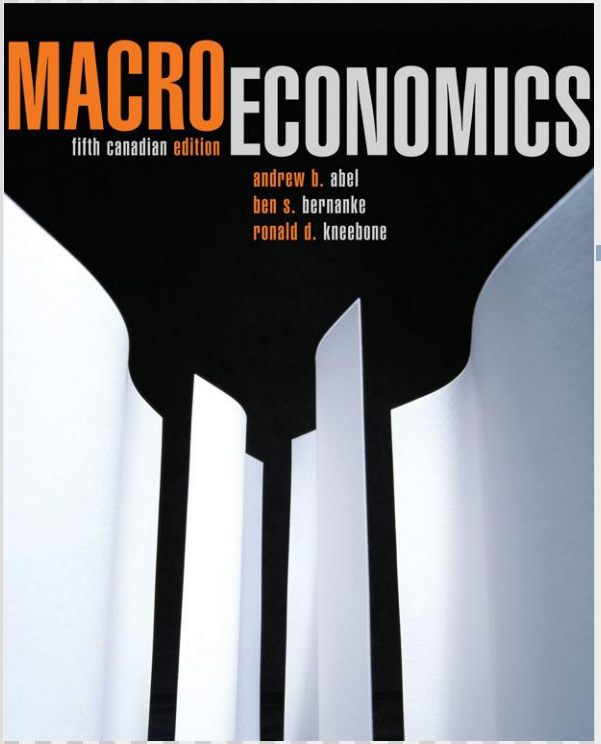


Chapter 7

The Asset Market, Money, and Prices

Asset Markets

- The asset market is the entire set of markets in which people buy and sell real and financial assets, for example, gold, houses, stocks and bonds.
- Money is an asset widely used and accepted as payment.

Asset Markets (continued)

- Money has long been believed to have special significance.
- The market for money is important because:
  - *Prices are expressed in terms of money;*
  - *Because of this is critical for understanding inflation;*
  - *In addition it may affect output and employment – that is real variables – in the short run.*

The Functions of Money

- The term money is used to refer to assets that are used as payments. Its functions are:
  - *A medium of exchange - money is a device for making transactions at less cost in time and effort; with it we avoid the so-called "double coincidence of barter".*
  - *A unit of account - money is the basic unit for measuring economic value.*
  - *A store of value - money is a way of holding wealth*.

The Money Aggregates

- Money aggregates are different measures of the money stock.
- M1 consists primarily of currency and balances held in chequing accounts.
- M1 conforms to what we normally think of as money.

The Money Aggregates (continued)

- M2 is M1 plus personal saving deposits, including those with a fixed term, and non-personal notice deposits.
- M2+ is M2 plus accounts at non-bank financial institutions, e.g. caisses populaires and credit unions.

The Money Aggregates (continued)

- M3 is M2 plus term deposits held by businesses and foreign currency holdings of Canadian residents.
- Weighted money aggregates may be more useful measures of money than are the standard aggregates, although they are difficult to understand.

TABLE 7.1

The Canadian Monetary Aggregates (January 2006)

M1	**$185.9 billion**
Currency	$44.8 billion
Personal chequing accounts	$42.6 billion
Current accounts	$99.4 billion
M2	**$668.4 billion**
Components of M1	$185.9 billion
Personal savings deposits	$419.6 billion
Nonpersonal notice deposits	$63.7 billion
M2+	**$926.8 billion**
Components of M2	$668.4 billion
Deposits at trust and mortgage loan companies	$12.2 billion
Deposits at caisses populaires and credit unions	$154.2 billion
Annuities and deposits at government savings institutions	$46.8 billion
Money market mutual funds	$46.3 billion
M3	**$965.5 billion**
Components of M2	$668.4 billion
Nonpersonal fixed-term deposits	$222.1 billion
Foreign currency deposits held by residents	$83.2 billion

Source: *Bank of Canada Weekly Banking and Financial Statistics*, January 2007, Tables E1 and C2. Components do not sum exactly to the aggregates because of adjustments listed in the source. Reprinted with permission from the Bank of Canada.

The Money Supply

- The money supply is the amount of money available in an economy.
- The money supply is partly determined by the central bank.
- We will assume that the Bank of Canada sets the money supply. In practice it is done indirectly.

The Money Supply (continued)

- One way to influence the money supply is open-market operations – open market purchases and sales of government bonds to the public.
- A purchase of government bonds from the public increases the money supply.

The Money Supply (continued)

- Another way to influence the money supply is to purchase and sell government bonds directly to the government.
- In effect this means the government is financing its expenditures by printing money.
- This can induce inflation, depending on the state of the economy.

Portfolio Allocation and the Demand for Assets

- To understand why people hold money we begin by considering the broader question of wealth allocation.
- A portfolio is a set of assets that a holder of wealth chooses to own.
- The portfolio allocation decision is based on expected return, risk and liquidity of an asset.

Expected Return

- The rate of return of an asset is the rate of increase in its value per unit of time.
- The return on a share or stock (ER) is the dividend paid by the stock plus any increase in the stock's price (here called P^A for price of an asset).

$$ER_{t+1} = Div + P^A_{t+1} - P^A_t$$

Expected Return (continued)

- The expected return is the best guess about the return on an asset – but it is a guess.
- Everything else being equal, the higher an asset's expected return, the more desirable the asset is and the more of it holders of wealth will want to own.

Risk

- An asset has high risk if there is a significant chance that the actual return received will be very different from the expected return.
- Everything else being equal, a more risky asset is less desirable for holders of wealth.

Liquidity

- The liquidity of an asset is the ease and speed with which it can be exchanged for goods, services or other assets.
- Money is a highly liquid asset.
- Everything else being equal, the more liquid an asset is, the more attractive it will be to wealth holders.

Asset Demands

- There is a trade-off among the three characteristics that make an asset desirable: a high expected return, low risk and liquidity.
- The amount of each particular asset that a holder of wealth desires to include in her portfolio is called her demand for that asset.

The Demand for Money

- The demand for money is the quantity of monetary assets that people choose to hold in their portfolios.
- Money is the most liquid asset but pays a low return (zero nominal return).

The Demand for Money (continued)

- The demand for money will depend on the expected return, risk and liquidity of money relative to other assets.
- The macroeconomic variables that have the greatest effects on money demand are the price level, real income and interest rates.

The Price Level

- The higher the general level of prices, the more dollars people need to conduct transactions and, thus, the more dollars people will want to hold.
- Everything else being equal, the nominal demand for money is directly proportional to the price level.

Real Income

- Higher real income means more transactions and a greater need for liquidity, therefore, the amount of money should increase.
- The increase in money demand need *not* be proportional to an increase in real income. Over time as incomes have risen we have become better at economising on money holdings.

Interest Rates

- An increase in the expected return on money, i.e., the interest rate on monetary assets, i^m, increases the demand for money.
- An increase in the expected return on alternative assets, i.e. i, causes holders of wealth to switch from money to higher-return alternatives.
- They are in effect trading off liquidity for a higher return and possibly more risk.

The Money Demand Function

$$M^d = P \times L(Y, i)$$

M^d is the aggregate demand for money

P is the price level

Y is real income or output

i is the nominal interest rate earned by nonmonetary assets

L is a function relating M^d to Y and i

The Money Demand Function (continued)

$$M^d = P \times L(Y, r + \pi^e)$$

r is the expected real interest rate

π^e is the expected rate of inflation, it is assumed to be fixed for now

- This is an equivalent way of writing the money demand relationship shown on the previous slide.
- Money demand depends on the interest rate on nonmonetary assets, which tends to change more often and is a likely reason for a change in the money demand.

The Money Demand Function (continued)

- Real money demand or demand for real balances is:

$$\frac{M^d}{P} = L(Y, r + \pi^e)$$

- The function *L* that relates real money demand to output and interest rates is called the real money demand function.
- In what follows we will typically use this form of the money demand function.

Other Factors Affecting Money Demand

- Money demand changes as a result of:
  - wealth;
  - riskiness of alternative assets;
  - liquidity of alternative assets;
  - inflation expectations;
  - efficiency of payment technologies.

Elasticities of Money Demand

- The income elasticity of money demand is the percentage change in money demand resulting from a 1% increase in real income.
- The interest elasticity of money demand is the percentage change in money demand resulting from a 1% increase in the interest rate.

Elasticities of Money Demand (continued)

- Suppose the money demand function was

$$M^d = Y^{\eta}(r + \pi^e)^{-\theta}$$

where η and θ measure the response of money demand to a change in income and the interest rate respectively. For ease of manipulation we are assuming that M^d is real money demand.

- These exponents are elasticities of money demand wrt to income and interest rate changes.

Elasticities of Money Demand (continued)

- First find the response of M^d to a change in Y, which is:

$$\Delta M^d/\Delta Y = \eta Y^{\eta-1}(r + \pi^e)^{-\theta}$$

- Now multiply dM^d/dY by Y, which yields:

$$(\Delta M^d/\Delta Y)Y = \eta Y^{\eta}(r + \pi^e)^{-\theta}$$

- Now divide that expression by M^d, which is equal to $Y^{\eta}(r + \pi^e)^{-\theta}$. Thus income elasticity is:

$$(\Delta M^d/\Delta Y)(Y/M^d) = \eta = \eta_y$$

- In a similar fashion it can be shown that the elasticity of M^d wrt to $(r + \pi^e)$ is $-\theta$

Elasticities of Money Demand (continued)

- The empirical evidence is that the income elasticity of money demand is positive but less than one.
- The empirical studies find a small negative value (-0.3) for the interest rate elasticity of money demand.
- In general, the broader the monetary concept the higher is income and lower is interest rate elasticities.

Velocity and the Quantity Theory of Money

- Velocity (V) is nominal GDP (P times Y) divided by the nominal money stock (M).

$$V = \frac{PY}{M}$$

- The quantity theory of money asserts that real money demand is proportional to real income.

The Quantity Theory of Money

$$\frac{M^d}{P} = kY$$

where k is a constant (Cambridge constant) and is 1/V.

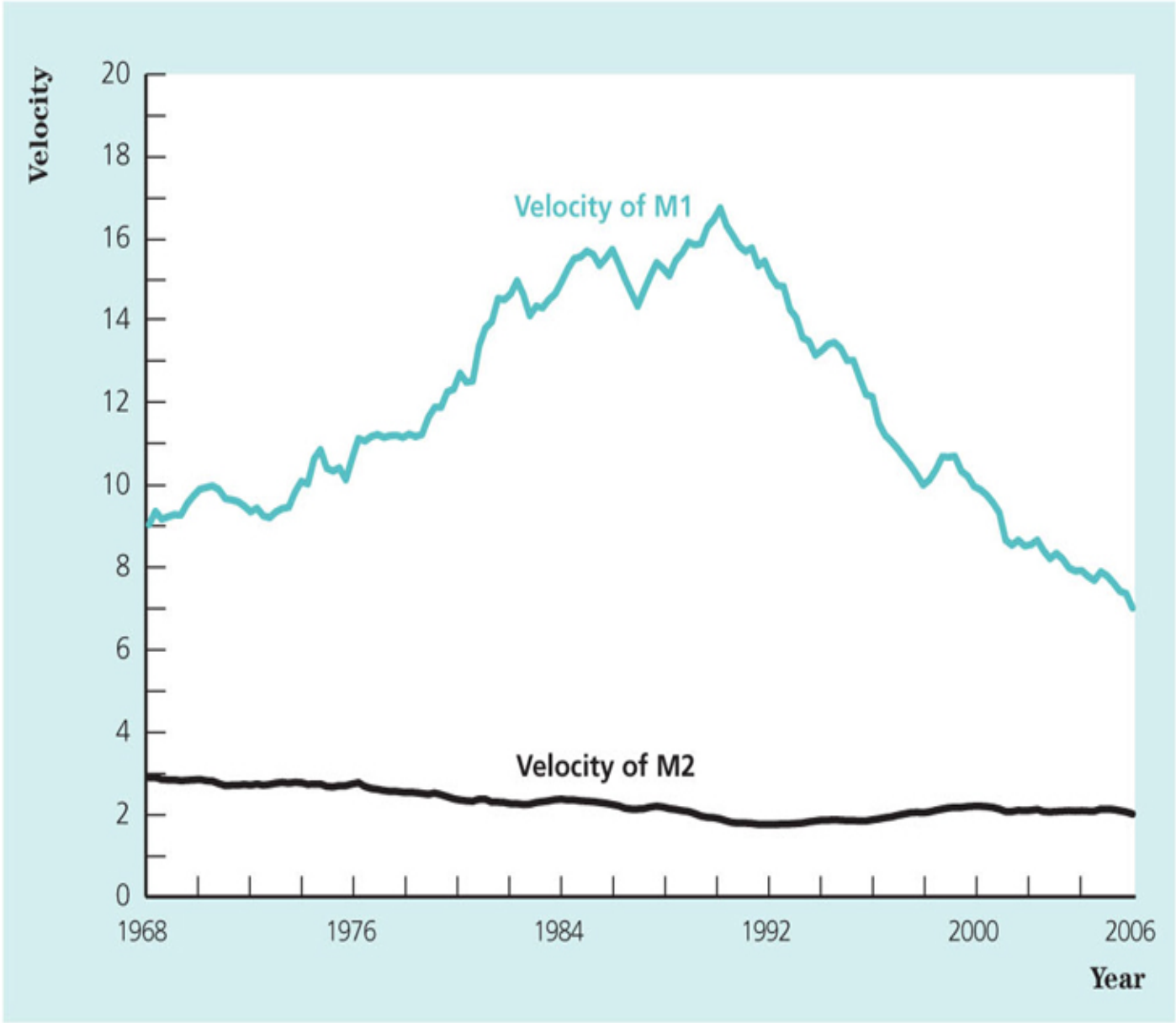
- The real money demand function $L(Y, r+\pi^e)$ takes the simple form kY.
- This is a strong assumption that velocity is a constant, $1/k$, and does not depend on Y and $r + \pi^e$.
- While M2 velocity is more stable than that of M1, neither can be considered a constant.

FIGURE 7.1

VELOCITY OF M1 AND M2, 1968–2006

M1 velocity is nominal GDP divided by M1, and M2 velocity is nominal GDP divided by M2. M1 velocity rose through the 1970s, then became more erratic in the 1980s, before falling in the 1990s. M2 velocity, while declining steadily, has been more stable than M1 velocity, but it has been unpredictable over some short time periods.

Source: Statistics Canada, CANSIM II Series v37124(M1), v37128(M2), v1992221 (GDP). Series are in millions of dollars, quarterly, and seasonally adjusted.



Asset Market

- The demand for assets depends on expected returns, risk and liquidity.
- The asset market is in equilibrium when the quantity of each asset that holders of wealth demand equals the (fixed) available supply of assets.

Asset Market Equilibrium Assumption

- We assume, perhaps heroically, that all assets may be grouped into monetary and nonmonetary assets.
- Asset market equilibrium then can be reduced to the condition that the quantity of money supplied equals the quantity of money demanded.

Asset Market Equilibrium

- The sum of all individual demands equals the economy's total nominal wealth:

$$M^d + NM^d = \text{aggregate nominal wealth}$$

M^d is the aggregate demand for money.

NM^d is the aggregate demand for nonmonetary assets.

Asset Market Equilibrium (continued)

- The aggregate nominal supply of wealth is:

$$M + NM = \text{aggregate nominal wealth}$$

M is the fixed nominal supply of money.

NM is the fixed nominal supply of nonmonetary assets.

Asset Market Equilibrium (continued)

- Thus, the equilibrium condition is:

$$(M^d - M) + (NM^d - NM) = 0$$

- If ($M^d - M$)=0, then ($NM^d - NM$)=0.
- This is what will make our model run.
- As long as the amount of money supplied and demanded are equal, the entire asset market will be in equilibrium – a simple but helpful assumption.

Asset Market Equilibrium Condition (continued)

- The asset market equilibrium condition is:

$$\frac{M}{P} = L(Y, r + \pi^e)$$

  - M is the supply of money and is determined by the central bank.
  - Y and r are determined by equilibrium conditions in labour and goods markets (as discussed previously).

Asset Market Equilibrium Condition (continued)

- In this case, the economy is at a long-run equilibrium position.
- *P* is determined by the asset market equilibrium condition.

$$P = \frac{M}{L(Y, r + \pi^e)}$$

- This is described as money being "neutral" in the long run.

Money Growth and Inflation

- The rate of inflation equals the growth rate of the nominal money supply minus the growth rate of real money demand.

$$\frac{\Delta P}{P} = \frac{\Delta M}{M} - \frac{\Delta L(Y, r + \pi^e)}{L(Y, r + \pi^e)}$$

Money Growth and Inflation (continued)

- We show that the rate of inflation is closely related to the rate of growth of nominal money supply.
- In long-run equilibrium with a constant growth rate of money, the nominal interest rate will also be constant.

Money Growth and Inflation (continued)

- Thus, the rate of inflation in a full-employment economy also depends on the percentage change in real income ($\Delta Y/Y$) and the income elasticity of money demand (η_Y), which is equal to "η" derived in slide 30 above:

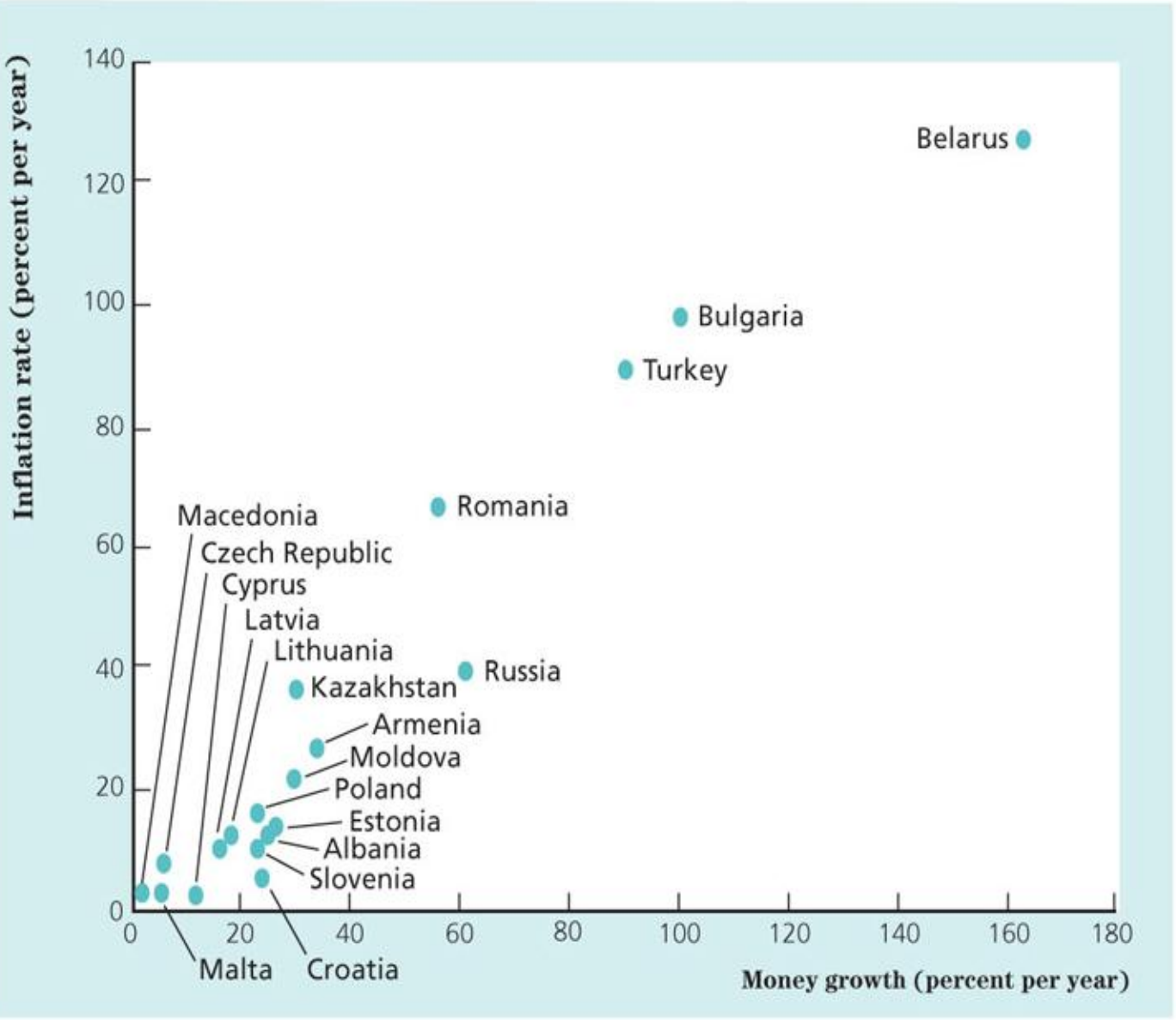
$$\pi = \frac{\Delta M}{M} - \eta_Y \frac{\Delta Y}{Y}$$

FIGURE 7.2

THE RELATIONSHIP BETWEEN MONEY GROWTH AND INFLATION

Nominal money growth and inflation during the period 1995–2001 are plotted for the European countries in transition for which complete data are available. There is a strong relationship between money growth rates and inflation rates, with countries having money growth rates in excess of 80% per year also having inflation rates in excess of 80% per year.

Source: Money growth rates and consumer price inflation from *International Financial Statistics*, February 2003, International Monetary Fund. Figure shows European countries in transition for which there are complete data.



The Expected Inflation Rate

- In practice, the current inflation rate often approximates the expected inflation rate, as long as people do not expect changes in *M* or *Y*.
- Policy actions (such as rapid expansion of money supply) that cause people to fear future increases in inflation should cause the nominal interest rate to rise, all else being equal.

FIGURE 7.3

INFLATION AND THE NOMINAL INTEREST RATE IN CANADA, 1960–2006

The figure shows the nominal interest rate on one- to three-year federal government bonds and the annual rate of inflation as measured by the CPI. The nominal interest rate tends to move together with inflation, although there are periods, such as the early 1980s and mid-1990s, when the two variables diverge.

Source: Nominal interest rate is the annual average yield on one- to three-year Government of Canada bonds: Adapted from Statistics Canada, CANSIM II series v122499. Inflation is the rate of change of the consumer price index: Adapted from Statistics Canada, CANSIM II series v735319.

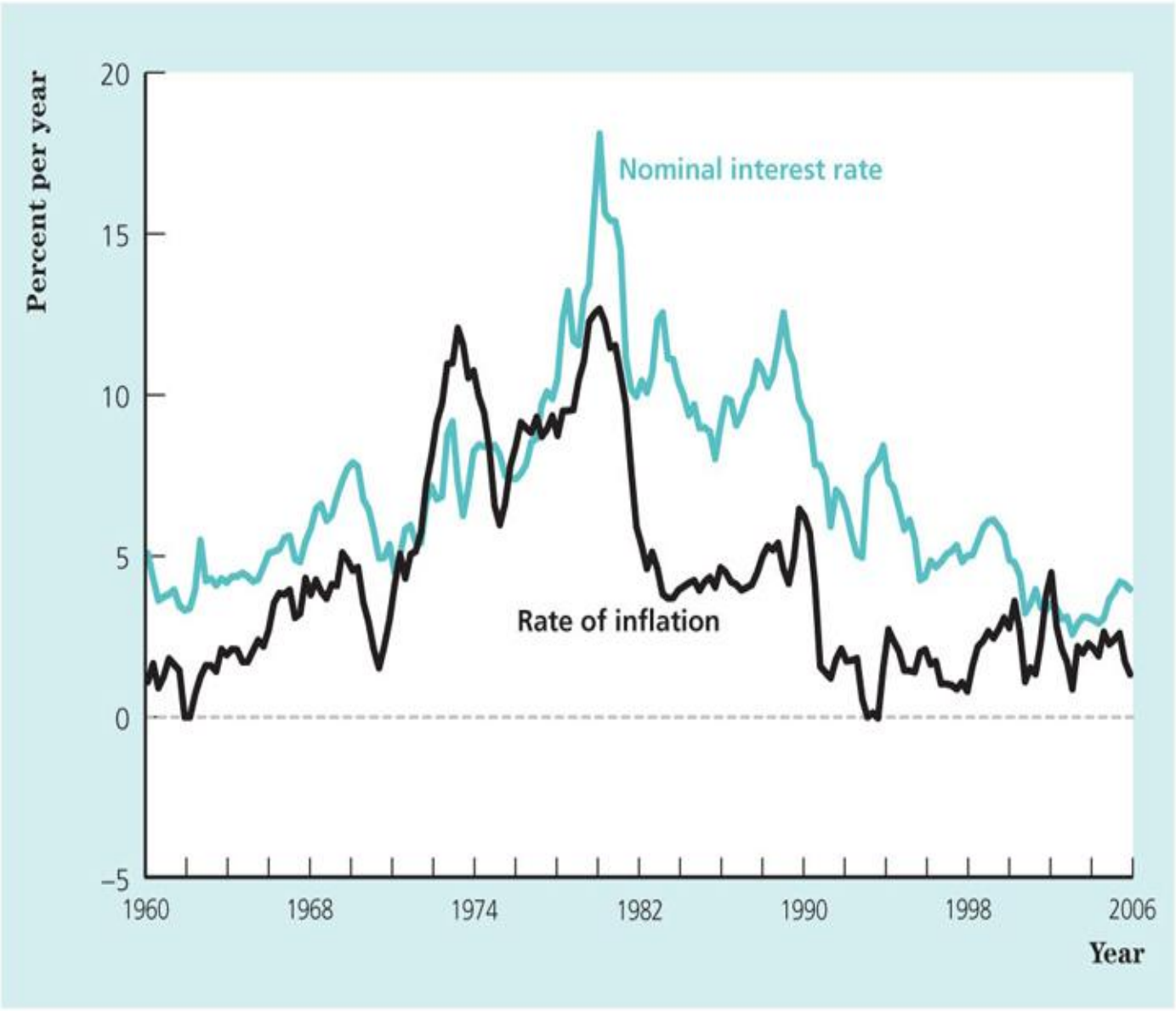


FIGURE 7.4

A MEASURE OF INFLATION EXPECTATIONS

The figure shows monthly data on the difference in nominal yields paid to owners of two types of Government of Canada bonds; a long-term conventional bond and a real return bond. This difference provides an estimate of inflation expectations. By this estimate, inflation expectations fell quickly during the late 1990s but have been increasing slowly since.

Source: Bank of Canada, *www.bank-banque-canada.ca.*