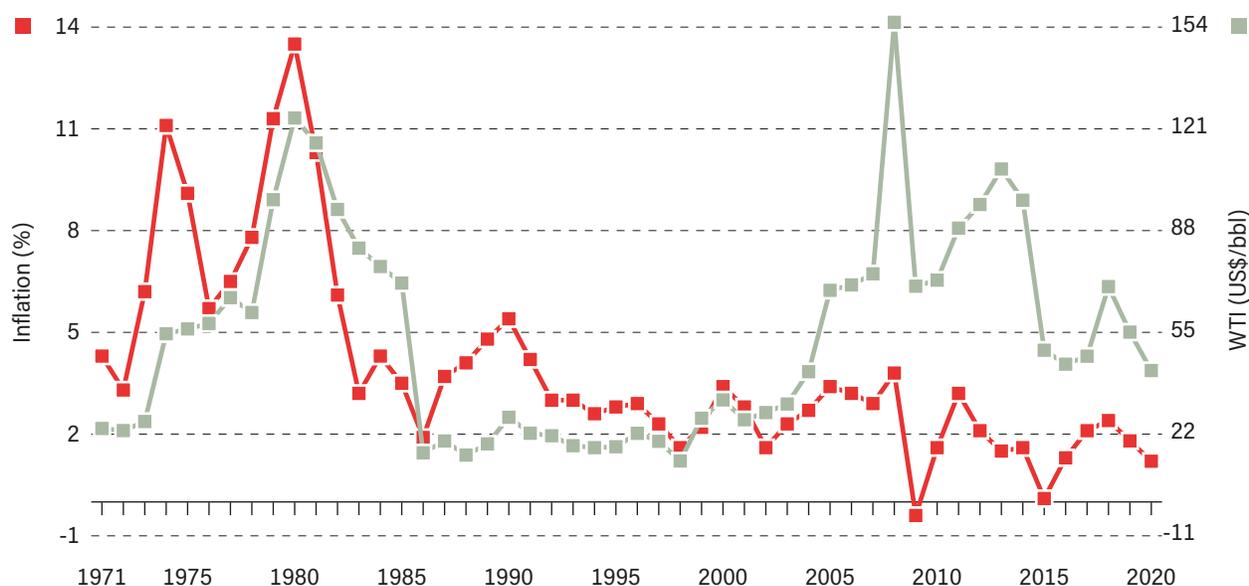
23. The correlation coefficient between the annual growth of M2 and velocity over the full period from 1971 to 2020 is also a modest .202.

24. The coefficient of variation of annual M2 growth from 1971 to 2020—that is, the ratio of the standard deviation to the mean—equals .438. This indicates relatively small year-to-year deviations from the average annual growth rate.

Over time, changes in the potential real output of an economy are a function of the growth of the labour supply and the growth of labour productivity. Since inflation reflects a demand for goods and services that exceeds the capacity of the economy to satisfy that demand at current prices, a slowing growth rate of the labour supply and labour productivity increases the prospects for higher inflation, given any increase in the money supply and any given turnover rate of the money supply. In the next section of this study, we will discuss the outlook for these two broad determinants of potential real output. At this point, we consider the argument made by Harvey (2011) and others that the sustained increase in the price of oil resulting from the actions of the OPEC cartel in the 1970s and 1980s was the key factor precipitating the relatively high inflation of the 1970s and early 1980s by effectively sharply decreasing the output potential of wealthy economies that relied heavily on oil products as a source of energy. In effect, the spike in oil prices reduced the productivity of the existing capital stock that relied on oil as an energy source.

Figure 1 plots the US inflation rate against the price of West Texas Intermediate Crude Oil, the US benchmark price for crude oil and, by extension, an indicator of the price of refined oil products. Figure 1 suggests that the sharp increase in the price of crude oil followed by a decline in the price over the period of the mid-1970s to mid-1980s was mirrored by an increase in inflation followed by a decrease in inflation over the same period. Indeed, the simple correlation coefficient between the WTI price and the rate of inflation was a relatively strong .655 over the period from 1971 to 1990. However, the

Figure 1: Inflation (%) in the United States and WTI price (US\$/bbl) of crude oil, 1971–2020



Sources: Macrotrends, 2021; OECD, 2021b; author's calculations.

data in figure 1 does not show any correspondence between the sharp increase in the WTI price followed by a decline over the period from 2010 to 2015 and the behaviour of the inflation rate over that period. The weak statistical relationship between the WTI price and inflation subsequent to the experience of the mid-1970s to mid-1980s is underscored by the weak and negative correlation coefficient (-0.156) between the WTI price and inflation over the period from 1985 to 2020: essentially, there is no correlation. The relationship between oil prices and inflation therefore suggests that supply side shocks can have short-run effects on inflation but that the longer-run effects are moderated by adjustments made by market participants, that is, in the case of crude oil, a reduction in the intensity of oil usage in the US economy.

Summary

The explosive growth of the US money supply in the past four calendar quarters and the accompanying uptick in inflation has set off an alarm among some economists that forces have been put in place for sustained inflation barring a major reversal of the growth of the money supply. Others argue that recent increases in the rate of inflation reflect transitory supply-side disruptions related to waves of COVID-19 infections and that inflation will recede as supply chains regain their normal levels of efficiency. Still others argue that the substantial recent increase in M2 is benign given a collapsing velocity of money consistent with economic agents having an increased demand for money for non-transactional purposes.

The evidence briefly reviewed in this section supports the empirical 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 of Exchange has been a more important influence on inflation than the other two variables. The current debate about whether the recent increase in the rate of inflation will subside in the near future or whether it will continue, perhaps even accelerate, over a longer period of time therefore needs to focus on the outlook for each of the variables on the right-hand side of Equation 2 and not just on any one specific variable. In this regard, if one subscribes to a view that the output potential of wealthy economies will grow at a significantly slower rate than it has over the past few decades, while the velocity of money will increase going forward, one will necessarily see inflation as being something more than a transitory phenomenon related to a temporary disruption of supply chains, unless central banks abruptly and substantially reverse the recent rate of growth of the money supply. The next section of this study discusses the outlook for output potential and velocity, as well as the challenges facing central bank policy makers in regulating the growth of the money supply.

4 Outlook for Factors Determining Inflation

As discussed in the preceding section of this essay, slower growth of an economy's potential to produce real output contributes to a higher sustained rate of inflation holding growth of the money supply and the velocity of money constant. By definition, supply-side shocks such as disruptions to supply chains caused by political conflict or pandemics are not predictable. However, the longer-run growth of an economy's productive capacity is a more predictable function of the growth of its labour supply and the growth of labour productivity.

Outlook for the growth of potential output

In all developed countries, a slower rate of growth of the supply of labour can be anticipated owing to an aging population and a declining birth rate.²⁵ While easier immigration policies and an increasing labour-force participation rate among older workers would mitigate the slowing growth in the supply of labour, the demographic forces underlying a substantially slower future rate of growth of the supply of labour are inexorable. This means that the growth of the productive capacities of developed countries increasingly will rely upon faster rates of growth of labour productivity. Notwithstanding anecdotal evidence of technological breakthroughs in areas such as robotics, artificial intelligence, genomics, and 3-D printing, among others, there is a substantial debate among economists about the outlook for future rates of technological change. This issue is of substantial importance, since technological change is the main source of improvements in labour productivity over time.²⁶

On one side of the debate are economists, most notably Robert Gordon, who argue that major technological breakthroughs contributing to improved standards of living are things of the past and that developed economies are unlikely to enjoy the scientific breakthroughs that resulted in major innovations such as electricity, jet airplanes, and even indoor plumbing. On the other side are economists, such as the economic historian, Joel Mokyer, who argue that technological change has been a durable feature of economic development over centuries, and that there is no reason to believe that the future will be different from the past.²⁷

25. For a discussion of this likelihood in the context of the United States, see Holzer and LaFarge, Jr., 2019; and for Canada, see Cross, 2021.

26. Technological change is frequently embodied in new machinery, equipment, and intellectual property products such as software.

27. For a journalistic overview of this debate, see Aeppel, 2014.

Since forecasts of technological developments are notoriously inaccurate, one can only guess at whether or not the scientific community will continue to supply the basic knowledge underlying major commercial innovations at a slower rate than in the past. However, there is some evidence of a decline in research productivity in recent years. For example, Bloom, Jones, van Reenan and Webb (2017) present a wide range of evidence from various industries, products, and firms showing that while research effort is rising substantially, research productivity is declining sharply. Based on a broad range of case studies, they conclude that ideas are getting harder and harder to find.

Increases in labour productivity, particularly in the short run, depend more upon “incremental innovation”, that is, modest accumulated improvements in already existing products and production and organizational processes, than upon major scientific and engineering breakthroughs.²⁸ In this regard, the recent behaviour of the growth in labour productivity clearly suggests a slowdown in incremental innovation. Specifically, **table 3** reports rates of growth of real Gross Domestic Product (GDP) per hour worked in the United States and in the G-7 countries for various decades over the period from 1971 to 2020.²⁹ In the case of the G-7 countries, there has been a consistent decline in real GDP per hour worked over the entire period, although the most recent decade (2011–2020) shows the slowest rate of growth in real output per hour worked over the 50-year period. The pattern for the United States is less consistent given the increases in real GDP per hour during the decades 1991-to-2000 and 2001-to-2010 compared to earlier decades. However, the growth of real GDP per hour of work was substantially slower over the decade from 2011 to 2020 than in any of the earlier decades.

Since the growth rates reported in table 3 were calculated simply as the percentage change between the end-of-decade value of GDP per hour worked and the value at the beginning of the decade, it is possible that the relatively slow rate of labour

Table 3: GDP per hour worked (percentage change) in the United States and G-7 countries, 1971–2020

	United States	G-7 countries		United States	G-7 countries
1971–1980	11.91	27.8	2001–2010	21.44	13.8
1981–1990	13.83	21.9	2011–2020	9.93	9.6
1991–2000	17.84	20.5			

Source: OECD, 2021a; author’s calculations.

28. For an extensive discussion of this assertion, see Globerman and Lybecker, 2014.

29. The G-7 countries include Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

productivity growth over the decade from 2011 to 2020 reflects the adverse impact of economic shutdowns and other disruptions associated with the emergence of the COVID-19 pandemic in early 2020. In fact, evidence from Canada suggests that shutdowns of non-essential businesses in the first half of 2020 actually contributed to an increase in labour-productivity growth, since the businesses that were particularly adversely affected by COVID-related shutdowns were relatively low productivity service-sector businesses (Wang, 2021). In this regard, compositional changes in patterns of production brought about by public-health mandates may be contributing to an overly optimistic picture of the labour productivity performances of developed countries over the 2011-to-2020 period.

Since the ongoing (as of this writing) COVID-19 epidemic has likely brought lasting changes to workplace practices and supply-chain arrangements, any forecast of the behaviour of labour productivity growth over the decade from 2021 to 2030 is extremely fraught. However, there are certainly forces at play, beyond a possible slower rate of knowledge creation that argue in favour of a continuation of the relatively slow productivity growth of 2011 to 2020 and perhaps an even worse performance. It would unduly extend the length of this already lengthy study to discuss these forces in any detail. Hence, we only briefly outline them below.

Investments in machinery and equipment and intellectual-property products such as software make major contributions to labour productivity growth both by providing workers with complementary inputs and by serving as conduits for the introduction of new and improved technologies. The willingness of private businesses to invest in capital equipment, machinery, and related assets increases with higher expected net revenues from specific investments and decreases with higher costs of capital. The anticipated decrease in the future growth of the supply of labour by itself should increase the expected profitability of capital investments, given anticipated cost savings from using labour-saving machinery and equipment. However, increases in the cost of capital could offset investment incentives created by higher costs of labour. Specifically, higher costs of debt and equity going forward could reduce the discounted value of any increases in the future profits expected from capital investments. The benchmark risk-free real interest rate in capital markets is the yield on US Government 10-year bonds minus the rate of inflation. This risk-free real rate was well below 1% from 2010 to 2020 and is now arguably negative given the recent rate of inflation. From 1980 to 2010, it averaged around 3.5%.³⁰ While it is certainly possible that a decline in the natural rate of interest has made low real interest rates a permanent macroeconomic feature, it

30. Ominously, the risk-free long-term interest rate averaged around 0.3% over the period from 1970 to 1979, presaging and coinciding with the rapid escalation of inflation commencing in the mid-1970s (Globerman, 2021a).

seems more likely that current real long-term interest rates that are close to, or even below, zero are unsustainable, even if central banks continue to be large purchasers of government debt.³¹

Besides the likelihood of an increase in real interest rates, corporate investment is likely to be discouraged by higher future tax rates and increased government regulations.³² The latter include government-mandated clean energy initiatives that, whatever their benefits in terms of addressing global warming, will likely have lower private rates of return than those from “conventional” corporate investments. More generally, a proliferation of “populist” economic measures including trade protectionism, government subsidies to “strategic” industries and companies, and government-led efforts to “onshore” larger portions of manufacturing supply chains, especially away from China, arguably has contributed to the slowing of labour productivity growth discussed earlier and may well continue to be a drag on future productivity growth.

In summary, there are strong reasons to expect the growth rate of potential output to decline going forward from what was already a relatively slow rate of increase over the past decade. Specifically, a decrease in the rate of growth of the labour supply seems a demographic certainty that might be augmented by increases in payroll and personal income taxes. At the same time, an increasingly unfavourable environment surrounding corporate investment argues against expecting an offsetting increase in the rate of growth of labour productivity. In short, T in the Equation is unlikely to grow at a faster rate than it did in recent years and might well grow even more slowly. This implies that unless V continues to decline substantially going forward, double-digit growth in M will likely produce inflation well above the notional 2% target of most central banks and that may well be as severe and as durable as the decade-long inflation that averaged 8.13% per year from 1975 to 1985.

Outlook for the velocity of money

The 22.7% decline in the velocity of money in the United States from 2019 Q1 to 2021 Q2 was a major offset to the approximately 42% increase in M2 over the same period, given the determinants of inflation according to the Equation. To my knowledge, there have been no econometric studies identifying the statistical determinants of the recent dramatic decline in the velocity of money. One plausible explanation offered by the media is that the large income-support programs implemented by governments in response to the COVID crisis created massive cash balances for households and businesses that have

31. There are various definitions of the natural rate of interest. In broad terms, it is the risk-free rate of interest consistent with stable inflation over a long-run period—5 to 10 years. The potential direction of the central bank’s monetary policy and its implications for future inflation will be discussed below.

32. At the time of writing, the Biden Administration in the United States is backing a Congressional budget proposal that will raise the corporate income-tax rate substantially for US companies, while it is also promoting the adoption of a minimum international corporate tax rate.

been largely saved. In the case of households, the savings reflected, in part, restrictions imposed on the operations of non-essential businesses, which constrained household spending on recreation, travel, and entertainment. For businesses, the uncertainty surrounding when and how robustly demand would return increased the precautionary demand for money (Antia, 2021). This explanation suggests that the recent reduction in velocity is likely to be significantly reversed with the restoration of economic conditions much closer to what existed before COVID.

To be sure, the reduction in the velocity of money predates the onset of the COVID-19 pandemic. As shown in table 2 (p. 9), the decade from 2011 to 2020 saw a substantial (21.2%) decrease in the velocity of money compared to 2001–2010. Again, I have seen no quantitative studies that identify reasons for the decline in velocity over this period. However, it seems reasonable to argue that the housing crisis of 2008/09 and the accompanying recession, especially in the United States and several other wealthy countries, increased the demand for money on the part of households and businesses. As well, the decline in inflation from the 2001–2010 decade to the 2011–2020 decade anchored inflation expectations around the 2% target of central banks, which, in turn, by reducing the cost of holding money, supported the demand for cash and near-cash assets.

It is certainly possible for velocity to remain at its post-1971 low and even decline further, especially if the pandemic crisis fails to abate. However, a credible case can be made that velocity will rebound towards its average value (1.82) realized over the period from 1971 to 2020. One reason is the prospect of continued increases in government spending on real goods and services, which, whether financed by taxes or borrowing, transfers potential demand from the private sector to the public sector. To the extent that the demand for money on the part of households and businesses has increased in recent years as a result of their increasing reluctance to spend money, whatever the reasons, that phenomenon will be mitigated by transferring more money balances into the hands of governments that are clearly eager to spend those balances.

A second reason for anticipating an increase in the velocity of money going forward is that expectations about inflation are arguably becoming less anchored to the low inflation target that central banks have credibly committed to for the past two decades. The recent change in US Federal Reserve's policy to tolerate inflation above 2% per year for some period of time has raised some doubt about the commitment of the largest central bank in the world to maintain its 2%-per-year inflation target (Cox, 2020). The extended period after 2019 during which central banks have been the largest direct purchasers of government bonds has also raised doubts about whether central banks are as committed to price stability as they were prior to the onset of the COVID-19 pandemic. To the extent that inflation expectations of households and businesses become less anchored to the 2%-per-year inflation target, especially as actual inflation drifts upward, the more likely they are to hold fewer cash balances as a store of wealth, since they will rationally view M2 holdings as being more likely to lose real value than was the case in the past.

If the growth rate of potential output slows, while the velocity of money increases, central banks will necessarily need to reduce the rate of growth of the money supply if a significant and non-transitory increase in inflation is to be avoided. The rate of growth of M2 during the first half of 2021 was more than 2.5 times faster (on annualized basis) than its rate of growth over the period from 1971 to 1980, a decade that included annual inflation as high as 13.5% (1980) and that averaged almost 8% per annum over that decade. The imperative to dramatically reduce the growth rate of the money supply raises at least two important questions: [1] Are central banks able to control the rate of growth of the money supply given existing tools of monetary policy? [2] Are central banks willing to take the actions needed to substantially reduce the rate of growth of the money supply?

5 Monetary Policy and Inflation

A basic tenet of Modern Monetary Theory (MMT) is that the central bank's monetary policy is no longer effective as a stabilization tool, if it ever was (Globerman, 2021a).³³ A related tenet is that the period of expansionary monetary policy by the US central bank (Quantitative Easing) following the housing crisis of 2007 and the 2008/09 recession had minimal effect on the growth of the money supply. Hence, the recent surge in M2 in the United States (and elsewhere) should be of little concern to policy makers according to MMTers, and the continued purchases of government debt by the central bank to fund increased public spending is likely sustainable without necessarily triggering higher inflation.

In fact, data reported in **table 4** provides some ambiguous support for the assertion of MMTers that there is a disconnect between the central bank's policy and the growth of the money supply. Specifically, the monetary base in the United States grew at a simple annual average rate of 23.3% over the period from 2001 to 2010. This compares to an 8.41% annual average growth rate for the other four decades: 1971–1980; 1981–1990; 1991–2000; and 2011–2020. At the same time, the growth of M2 averaged 6.15% at a simple annual average rate from 2001 to 2010, which was below the average annual growth rate of 7.17% for the other four decades for which data are reported in table 4. In short, an explosive growth in the monetary base from 2001 to 2010 did not materialize in an explosive growth in M2;³⁴ however, as table 4 reports, the annualized (and extraordinary) 29.6% increase in the monetary base in the first half of 2021 was accompanied by an annualized growth rate of M2 of 25.9%.

Table 4: Average per-annum growth (%) in US monetary base and M2

	Monetary base	M2		Monetary base	M2
1971–1980	9.21	9.76	2001–2010	23.3	6.15
1981–1990	8.19	7.71	2011–2020	6.81	6.20
1991–2000	9.44	4.99	2021 Q1/Q2	29.6	25.87

Sources: Federal Reserve Economic Data [FRED], 2021a, 2021b; author's calculations.

33. It should be noted that most non-MMT economists share Friedman's (1968) view that central bank monetary policy is a powerful influence on changes in the aggregate price level.

34. Williams (2012) highlights this disconnect between the growth of the monetary base and the growth of M2 and ascribes it, in part, to the US central bank's paying interest to commercial banks on the reserves they hold at the central bank.

To understand the possible reason for the difference in the relationship between the growth of the monetary base and the growth of M2 during the two periods of exceptionally rapid growth in the monetary base, it is helpful to note that the monetary base consists of banknotes and coins held by the public and commercial bank reserves that are cash deposits held in the banks' accounts at the central bank. Reserves make up the bulk of the monetary base. In turn, central banks influence the monetary base primarily by buying and selling government securities in the private capital market. When the central bank buys securities, private-sector sellers receive cash in return for the securities they sell. That cash takes the form of deposits in the accounts of the sellers at commercial banks that, in turn, create commercial-bank reserve deposits at the central bank. Hence, the central bank's purchases of government securities increase commercial bank reserves, which, in turn, expand the capacity of commercial banks to make loans to the private sector. Those loans, in turn, take the form of demand-deposit accounts in commercial banks, therefore contributing to an increase in the money supply. The opposite dynamic occurs when the central bank sells government securities: commercial bank reserves decline, and bank lending must contract, thereby shrinking the money supply.³⁵

An obvious issue raised is why the relationship between the growth of the monetary base and the growth of the money supply during the 2001–2010 period was so much different than the relationship between the two variables in the first half of 2021. There are several plausible and non-competing possible explanations. One plausible explanation of the different experiences might arise from the different underlying economic circumstances characterizing the two periods. The growth in the monetary base (in the United States) was especially rapid from 2007 to 2010. Specifically, it grew by 142% over that period. Over the entire period from 2001 to 2010, it grew by 233%. The 2007–2010 period was characterized by a financial crisis that involved a major financial institution declaring bankruptcy (Lehman Brothers), a collapse in housing wealth, a severe recession, and a great deal of uncertainty surrounding the global economic outlook. While central banks implemented aggressive quantitative easing in the aftermath of the subprime mortgage crisis of 2007, particularly to stabilize asset prices by undertaking a massive increase in the acquisition of government debt, there was also and unsurprisingly a reluctance on the part of banks to make loans to businesses and households, as well as a reluctance on the part of households and businesses to borrow money given the severe ongoing recession, a substantial decline in household net worth, and uncertainty about the creditworthiness of borrowers. Consequently, the growth of the money supply lagged far behind the growth of the monetary base, and commentators increasingly raised a concern that central banks no longer had much control over the growth of the money supply (Aziz, 2015).

35. For a discussion of the various monetary policy tools used by central banks and their potential influence on bank reserves and the money supply, see *What Is the Money Supply?* (Anna J. Schwartz, undated).

Government shut-downs of non-essential businesses combined with voluntary self-isolation, especially by individuals deemed to be at high risk of suffering particularly bad outcomes from COVID-19 infection, contributed to a sharp decline in GDP in most developed countries in the first half of 2020. The response of governments and central banks to the economic consequences of the spread of the pandemic included massive income and revenue support programs for workers and businesses, loan programs for businesses backed by treasury and finance departments, mortgage insurance and mortgage forbearance schemes for households, federal aid to lower levels of government, and a spike in government spending on public-health measures. Moreover, much of the financing for increased government spending took the form of direct purchases of government bonds by central banks. The money borrowed by the government was directly and indirectly converted into commercial bank deposits held by households and businesses that were beneficiaries of government income-support programs. Further, government backing of bank loans to businesses and mortgages to households reduced the risk of lending on the part of banks, while forbearance of mortgage defaults and active government encouragement of banks to make mortgage loans helped ignite a sharp increase in housing demand and increased borrowing related to house purchases and home-owner-related expenditures. As a consequence, the rapid expansion of the monetary base post-2019 was also accompanied by a sharp increase in the money supply. In short, the post-2019 experience suggests that central banks retain the ability to increase the money supply, albeit the degree of control depends upon economic conditions. By extension, they have the ability to reverse the growth of the money supply.

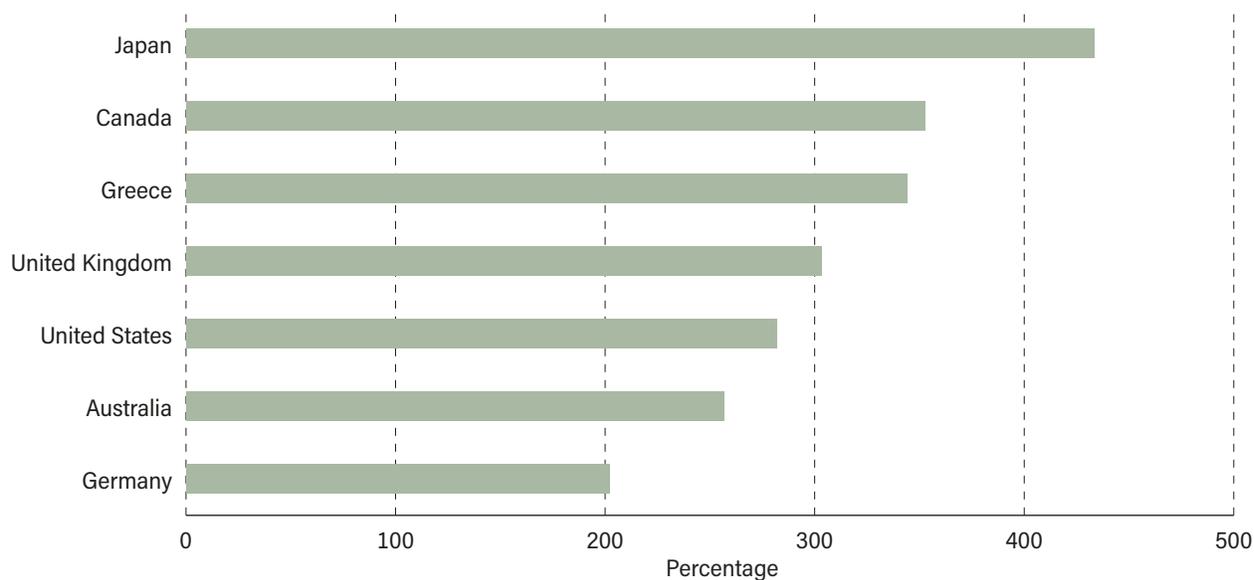
If one concedes that central banks still have a robust ability to control the growth of the money supply, and if one agrees that the future trajectories of V and T are likely to be stronger contributors to inflation going forward than they have been over the past few decades, one should conclude that a continuation of the recent expansionary monetary policies of central banks might well precipitate a return to the prolonged inflation of the period from mid-1970 to mid-1980. Absent a sharp reversal of central bank programs of quantitative easing, forecasts that inflation will return to the 2% target rate of central banks by mid-2022 at the latest are likely to prove spectacularly wrong. The related issue is then whether central banks will reverse their recent policies of quantitative easing in a manner sufficiently timely and aggressive to blunt the outlook for rising inflationary pressures outlined in this study.

While officials of central banks in Canada, the United States, and Europe have moved the tapering of their purchases of government bonds onto their agendas, the speed and degree of tapering remain uncertain.³⁶ It is clear that there is a growing

36. On October 27, 2021, the Bank of Canada announced it was ending quantitative easing and moving into the reinvestment phase during which it will purchase Government of Canada bonds solely to replace maturing bonds (Globerman, 2021b).

constituency in support of a continuation of expansionary monetary policy. This constituency is prompted by the substantial indebtedness of governments, households, and the corporate sector in developed economies, as illustrated in **figure 2**. This indebtedness creates political support for a continuation of negative real interest rates, including a continuation of purchases of government bonds by central banks. In particular, higher real interest rates increase the financing burden on governments, thereby reducing the financial ability of governments to increase funding of income support programs, green energy initiatives, and other government priorities.

Figure 2: Debt as a percentage of GDP in seven developed economies, end of 2020 Q3



Source: Argitis, 2021.

Central banks are nominally independent of government treasury and finance departments. However, this independence is not “guaranteed”: van den Berg (2018) notes that there is no consensus among academics about how best to measure the independence of a central bank. For example, under the Federal Reserve Act, the US president may remove any member of the board of governors of the US Central Bank with “cause”.³⁷ However, the Federal Reserve Act does not define cause, and case law on this issue is considered to be vague. Legal scholars believe, on balance, that the chair of the Federal Reserve does not enjoy protection against being removed by the US president. Although the chair of the Federal Reserve is only one member of the Open Market Committee that makes monetary policy decisions, the chair has traditionally had a major influence on the committee’s operating decisions.

37. See van den Berg, 2018 and Globerman, 2021a for a more detailed discussion of *de facto* versus *de jure* central bank independence

The Bank of Canada Act sets out the central bank's mandate, powers, and structure and provides the central bank a considerable level of independence. However, under the Act, the minister of finance and the governor of the Bank of Canada must consult regularly on monetary policy and on its relation to general economic policy. The Act does state that the central bank must work in the best interests of the nation's economic life rather than on behalf of the government. Furthermore, the governor and deputy governor of the Bank of Canada enjoy substantial protection from dismissal by a government that disagrees with the Bank's decisions. Still, under the Act, if the minister of finance and the governor of the Bank of Canada disagree on monetary policy, the minister of finance must give a written directive that the Bank must follow. The directive must be made public, and the government must present the directive to Parliament. While, to date, no minister of finance has used this directive power, the potential to do so clearly represents a threat to the Bank's independence.

In summary, criticisms that dismiss the relevance of monetary policy as a determinant of the growth of the money supply, as well as the importance of the growth of the money supply as a determinant of inflation are, at best, misguided and, at worst, dangerous invitations to a substantial and sustained period of inflation. The credible commitment of central banks to maintaining low and stable rates of inflation has been the cornerstone of monetary policy over the past three decades.³⁸ The credibility of this commitment is coming into question as central banks continue their unprecedented direct purchasing of government bonds. Continued delays in making the politically fractious decision to tighten monetary policy increase the likelihood that developed economies will again experience the devastating inflation of the 1970s and 1980s.

38. The commitment has primarily taken the form of an inflation anchor which, for the major central banks, has been set at 2% per annum over the past three decades.

Concluding Comments

Central bankers have assured financial markets that the recent increases in inflation are transitory, arguing that they are primarily the outcome of supply-chain disruptions related to the COVID-19 pandemic. It is undoubtedly the case that disruptions of supply chains have reduced the potential output of developed economies, which has amplified the effect of massive recent increases in the money supply on the prices of goods and services. In this context, improvements in supply-chain efficiencies will ease future inflationary pressures, other things constant. However, other longer-run developments underscore the potential for inflation to be sustained rather than transitory. Specifically, a case can be made that the growth rate of potential output over the next decade will be even slower than it was over the previous decade. Furthermore, an increase in the velocity of money going forward seems more likely than a continuation of the trend towards decline in that variable. To the extent that T declines over the foreseeable future while V increases, any rate of expansion of the money supply is likely to have more of an inflationary impact than was the case over the past two decades.

It is reckless to believe that a continuation of the recent growth rate of the money supply will not be a significant inflationary accelerant. The issue is not whether central banks can substantially moderate the growth of the money supply. The relevant issue is whether central banks will exercise their *de jure* independence to do so in light of what is likely to be substantial political pressures to maintain very low, even negative, real interest rates. The longer that central banks delay a substantial tapering of their direct purchases of government debt instruments, the more likely it is that public expectations of higher inflation will take root, which, in turn, will increase the imperative for central banks to substantially moderate the growth of the monetary base in order to curb the growth rate of the money supply.

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Acknowledgments

The author thanks two unidentified external reviewers for helpful comments on an earlier draft. 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.

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Date of issue

2021

ISBN

978-0-88975-677-9

Citation

Steven Globerman (2021). *The Outlook for Inflation and Its Links to Monetary Policy*. Fraser Institute. <<http://www.fraserinstitute.org>>.

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