

CHAPTER 9

Monetary Policy: A Preview

CHAPTER HIGHLIGHTS

- The objective of monetary policy is to preserve the value (purchasing power) of a nation's currency. Many countries focus on keeping inflation low, stable, and predictable to achieve this goal. Ultimately, monetary policy seeks to promote sound financial decision making, long-term investments, economic growth and job creation, and individual well-being.
- Monetary authorities manage the money supply by raising or lowering short-term interest rates. Through various channels, lower interest rates raise demand for a country's goods and services. Higher aggregate demand puts upward pressure on prices. If price increases threaten the inflation target, interest rates will be raised.
- Central banks balance the effects of monetary policy decisions on both output and inflation. The relative weights given to each can be summarized by the Taylor rule.
- In explaining the macroeconomy, we explain where we end up when a shock affects prices and output. In contrast, policymakers pinpoint where the economy should be and then determine how much change is needed to get there.

A key goal of macroeconomics is to understand how the aggregate economy works to explain outcomes. One needs to understand the macroeconomy before one can tweak it to improve it or react properly to events that affect it. How to intervene—to use fiscal and monetary policy to change outcomes—is a second key goal of macroeconomics.

Much of the material in earlier chapters explored aggregate supply. This chapter introduces the machinery and objectives of monetary policy, which is used on a daily basis to fine-tune and stabilize the economy by influencing aggregate demand. Fundamentally, the central bank moves short-term interest rates in response to deviations of output and inflation from desired levels—a notion summarized by the Taylor rule.

As we begin to learn how knowledge of the macroeconomy is applied in practice, we set the stage for our discussions in subsequent chapters. Going forward, we'll delve more deeply into the details of aggregate demand, and build a model that is a simplified version of the models central banks really use to make monetary policy decisions. We'll also discuss fiscal policy, which tends to be more lumpy in its application, and typically takes time both to legislate and to take effect.

9-1 The Machinery of Monetary Policy

Before we dive into details in subsequent chapters, let's think about how monetary policy authorities operate as it might be explained by newspapers and magazines, radio and television stations, and online sites that provide high-quality coverage of the economy. Journalists often gather information and organize their stories in terms of the Five Ws: *who*, *what*, *why*, *when*, and *where*. We do so here as well.

The “Who”

Both fiscal policy—changes in taxes, and government spending and borrowing—and monetary policy—actions taken by the central bank to influence short-term interest rates and manage the money supply—influence macroeconomic conditions. Most short-term tuning of the economy is done with monetary policy.¹ So the “who” of stabilization policy typically means the central bank; for example, the Bank of Canada in Canada,² the Federal Reserve System (“the Fed”) in the United States, the Bank of England in the United Kingdom, and the European Central Bank for the 19 European Union countries that have adopted the euro.

In Canada, responsibility for interest rate decisions and the conduct of monetary policy rests with the **Governing Council** of the Bank of Canada. The Bank of Canada is a Crown corporation, the share capital of which is held by the Minister of Finance on behalf of the federal government. The Governing Council is composed of the Bank's Governor and Senior Deputy Governor, and four Deputy Governors. The Governor and Senior Deputy Governor are appointed for seven-year terms by the 12 members of the Bank's Board of Directors, with the approval of the Cabinet of Canada.³ Directors, appointed by the Minister of Finance, with the approval of Cabinet, serve three-year terms. The work of the Governing Council is informed through meetings of the Monetary Policy Review Committee, whose members also include various advisors, and senior personnel of the Bank and its regional offices.

¹For a discussion of the use of fiscal policy, see Alan Auerbach, “Is There a Role for Discretionary Fiscal Policy?” *Rethinking Stabilization Policy*, Federal Reserve Bank of Kansas City, 2002.

²In addition to monetary policy, the Bank of Canada has three other core functions: it fosters a stable financial system by providing oversight, liquidity, and other services, and acting as a lender of last resort; it is the federal government's banker, and manages the accounts of the Receiver General, Canada's foreign exchange reserves, and debt; and it is the sole authority for designing, producing, and issuing bank notes.

³Tiff Macklem is the current Governor of the Bank of Canada. He assumed this role on June 3, 2020.

In the United States, the Board of Governors of the Federal Reserve System is responsible for setting interest rates. Its seven members are nominated by the President and confirmed by the Senate for 14-year terms. The Board works with the Federal Open Market Committee (FOMC), of which it is a part, to conduct monetary policy. The other members of the FOMC are the president of the Federal Reserve Bank of New York and four of the remaining eleven Reserve Bank presidents, who serve 1-year terms on a rotating basis.



9-1 History Speaks

Bank of Canada Independence

In some countries, the national government has a good deal of influence—sometimes officially and sometimes behind closed doors—on the decisions of the central bank. An independent central bank separates the power to create money from the power to spend money. Relatively long tenures allow governors to adopt longer-term perspectives than elected national governments. The tradeoff between a short-term reduction in unemployment at election time and a long-term increase in inflation is therefore less likely, which makes for more effective monetary policy. For this reason, the trend in many countries has been toward greater independence in the regular activities of central banks (see Section 18-7). At the same time, monetary policy can only be unbiased if the central bank decision makers are impartial as well.* Accordingly, the personal histories and views of central bank governors and directors matter, and their appointments are carefully scrutinized.

The question of the independence of the Bank of Canada took centre stage in 1961. At issue was essentially a difference of opinion about which was more important, unemployment or inflation. We know about the tradeoff between unemployment and inflation from Chapter 6, but keep in mind that it was not formalized by Bill Phillips until 1958, and also that expectations would not be added to the simple Phillips curve for at least another decade. We also know from Chapter 6 that whenever either inflation or unemployment is high, it is seen as *the* national issue. Well, inflation and unemployment were both “high” (relatively speaking) in the late 1950s and early 1960s. The unemployment rate averaged 6.6 percent between 1958 and 1962, about double its 1956 value. Nonexistent in 1955, inflation peaked at the rate of 3.5 percent in 1957, and then averaged 1.3 percent from 1958 to 1963.

In June 1957, the Progressive Conservatives under the leadership of John Diefenbaker were able to form a minority government despite having lost the popular vote in an upset election victory over the Liberals led by Louis St. Laurent. James Coyne, who had been appointed Governor of the Bank of Canada two years earlier, had been directing the Bank’s efforts to keep inflation low, and held the view that governments should run balanced budgets and that there was no long-run tradeoff between inflation and unemployment. In the 1957 election campaign, Diefenbaker had promised that “tight money will disappear under a Conservative administration,” and once elected, his government began running a budget deficit to stimulate the economy and reduce unemployment. There was also some disagreement, and political waffling, about who was ultimately responsible for monetary policy.

To make a long story short and to be polite (in typically Canadian fashion), let’s just say that the Conservative government and Coyne did not see eye to eye and could not come to an agreement. After a long, unedifying public fight, and following

an unsuccessful attempt by the government to legislate him out of his position, Coyne resigned.[†]

Louis Rasminsky succeeded Coyne as Governor in May 1961. Due to the controversy surrounding Coyne's departure, Rasminsky had insisted, as a condition of his appointment, that the roles and responsibilities of the Bank and the government over monetary policy be clearly defined.[‡] As of 1967, the law was clear in this respect. Section 14 of the *Bank of Canada Act* sets out the relationship between the Minister of Finance and the Governor of the Bank of Canada. Should a difference of opinion arise between them about the conduct of monetary policy, the Minister may direct the Bank to comply with the wishes of Cabinet, and the government must make the written directive public.

The joint five-year public agreements between the federal government and the Bank on the inflation-control target serve today to establish the goals of monetary policy, and remove politics from the Bank's day-to-day operations, thereby solidifying its independence. Those agreements did not exist 60 years ago. Neither did a good deal of the economic theory you are learning today!

^{*}See Chris Adolph, *Bankers, Bureaucrats, and Central Bank Politics: The Myth of Neutrality* (Cambridge University Press, 2013).

[†]Peter C. Neuman, "What Was Behind the James Coyne Fiasco?" *MacLean's*, October 19, 1963.

[‡]Gordon Thiessen, Governor of Bank of Canada, "Can a Bank Change? The Evolution of Monetary Policy at the Bank of Canada 1935–2000," lecture to Faculty of Social Science at University of Western Ontario, Bank of Canada, October 2000.

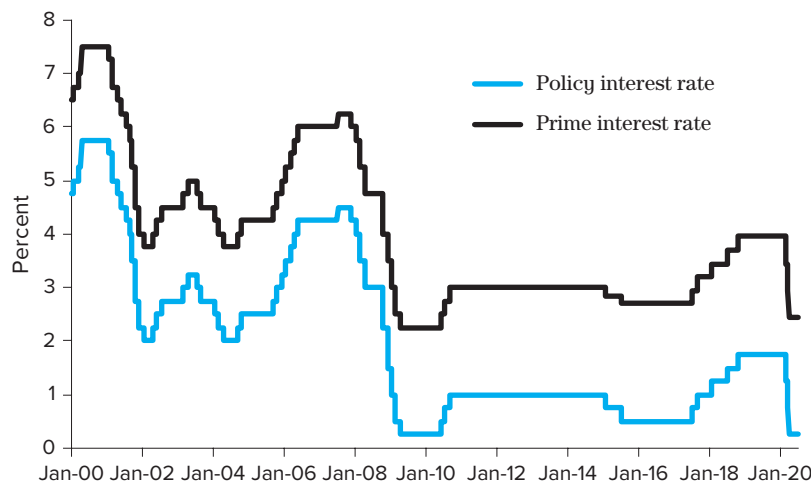
The “What”

The central bank conducts monetary policy by raising or lowering the rate used for one-day or “overnight” loans between financial institutions. In Canada that rate is called the **overnight rate**, and in the United States, the *federal funds rate*. Whatever its name, the *target set* for this benchmark rate, termed the **policy interest rate** in Canada, affects the prime rate—the interest rate commercial banks charge their most creditworthy customers—and has a ripple effect on interest rates for bonds, mortgages, personal and business loans, credit cards, and other forms of lending.

Figure 9-1 shows the policy interest rate and its relationship to the prime rate between 2000 and 2020. Since July 2015, the prime rate has equalled the policy interest rate plus 2.2 percentage points.

Higher interest rates make it more expensive for banks and other financial institutions to borrow money, so they raise interest rates to cover their added costs. The higher cost of borrowing encourages households to save more, and consumers and firms to borrow and spend less. For example, variable-rate mortgage payments increase when interest rates rise, reducing the amount of money households have for other spending. New fixed-rate mortgages become more expensive, dissuading households from purchasing new houses. Consumption and investment, two components of aggregate demand, fall. For a given overall price level, the aggregate demand curve shifts left. The relation between interest rate adjustments and borrowing and spending behaviour is called the **interest rate effect**.

Higher interest rates reduce asset prices. Bond prices decline, and reduced consumer and business spending negatively affects earnings, which causes firms' stock prices to fall. Lower wealth reduces spending. For a given overall price level, the

FIGURE 9-1 Canada's Policy and Prime Interest Rates, 2000–2020

Source: Bank of Canada.

aggregate demand curve shifts left. The **wealth effect** is relation between wealth and consumption spending.

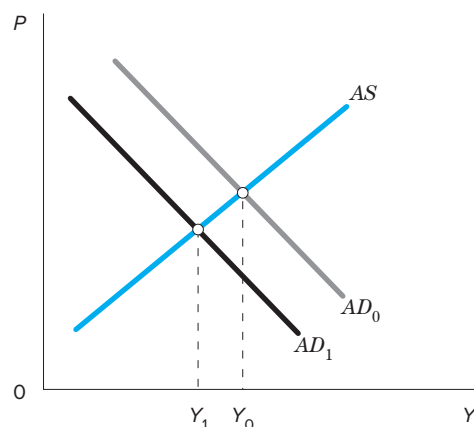
Higher interest rates make a nation's assets more attractive to foreign savers. This attracts foreign capital, which raises the value of the domestic currency relative to other currencies (its purchasing power over foreign goods). A flexible exchange rate appreciates. A dollar can buy more foreign goods, while a given amount of foreign currency, a euro for example, can buy fewer Canadian goods. This discourages relatively-higher-cost exports (foreign spending on domestic goods) and encourages relatively-lower-cost imports (domestic spending on foreign goods), decreasing net exports, a third component of aggregate demand. For a given overall price level, the aggregate demand curve shifts left. The relation between exchange rates and net exports might be called the **exchange rate effect**.

So higher interest rates reduce aggregate demand through various channels. We introduced the national income accounting identity in Chapter 2. Total or aggregate demand, AD , for domestic output, Y , is composed of four spending categories: consumption, investment, government spending, and net exports. Government purchases are discretionary, but the other three categories are affected by interest rates.

$$Y = AD(i) = C(i) + I(i) + G + NX(i) \quad (9-1)$$

When the output gap is positive (see Chapter 5), the Bank of Canada may raise the nominal policy interest rate to dampen growth, keep inflation in check, and support a positive real return for investors. The AD curve shifts left because higher interest rates reduce consumption, investment, and net exports. This is shown in Figure 9-2. In the medium run, higher interest rates reduce economic activity and lower prices.

Lower interest rates operate through the same channels—consumption, investment and net exports—but to increase aggregate demand—shift it to the right. They stimulate economic activity and lead to higher prices. We have uncovered a key piece of information: **monetary policy affects the economy by influencing aggregate**

FIGURE 9-2 Higher Interest Rates Shift Aggregate Demand to the Left

demand. In terms of what it does not do, monetary policy has little to no influence on aggregate supply.

The details of how central banks operate are explored further in the next section and in Chapter 17. A deeper look at the avenues through which interest rates influence an economy are covered in Chapter 11 through Chapter 15.

The “Why”

The preamble to the *Bank of Canada Act* sets out the Crown corporation’s mandate to “regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada.” In other words, the Bank is to work to keep inflation low, and by implication, to stabilize real GDP around potential GDP.

There is an obvious conflict between these two goals. Increasing aggregate demand increases economic activity, but also leads to higher inflation. Higher economic activity increases standards of living and reduces unemployment, the costs of which are large compared to the costs of low, stable inflation. So there is a natural tendency to emphasize boosting economic activity to enhance economic welfare over controlling inflation. Unfortunately, the vertical long-run supply curve means that, while the central bank can change prices by affecting aggregate demand, it has no influence over the productive capacity of the economy in the long run. In the short run, the relatively flat aggregate supply curve allows for monetary policy to stimulate economic activity, but only temporarily and with the unintended consequence of higher prices in the future.

Central banks recognize these tensions and have modified their policy objectives in two ways. First, central banks focus on stabilizing economic activity around a sustainable goal rather than increasing economic activity. Essentially, the goal on the output side is to stay close to potential GDP or the natural rate of unemployment. Second, many central banks have moved toward **inflation targeting**, in which much weight is put on hitting a low and unchanging inflation target. The inflation target

the Bank of Canada uses to guide its monetary policy under the terms of five-year agreements with the federal government is the 2 percent midpoint of the 1 to 3 percent inflation-control range as measured using the all-items CPI. The day-to-day conduct of monetary policy is the Bank's responsibility. The relative importance put on the output and inflation goals can be summarized by the **Taylor rule**, discussed in the next section.

The “When”

The Bank of Canada's policy interest rate—the target it sets for the overnight rate—is normally adjusted on eight fixed dates every year, between five and eight weeks apart.⁴ This system for announcing changes was introduced in November 2000. Prior to that date, the Bank could, in principle at least, adjust interest rates on any business day. The 2020 schedule for overnight rate announcements, each on a Wednesday at 10 a.m., was issued in July 2019.

Benefits of the fixed-date approach include

- greater certainty about when the overnight rate might be adjusted to enable market participants to better prepare for any changes;
- regular opportunities for the Bank to provide information on the economy, the economic and financial outlook over 18 to 24 months (the time horizon for monetary policy actions to take full effect), and the conduct of monetary policy to improve understanding and decision making; and
- greater transparency in the conduct of monetary policy to enhance credibility in the Bank, its actions, and the inflation-control target (expectations of future interest rates).

Many other central banks in developed countries also use preset dates including the U.S. Fed, the Bank of England, and the European Central Bank.

The “Where”

The Bank of Canada actually sets a *target* or *operating band* for the overnight rate. The top of the band is the **bank rate**—the rate Canada's major financial institutions pay for one-day loans from the Bank. The bottom of the band is the **deposit rate**—the rate the Bank pays Canada's major financial institutions on their one-day deposits with the Bank. The overnight rate is the centre of the band. The band itself is normally one-half of a percentage point. The Bank's target for the overnight rate is therefore really the average rate the Bank wants to materialize in the overnight market.

What is the **overnight market**? It is the Large Value Transfer System (LVTS), a national, Canadian-dollar, electronic credit transfer system run by Payments Canada,

⁴Of course, the Bank of Canada can change, and has changed, the policy rate between fixed announcement dates in extraordinary situations. It did so most recently in March 2020 in response to the “material negative shock to the Canadian and global outlooks” of the COVID-19 virus. The policy interest rate was reduced three times that month, to 1.25 percent on March 4, to 0.75 percent on March 16, and finally to 0.25 percent on March 27. Actions that the Bank of Canada takes in extraordinary situations are discussed further in Chapter 17.

under the authority of the *Canadian Payments Act* and the *Payment Clearing and Settlements Act*, to provide real-time processing and finality of payment for large-value transactions.⁵ Oversight of this clearing and settlement system is shared by the Bank of Canada and the Minister of Finance. The Bank of Canada and 15 major financial institutions participate directly in the LVTS. They calculate how much they owe each other at the end of each business day as a result of their and their customers' transactions, and how much they need to borrow and lend, and transfer funds among themselves and the Bank of Canada to settle those balances. In 2019, the LVTS was used to clear and settle a daily average 40,000 payments totalling almost \$190 billion, about 87 percent of the total value moving through the Canadian payment system.

The LVTS is where the Bank of Canada implements monetary policy every day. Publicly announced changes in the policy interest rate tell direct LVTS participants the average interest rate the Bank wants in the overnight market. Here is how the Bank ensures the target is hit:

- First, borrowing and lending among direct LVTS participants moves the overnight rate away from the extremes of the 50-basis-point target band. A financial institution that has a net deficit position will need to borrow to permit settlement of the LVTS at the end of the day. Since it can always borrow from the Bank of Canada, the borrower need never pay more than the bank rate to obtain an overnight loan, and could pay less if it borrows from another direct LVTS participant. Similarly, a financial institution in a net surplus position need never receive an overnight return less than the Bank of Canada's deposit rate, and might receive more if it lends to another direct LVTS participant. Thus, it is in the interest of each direct LVTS participant to negotiate a more favourable overnight rate than the bank or deposit rates. Borrowing and lending among direct LVTS participants is routine, and encouraged by the Bank.
- Second, the Bank of Canada intervenes in the LVTS as required to move the overnight rate to the middle of the target band. If the overnight rate is higher than the midpoint, the Bank buys securities under Special Purchase and Resale Agreements, commonly called "repos," from direct LVTS participants in deficit. The sale provides cash (liquidity) to the borrower, and a return to the Bank when the issuer repurchases the securities at a higher price the next day. Pricing is set so that the Bank's return equals the lower policy interest rate. If the overnight rate is lower than the midpoint of the target band, the Bank sells securities to direct LVTS participants in surplus under Sale and Repurchase Agreements, commonly referred to as "reverses." The sale reduces liquidity in the market. Pricing is such that the one-day return earned by the lender equals the higher policy interest rate.

⁵Payments Canada also operates the Automated Clearing Settlement System (ACSS) through which almost all retail payments in Canada are cleared. The system handles both paper-based payments (cheques, Treasury bills, coupons) and electronic payments (direct deposits, e-transfers, debit and credit cards, online debits and credits). The Bank of Canada and 11 major financial institutions participate directly in the ACSS. In 2019, an average of almost 33 million transactions were cleared daily. A third system operated by Payments Canada, the U.S. Dollar Bulk Exchange (USBE), uses a mechanism similar to that of the ACSS, but for U.S. dollar payments drawn on U.S. dollar accounts at financial institutions in Canada that are settled through banks in New York.



9-1 What More Do We Know?

The Bank for International Settlements (BIS)

The BIS is an international financial institution based in Basel, Switzerland, and owned by 62 central banks and monetary authorities, including the Bank of Canada. The countries that the central banks represent account for about 95 percent of world GDP. The BIS supports central banks in promoting monetary and financial stability in their own countries and internationally, conducts economic research on policy issues, and provides banking services to central banks.

The way in which the BIS promotes global monetary and financial cooperation is known as the *Basel Process*. It revolves around meetings of governors and other senior officials of member central banks on the world economy and financial markets, and support for various committees engaged in the pursuit of international financial stability.

For example, the bimonthly meetings of the Global Economy Meeting focus on current macroeconomic and financial developments in major advanced and emerging market economies. The bimonthly All Governors' Meeting provides a forum for exchanging views on selected topics of general interest to BIS members.

The Basel Committee on Banking Supervision develops global standards for the prudential regulation of banks. The Committee on the Global Financial System monitors developments in global financial markets. The Committee on Payments and Market Infrastructures establishes and promotes global regulatory/oversight standards for clearing and settlement systems, and monitors developments in those areas.

9-2 Monetary Policy Rules

Inflation targeting involves setting a target for inflation within a range, adjusting a short-term interest rate based on forecasts of economic prospects, and being highly transparent and accountable in order to manage the private sector's expectations of future inflation. The inflation target adopted is often about 2 percent inflation, as measured by the CPI, plus or minus one percentage point.⁶ The inflation range allows for some flexibility in raising or lowering interest rates to meet current economic circumstances while maintaining the inflation target. Basing interest rate changes on the economic outlook recognizes the 18-to-24-month lag between monetary policy actions and their full effect. Keeping the inflation rate within the target range is critical to anchor expectations to the target, so that the policy is seen to be credible, and therefore, effective in keeping inflation low and stable. How do central banks implement the inflation targeting framework?

A **monetary policy rule** is a prescription for how a central bank should react in response to changing economic conditions in order to stabilize the economy in the short run. Various monetary policy rules have been proposed over the years.⁷ They

⁶A list of inflation targets by country may be found in Sarwat Jahan, "Inflation Targeting: Holding the Line," *Back to Basics: Economic Concepts Explained* (Washington, DC: International Monetary Fund, 2017). The inflation target for the United States is set out in "Statement on Longer-Run Goals and Monetary Policy Strategy" by the Board of Governors of the Federal Reserve System, as amended effective August 27, 2020.

⁷For an interesting discussion of the meaning of a monetary policy rule as followed by a central bank, and an examination of the design of such a rule, see William Poole, "Monetary Policy Rules?" *Review*, Federal Reserve Bank of St. Louis, March–April 1999.

might focus on the money supply, interest rates, inflation, or the overall price level. Each takes some discretionary authority away from central banks (or governments) in formulating and implementing policy to promote economic and financial well-being. To be operational, a monetary policy rule must pertain to an instrument under the direct control of the central bank, such as the money supply or a short-term interest rate. If economic conditions weaken, a particular rule would dictate how *accommodative or expansionary monetary policy* should be to stimulate aggregate demand and to move the economy toward full employment. When economic growth is strong, the same rule would indicate exactly how *contractionary or tight monetary policy* should be to reduce aggregate demand and achieve the same objective. Monetary policy rules are based on the notion that systematic policy is preferable to a purely discretionary approach, and a reaction to the poor performance of central banks during the Great Depression, and the 1970s and 1980s.

Constant Money Supply Growth

A constant rate of growth of the money supply is a simple monetary policy rule that was advocated by Milton Friedman.⁸ It is based on the quantity theory of money which we introduced in Chapter 5 and will elaborate on in Chapter 12. In essence, the proposal is to increase the stock of money circulating in an economy at a rate equal to the economy's natural (long-run) rate of nominal income growth. This is shown in Equation 9-2. For example, if the velocity of money, V —the average number of times a dollar is used to purchase goods and services—is constant, the long-run rate of growth of real GDP, Y , is 3.1 percent (as it was for Canada between 1961 and 2019), and the target rate of inflation, π^* , is 2 percent, then the rate of growth of the money supply, M , should be 5.1 percent annually.

$$\frac{\Delta M}{M} = \frac{\Delta Y}{Y} + \pi^* - \frac{\Delta V}{V} = 3.1 + 2 + 0 = 5.1 \text{ percent} \quad (9-2)$$

A constant-money-growth rule requires little information to implement and is not dependent on any particular macroeconomic forecasting model. However, it is a relatively blunt tool and, as indicated in History Speaks 9-2, doesn't really work all that well.



9-2 History Speaks

What's the Right Anchor?

To preserve the value of money, a central bank must provide a nominal anchor to tie down the price level. The money supply and inflation seem two likely candidates for guiding monetary policy. So why target inflation instead of the money supply?

Canada's monetary policy did target the money supply ($M1$ —currency outside banks plus chequable deposits held at financial institutions) beginning in late 1975. (It should also be noted that Canada was under a floating exchange rate at the time. Its adoption in 1970, for the second time, allowed monetary policy to be effective in

⁸Milton Friedman, *A Program for Monetary Stability* (New York: Fordham University Press, 1960).

influencing domestic economic conditions, as we will see in Chapter 13.) The U.S. began targeting the money supply in 1979.

We introduced the quantity theory of money in Chapter 5 to get a handle on the aggregate demand curve, even if the quantity theory does leave out some important elements—like the entire goods market! Recall that when the velocity of money, V , is constant, the equation $M \times V = P \times Y$ turns into an aggregate demand curve. The AD curve slopes downwards because, if the money supply, M , is constant, any percentage increase in real output, Y , must be offset by an equal percentage decrease in the price level, P . A decrease in the money supply shifts the AD curve down: a lower price is associated with any given value of Y . Consequently, with inflation rising to a new high of 12.7 percent in December 1974, it was thought as Friedman had suggested, that a gradual reduction in the money supply would get inflation under control over time. Inflation did fall to 5.6 percent two years later, but then began to rise again and aided by the second oil price shock, achieved another new high in July 1981 of 12.9 percent.

Two reasons were suggested for the policy's poor control over inflation. The first was that $M1$ was the wrong monetary aggregate to target because altering its growth rate did not affect interest rates enough to have the desired effect on aggregate demand. The second was that the ability of $M1$ to affect aggregate demand was weakened by financial product innovations designed to help shelter savers from inflation. In essence, the implication of the latter was that the velocity of money was no longer constant and no longer predictable. The link between money growth, aggregate demand, and prices had become unstable. Alternative monetary aggregates were explored, but they too were found to be unsatisfactory for using the money supply as the anchor to guide monetary policy. (Previous experience taught us as well that neither the gold standard nor fixed exchange rates were suitable nominal anchors.)

We also mentioned in Section 5-3 that, when the purchasing power of money, M/P , rises, interest rates fall and aggregate demand rises. This is the link to the goods market. In the previous section, we sketched out how short-term interest rates affect aggregate demand through interest rate, wealth, and exchange rate effects. We will develop a more complete understanding of aggregate demand—the combinations of the price level and level of output for which both the goods and money markets are simultaneously in equilibrium—in Chapters 10, 11, and 12.

In 1982, the Bank conceded that its experiment with Friedman's monetarism did not work. However, it took until 1991 for 2 percent inflation to become the formal anchor for monetary policy in Canada. Monthly inflation bounced around between 3.4 and 6.9 percent in the interim. New Zealand was first in 1990 to implement inflation targeting; Canada was second the following year. Inflation targeting was implemented implicitly in the U.S. in 1995 and explicitly, at a 2 percent rate, in 2012.

Inflation targeting combines elements of both “rules”—the 2 percent inflation target and range for the medium term— and “discretion”—the ability to respond to economic shocks to stabilize output in the short run—in monetary policy. To be effective, it requires a central bank that is independent (see History Speaks 9-1) and that does not get distracted from its inflation-control target. Using interest rates as the lever to influence aggregate demand to control inflation has been found to be more effective than a money supply growth rule. This is partly because central banks can control interest rates more precisely than the money supply, which depends on lending behaviour. Furthermore, since their effect on aggregate demand is through interest rates, changes to monetary aggregates are also unable to influence aggregate demand as successfully as altering interest rates directly. Today, the central banks of many countries, both developed and developing, use inflation targeting.

The Taylor Rule

The Taylor rule is another well-known example of a monetary policy rule that is helpful in thinking about how a central bank undertakes inflation targeting.⁹ Taylor's reactive rule recommends that a central bank raise short-term interest rates when inflation or employment levels are high. Conversely, when inflation and employment levels are low, interest rates should be lowered.

Specifically, the rule would adjust interest rates according to the deviation of inflation from its target rate and real GDP from potential output (or equivalently, the natural rate of unemployment).¹⁰ The objective is, therefore, to stabilize output at potential for some target inflation rate. Equation 9-3 provides one version of Taylor's rule.

$$i = r^* + \pi^* + (1 + \alpha)(\pi - \pi^*) + \beta \left(\frac{Y - Y^*}{Y^*} \times 100 \right) \quad (9-3)$$

If actual inflation, π , equals its target rate, π^* , and the economy is operating at potential output, so that actual output, Y , equals potential GDP, Y^* , then the nominal interest rate, i , equals the natural interest rate, r^* , plus the target rate of inflation. For example, if $r^* = 1$ percent, $\pi = \pi^* = 2$ percent and $Y = Y^*$, then $i = 3$ percent. The natural interest rate is a long-run real rate of interest, which for our purposes here is constant and therefore unaffected by changes in short-term nominal interest rates.¹¹

If the actual inflation rate is above target, $\pi > \pi^*$, or the output gap is positive (the economy is operating above potential), $Y > Y^*$, then the central bank should raise the interest rate for one-day loans. The parameters α and β , which are positive, indicate by how much to increase interest rates: by $1 + \alpha$ percentage points when actual inflation is one percentage point higher than target, and by β percentage points when the output gap is 1 percent.¹² For example, if $\pi = 3$ percent and $\alpha = 0.5$, the Taylor rule says that the 3 percent interest rate in the example in the previous paragraph should rise by 1.5 percentage points to 4.5 percent. On the other hand, if Y is 1 percent higher than Y^* , while inflation is on target, then the 3 percent interest rate in the example should rise by 0.5 percentage points to 3.5 percent if $\beta = 0.5$. If α and β are large, the Taylor rule dictates aggressive interest rate responses to above-target inflation and to economic booms. If α is large relative to β , the central bank should respond more aggressively to inflation than to the level of economic activity.

⁹John B. Taylor, "Discretion Versus Policy Rules in Practice," Carnegie-Rochester Conference Series on Public Policy, 1993. For evidence that the Taylor rule works in the U.S., see John P. Judd and Glenn D. Rudebusch, "Taylor's Rule and the Fed: 1970–1997," Federal Reserve Bank of San Francisco Review, 1998. For other monetary policy rules that prescribe the level and adjustment of the short-term policy interest rate based on the deviation of inflation from the target rate or the difference between the current value of real GDP and potential GDP, see "Policy Rules and How Policymakers Use Them," Board of Governors of the Federal Reserve System, March 2018.

¹⁰For this rule to work, a country must also be running a floating exchange rate.

¹¹The natural or neutral rate of interest is unobservable. As we will see in Chapter 11, it is, in concept, the real rate of interest that equilibrates saving and investment when output is at its steady-state level. The natural interest rate varies across countries and over time with changes in population growth and technical progress, factors affecting real GDP growth in the steady state, which we discussed in Chapter 3. Natural rates of interest have been declining in many countries. The Bank of Canada estimates the Canadian natural interest rate to have fallen from about 3.25 percent in the mid-2000s to a range of 0.5 to 1.5 percent in 2017. See José Dorich, Abeer Reza and Subrata Sarker, "An Update on the Neutral Rate of Interest," *Bank of Canada Review*, Autumn 2017, and Rhys R. Mendes, "The Neutral Rate of Interest in Canada," Discussion Paper 2014-5, Bank of Canada, September 2014.

¹²In discussing what a representative policy rule might look like, Taylor (1993) set $\alpha = 0.5$ and $\beta = 0.5$. See John B. Taylor, "Discretion Versus Policy Rules in Practice," Carnegie-Rochester Conference Series on Public Policy, 1993.

Applying a Taylor-Like Rule to Canada

Can Canadian interest rates be said to be following a Taylor-like rule? Let's consider a simple example keeping in mind that monetary policy decisions are forward-looking by 18 to 24 months. In telling the story, we will assume the Bank of Canada actually got their forecasts of inflation and real GDP growth right.¹³

It is January 2004 and we are making monetary policy decisions based on forecasts to 2006. Pichette, St-Amant, Tomlin, and Anoma (2015) indicate that Canada was operating near potential output in 2005, so we can effectively ignore the percentage output gap term in Equation 9-3.¹⁴ Inflation began edging up in mid-2004 and averaged 2.2 percent from that time to the end of 2005, slightly above the 2 percent target rate. Based on a Taylor-like rule, the Bank of Canada should have been increasing interest rates in 2004. This is indeed what happened. The policy interest rate increased from 2 percent in April 2004 to 2.5 percent in October 2004. Inflation finally fell below 2 percent August 2006, but averaged 2 percent in 2006.

Continuing with the example, it is now January 2005. Because average inflation is forecast to be on target in 2006, $\pi = \pi^*$, this time we ignore the term $(1 + \alpha)(\pi - \pi^*)$ in Equation 9-3. Pichette, St-Amant, Tomlin and Anoma (2015) show that Canada was operating above potential output in 2006. In line with a Taylor-like rule and forward-looking monetary policy, the Bank of Canada increased the policy interest rate over the course of 2005 from 2.5 percent in September 2005 to 3.25 percent in December 2005. Real GDP growth fell from 3.2 percent in 2005 to 2.6 percent in 2006.

It is now January 2006. Because the output gap remained positive in 2007 and upward pressure on prices was pushing the inflation rate to average 2.1 percent for 2007, interest rates should have been, and were, increasing over the course of 2006. The policy interest rate rose from 3.25 percent in January 2006 to 4.25 percent in May 2006. Real GDP growth fell to 2.1 percent in 2007 from 2.6 percent in 2006, and inflation fell below 2 percent in February 2008.

It would seem that Equation 9-3 tells a pretty good story! It also helps make the actions of the central bank credible.

9-3 Actually Hitting the Target

In explaining the macroeconomy, we start with an observed shock or proposed policy change. We then identify if the event affects the *AS* curve, the *AD* curve, or both. Next, we ask which way the curve shifts (or curves shift). Finally, taking into account the slopes of the *AS* and *AD* curves, we calculate how the event affects output and the price level.

Policymakers use the same tools, but they run the exercise in reverse. They begin by asking where output and the price level (or unemployment and inflation) should be. They then determine how much they need to shift the *AS* or *AD* curves to hit those targets; in practice, short-run policy focuses almost exclusively on aggregate demand.

¹³Bear in mind that economists were created to make weather forecasters look good!

¹⁴Lise Pichette, Pierre St-Amant, Ben Tomlin, and Karine Anoma, "Measuring Potential Output at the Bank of Canada: The Extended Multivariate Filter and the Integrated Framework," Discussion Paper 2015-1, Bank of Canada, January 2015.

Finally, they calculate how large a policy change is required to move the AD curve the necessary distance. What More Do We Know? 9-2 provides an example of this sort of policy formulation.



9-2 What More Do We Know?

A Policy Exercise—If Only It Were This Easy!

The unemployment rate is 7 percent. *Your* mission, should you choose to accept it, is to use monetary policy to move the economy to full employment. (This scenario will self-destruct at the end of this box, so that the real monetary policy experts can resume their role and keep the country running smoothly!)

Your Approach

1. From Chapter 7, we know that “full employment” is about 6 percent unemployment. So your job is to reduce unemployment by 1 percentage point.

$$\Delta u = -1$$

2. According to “Okun’s law for Canada” (see Section 6-7), a 1 percentage point reduction in unemployment requires a 1.7 percent increase in output.

$$\frac{\Delta Y/Y}{\Delta u} = -1.7$$

$$\frac{\Delta Y}{Y} = -1.7 \times \Delta u = -1.7 \times -1 = 1.7$$

3. Because the economy is producing below potential, you know from What More Do We Know? 5-2 that the AS curve is quite flat. Let’s make the curve horizontal so that a rightward shift of the AD curve translates entirely into an increase in real GDP.
4. Suppose that removing a positive 1 percent output gap (i.e., reducing output by 1 percent) requires a 0.5 percentage point increase in interest rates; in other words, $\beta = 0.5$ in Equation 9-3. This means that closing a negative 1.7 percent output gap (i.e., increasing output by 1.7 percent) requires a 0.85 ($= 0.5 \times 1.7$) percentage point reduction in interest rates.

$$\frac{\Delta i}{\Delta Y/Y^*} = \beta = 0.5$$

$$\Delta i = 0.5 \times \frac{\Delta Y}{Y^*} = 0.5 \times -1.7 = -0.85$$

5. Thus, your answer is to cut interest rates by 0.85 percentage points to increase real GDP by 1.7 percent and thereby reduce unemployment by 1 percentage point. Job well done!

$$\Delta i = \left(\frac{\Delta i}{\Delta Y/Y^*} \right) \times \left(-\frac{\Delta Y/Y}{\Delta u} \right) \times \Delta u = 0.5 \times 1.7 \times -1 = -0.85$$

Hold on a Sec!

1. The link from interest rates to output/unemployment takes time to materialize. The Bank of Canada suggests 18–24 months. The exact timing is uncertain (and other shocks are likely in the interim). Are you willing to bet that the economy will be humming along at full employment in two years because of your recommendation?

2. The β parameter needs to be calibrated or estimated. It is not necessarily 0.5 and may change over time. This adds more uncertainty to the result.
3. While prices are fixed over the short run, they rise over the medium term. Will actual inflation rise above target over the medium term? If so, will you raise interest rates as required by Equation 9-3? If you do, will you still obtain your unemployment objective? This adds “a bit of” uncertainty too.
4. You know Okun’s law is not really a law, but rather a statistical result. Is the value really 1.7, or might it be 2 or some other value? (Beginning to wonder if you’ve bitten off a little more than you can chew?)
5. Is the natural rate of unemployment really 6 percent? Doubtful. (It might be time to give the job back to the experts!)

In the next several chapters, we build up a model of aggregate demand that is a simplified version of the models central banks really use to make the kind of decisions made in this box. Then, in Chapter 18, we return to the question of how policy should be structured in the face of uncertainty about shocks to the economy and in the light of imperfections in even the best of economic models. We will see that uncertainty calls for policy design that tries to automatically offset errors.

Going Forward

As we proceed to flesh out aggregate demand in the chapters that follow, we frame the discussion largely along the lines of “if we change factor X (say reduce interest rates or increase the money supply), what happens to outcome Y (such as unemployment, real GDP, or inflation)?” While this is a natural way to construct a model of the economy, when thinking about policy you’ll sometimes want to run your mind in the other direction, à la What More Do We Know? 9-2.

You may observe that we can sometimes put a pretty “hard” number on how one variable affects another, while at other times all we can say is that “the effect is large or small” or “positive or negative.” Not all numbers are known, some are not observable, and others change over time. Policymakers have to live and deal with this situation. One sensible approach is to implement policy changes by taking a modest step in the right direction, and then seeing how the economy responds before taking the next step. You know this approach is sensible—you used it in learning how to walk! It is also the approach the central bank takes. Changes to policy interest rates tend to be undertaken in small increments. For example, instead of increasing the policy interest rate by 150 percent in July 2017, the Bank of Canada raised it in increments of 0.25 percentage points from 0.5 to 1.25 percent over six months. (For further discussion, see Chapter 18.)

Our approach moving on is “technocratic”; that is, we are concerned more with the technical relationships governing economic variables than with the politics of how the information gets used. If you want to know why particular policies are pursued, you first have to know what the policies will do. That’s the job of the following chapters. But even policy choices that improve the overall economy create winners and losers—it is rare indeed that a policy decision does not create winners and losers. While we have less to say about this aspect, do keep it in mind as you work through the technical material. After all, a fiscal stimulus isn’t neutral: some golf courses have benefited more than others! And the cost of student loans rises or falls when the central bank moves interest rates up or down to steer the economy.

Summary

1. In practice, most short-term tuning of the economy is done with monetary policy under the terms of agreements between the central bank and the government. Monetary policy is carried out by adjusting short-term interest rates.
2. The Governing Council of the Bank of Canada is responsible for monetary policy decisions. The decisions taken affect the overnight rate.
3. Raising the policy interest rate—the target for the overnight rate—influences all interest rates, and reduces consumption, investment, and net exports. Lower interest rates stimulate aggregate demand—shift the *AD* curve to the right.
4. Since November 2000, the Bank of Canada's policy interest rate has typically been adjusted (if at all) on one of eight fixed dates each year. The dates are advertised well in advance.
5. The Bank of Canada intervenes in the overnight market—the Large Value Transfer System—every day to ensure the overnight rate remains close to the policy interest rate.
6. Inflation targeting seeks to stabilize the economy at potential GDP while keeping inflation low and stable in order to promote economic and financial well-being.
7. The Taylor rule gives insight into how the Bank of Canada sets interest rates in response to deviations from desired levels of inflation and output.
8. Hitting the inflation and output targets is fraught with uncertainty.
9. Policy instruments are typically set by determining where we want to end up, and implemented through small, incremental changes to deal with inherent economic uncertainty.

Key Terms

bank rate
deposit rate
exchange rate effect
Governing Council

inflation targeting
interest rate effect
monetary policy rule
overnight market

overnight rate
policy interest rate
Taylor rule
wealth effect

Problems

Conceptual

1. What are the Five Ws of Canadian monetary policy?
2. What is the Large Value Transfer System and how does it work?
3. What are the channels through which a fall in the overnight rate affects aggregate demand?
4. Explain why a value of less than one for the coefficient relating actual to target inflation in the Taylor rule might lead to runaway inflation.

Technical

1. If the velocity of money is constant, the average annual growth rate of real GDP is 2.5 percent, and the target rate of inflation is 2 percent, then according to Friedman's simple monetary policy rule, what should the annual rate of growth of the money supply be?
2. According to Taylor's monetary policy rule, at what rate should the Bank of Canada set the overnight rate if the natural interest rate is 0.75 percent, actual equals target inflation of 2 percent, output is at its potential level, and α and β are each equal to 0.5?
 - a. Now suppose actual inflation increases to 2.5 percent. By how much and to what level should the Bank increase the overnight rate relative to your initial calculation? How does your answer relate to the point change in the inflation rate?
 - b. Suppose instead that actual inflation is on target, but output rises 2 percent above potential output. By how much and to what level should the Bank increase the overnight rate relative to your initial calculation? How does your answer relate to the percentage change in the output gap?
3. Suppose the unemployment rate is 1.5 percentage points lower than its natural rate. Assuming that a 1-percentage-point increase in unemployment reduces GDP by 1.8 percent and removing a 1 percent output gap requires a 0.6 percentage point increase in interest rates, by how much should interest rates be adjusted in order to return the economy to full employment? Consider the aggregate supply curve to be horizontal in answering this question.

Empirical

1. Can Equation 9-3 help explain the evolution of interest rates in Canada since January 2015?
 - a. Use your Web browser to access the Department of Finance Canada's "Fiscal Reference Tables September 2019." Click on Table 17, "Actual, cyclically adjusted and cyclically adjusted primary budgetary balances." Copy the data for Actual (millions of dollars) and for Actual (per cent of potential GDP) for 2016–17, 2017–18, and 2018–19 into an Excel spreadsheet. Then divide Actual (millions of dollars) by Actual (per cent of potential GDP) to obtain rough estimates of potential GDP for Canada for those fiscal years. For fiscal year 2015–16, assume that actual GDP equals potential GDP.
 - b. Use your Web browser to access Statistics Canada's Table 36-10-0104-01, "Gross domestic product, expenditure based." Click on "Add/Remove data." You will see a horizontal list of options under the title "Customize table." Select each of the following: "Canada" under "Geography"; "Current prices" under "Prices" (after first clicking "Clear all"); "Seasonally adjusted at annual rates" under "Seasonal Adjustment"; "Gross domestic product at market prices" under "Estimates" (after first clicking "Clear all"); and From "Q2 2015" and To "Q1 2019" under "Reference period." Then click "Apply." Click on the "Download options" button to download and save your data in an Excel file. Take the average of Q2, Q3, Q4, and Q1 for each year to calculate actual GDP for each of the four fiscal years from 2015–2016 through 2018–2019.
 - c. Use your Web browser to access Statistics Canada's Table 18-10-0004-01, "Consumer Price Index." Click on "Add/Remove data." You will see a

horizontal list of options under the title “Customize table.” Select each of the following: “Canada” under “Geography”; “All items excluding food and energy” under “Products and product groups” (after first clicking “Clear all”); and From “March 2015” and To “March 2019” under “Reference period.” Then click “Apply.” Click on the “Download options” button to download and save your data in an Excel file. Calculate the 12-month percentage change in the CPI from March of one year to March of the next to determine the core inflation rate for each of the four fiscal years from 2015–2016 through 2018–2019.

- d. Combine your fiscal-year data on actual and potential GDP, and inflation in a single Excel file. Calculate the output gap and, assuming the target inflation rate is 2 percent, the difference between actual and target inflation.
- e. Use your Web browser to access Statistics Canada’s Table 10-10-0139-01, “Bank of Canada, money market and other interest rates.” Click on “Add/Remove data.” You will see a horizontal list of options under the title “Customize table.” Select each of the following: “Canada” under “Geography”; “Target rate” under “Financial market statistics” (after first clicking “Clear all”); and From “April 1, 2014” and To “April 1, 2019” under “Reference period.” Then click “Apply.” Click on the “Download options” button to download and save your data in an Excel file. Identify the fiscal years in which the policy interest rate (the target rate) was actually lowered, raised, or left unchanged. (*Hint:* Creating a column graph might be helpful in establishing the dates on which changes to the policy interest rate were made.)
- f. Now assume that the Bank of Canada is deciding in fiscal year 2014–2015 what interest rate actions to take, if any, based on forecasts of the output gap and actual relative to target inflation for the subsequent fiscal year (about 18 months ahead). Based on your calculations of those variables, which will constitute the Bank’s economic outlook, and referring to Equation 9-3, should the Bank change the policy interest rate in 2014–15? If so, should they raise or lower it, or leave it unchanged? Repeat this exercise for each of the three subsequent fiscal years.
- g. Does your analysis predict the direction in which the Bank actually changed interest rates over the period?