Macroeconomics

SEVENTH EDITION

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GLOBAL EDITION

Pearson

ALWAYS LEARNING

Financial Markets I

Chapter 4

PEARSON

Chapter 2 Outline

Financial Markets

Financial Markets

- Financial markets are intimidating, but they play an essential role in the economy.

- In this chapter, we focus on the role of the central bank in affecting these <u>interest rates</u>.

- We learn how the interest rate on bonds is determined, and the role of the central bank (**Federal Reserve Bank**, or the **Fed**, in the US, TCMB in Turkey, ECB in Europe) in this determination.

4-1 The Demand for Money

- Suppose you only have a choice between 2 assets: money and bonds.

- *Money* are used for transactions, but it pays no interest.

- Two types of money: **currency** and **checkable deposits.**

- **Bonds** pay a positive interest rate, *i* (*the* rate of interest), but cannot be used for transaction.

4-1 The Demand for Money

- The holding of money and bonds depends on:
  - Your level of transactions
  - The interest rate on bonds

- You can hold bonds indirectly through **money market funds**, or *money market mutual funds*.

- In the early 1980s, the interest rate on money market funds reached 14% per year, so people earned more interest by moving their wealth from checking accounts to these funds.

- Ex: in US inflation low→ people keep more of their wealth in money than they did in early 1980s

Inflation Rate in the US

Figure 4.0. Inflation Rate, Using the CPI and the GDP Deflator, 1960–2014

The inflation rates, computed using either the CPI or the GDP deflator, are largely similar.
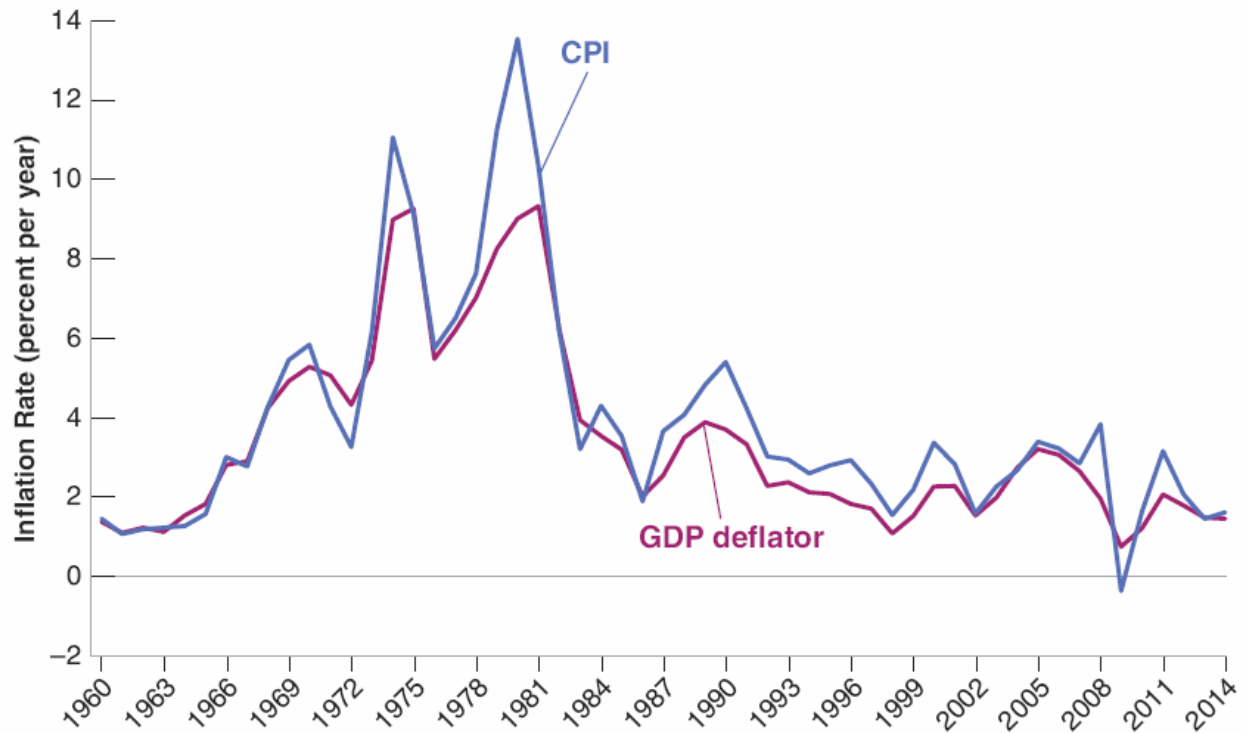
Source: Calculated using series USAGDPDEFAISMEI, CPALTT01USA659N Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/.

FOCUS: Semantic Traps: Money, Income, and Wealth

Money is what can be used to pay for transactions.

Income is what you earn, and it is a <u>flow</u>.

Saving is the part of after-tax income that you do not spend, and it is also a <u>flow</u>.

Savings is the value of what you have accumulated over time.

Financial wealth, or wealth, is the value of all your financial assets minus all your financial liabilities, and it is a <u>stock</u> variable

Investment is what economists refer to as the purchase of new capital goods.

Financial investment is the purchase of shares or other financial assets.

4-1 The Demand for Money

- Demand for money (M^d) is equal to nominal income $\$Y$ (a measure of level of transactions in the economy) times a decreasing function of the interest rate i:

$$M^d = \$Y \, L(i) \qquad (4.1)$$
$$(-)$$

- An increase in the interest rate decreases the demand for money, as people put more of their wealth into bonds.

$$i\uparrow \rightarrow \quad M^d\downarrow$$

- Equation (4.1) means that he demand for money:
  - increases in proportion to nominal income, and
  - depends negatively on the interest rate.

- The relation between the demand for money and interest rate for a given level of income $\$Y$ is represented by the M^d curve.

$$\$Y\uparrow \rightarrow \quad M^d \uparrow$$

# 4-1 The Demand for Money

Figure 4-1 The Demand for Money

The relation between the demand for money and interest rate for a given level of income $Y is represented by the M^d (Money demand) curve.

For a given level of nominal income, a lower interest rate increases the demand for Money

(this is a movement <u>along</u> the M^d curve !!!)

At a given interest rate, an increase in nominal income <u>shifts</u> the demand for money to the right.

(this is a shifts of the money demand curve from M^d to M$^{d'}$!!)
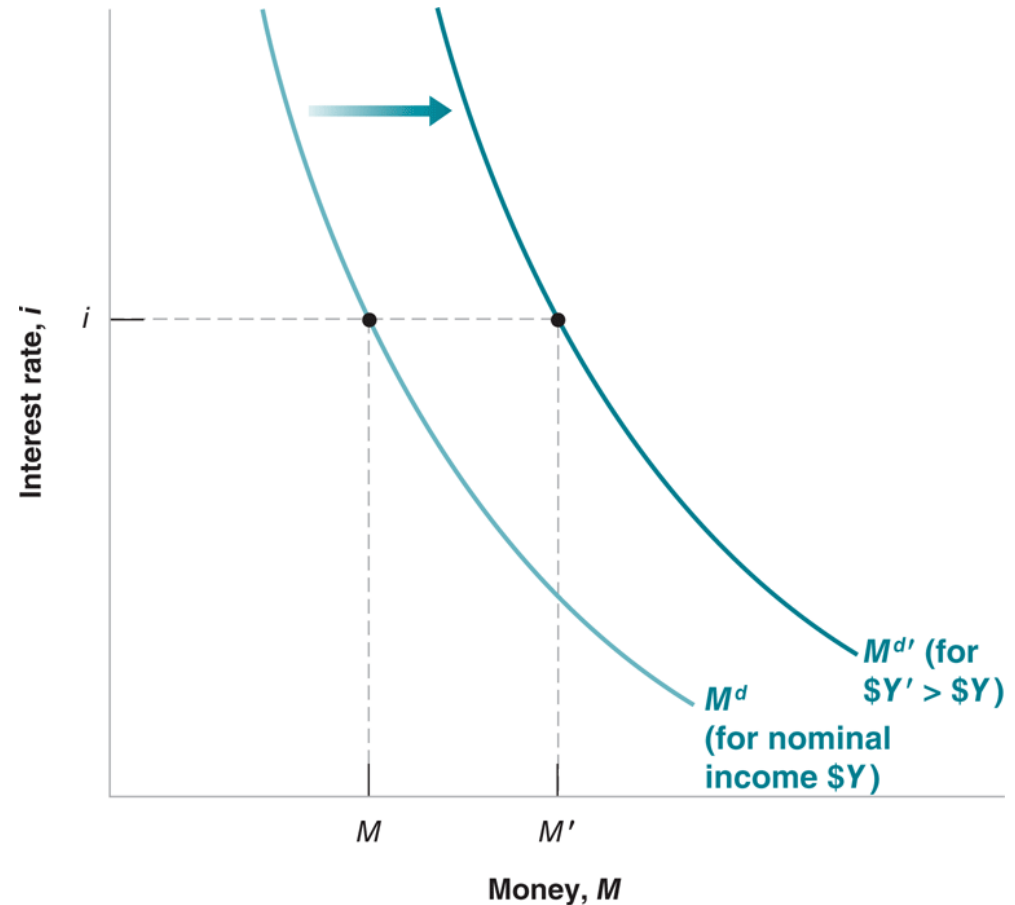
4-2 Determining the Interest Rate: I

- Suppose the central bank decides to supply an amount of money equal to M:

$$M^s = M$$

Equilibrium in financial markets requires that
$$M^s = M^d = M$$

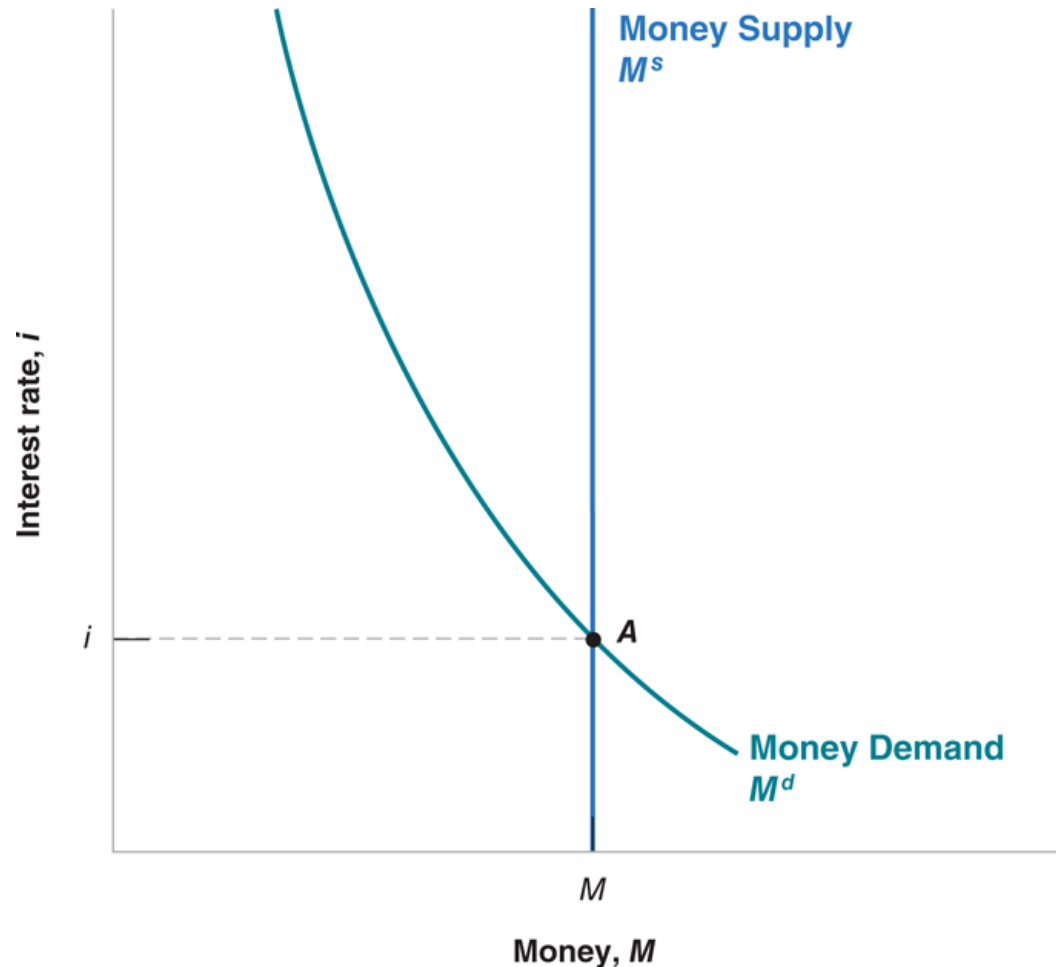$$\text{Money supply} = \text{Money demand}$$
$$M = \$Y \, L(i) \tag{4.2}$$

4-2 Determining the Interest Rate: I

Figure 4-2 The Determination of the Interest Rate

The **interest rate** must be such that the supply of money (which is independent of the interest rate) is equal to the demand for money (which does depend on the interest rate).

Financial market Equilibrium condition: $M^s = M^d = M$:
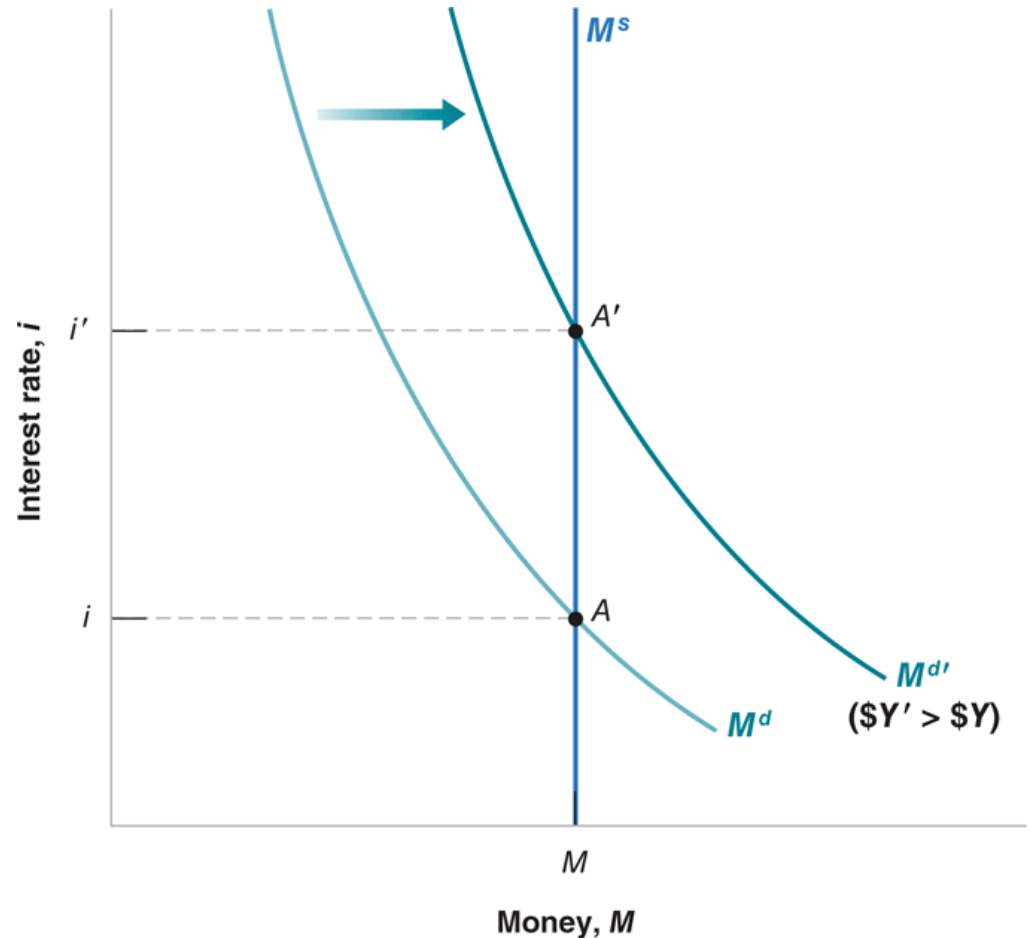
4-2 Determining the Interest Rate: I

Figure 4-3 The Effects of an Increase in Nominal Income on the Interest Rate

Given the money supply, an increase in nominal income leads to an increase in the interest rate.

$$\$Y\uparrow \ (\rightarrow M^d \uparrow) \rightarrow i \uparrow$$
$$\text{(for a given } M^s\text{)}$$

(Because higher income means higher transaction demand for money. So money demand is higher and interest rates rise.)

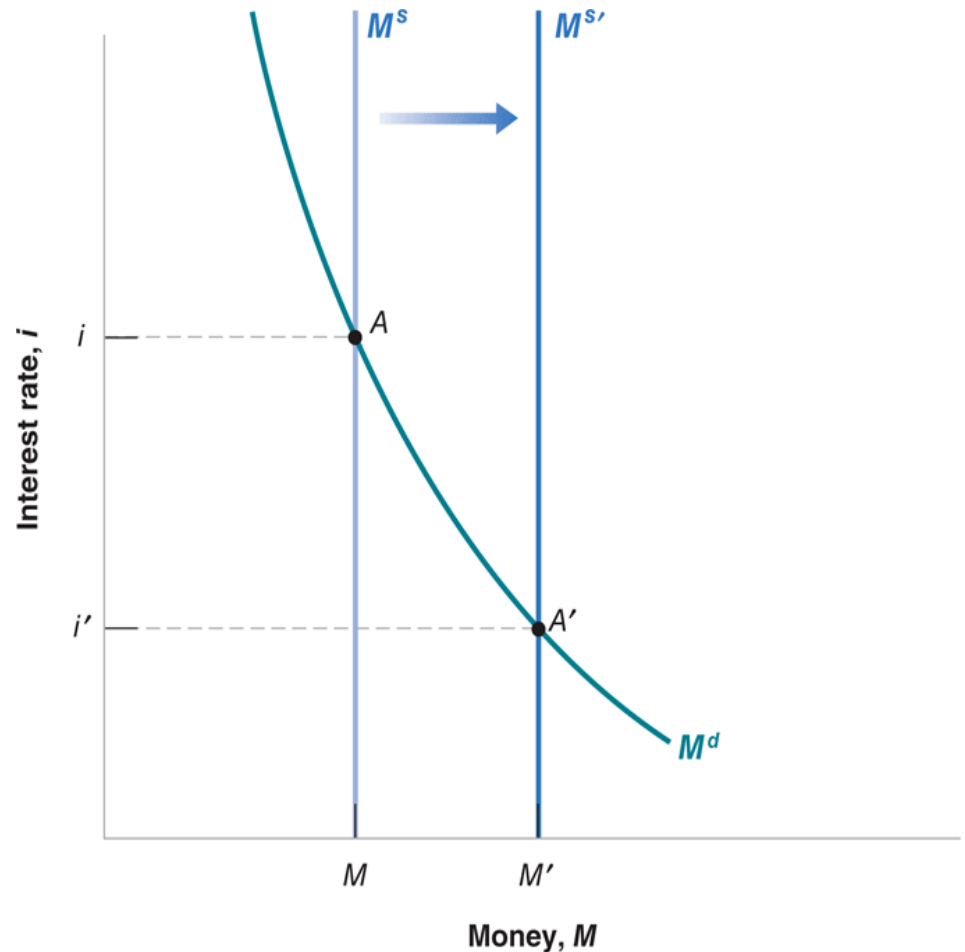Financial market equilibrium moves from point A to A'

4-2 Determining the Interest Rate: I

Figure 4-4 The Effects of an Increase in the Money Supply on the Interest Rate

An increase in the supply of money leads to a decrease in the interest rate.

M^s ↑ (M^s curve shifts to the right) → i ↑
(for a given $Y)

Financial market equilibrium moves from point A to A'

4-2 Determining the Interest Rate: I

- For a given money supply, *an increase in nominal income leads to an increase in the interest rate.*

$$\$Y \rightarrow i\uparrow$$

- *An increase in the supply of money by the central bank leads to a decrease in the interest rate.*

$$M^s\uparrow \rightarrow i\downarrow$$

4-2 Determining the Interest Rate: I

- Central banks typically change the supply of money by buying or selling bonds in the bond market— **open market operations (açık piyasa işlemleri)**.

- **Expansionary (genişleyici) open market operation**: the central bank *expands* the supply of money by <u>buying</u> bonds. ($M^s\uparrow$)

- **Contractionary (adarltıcı) open market operation**: the central bank *contracts* the supply of money by <u>selling</u> bonds. ($M^s\downarrow$)

4-2 Determining the Interest Rate: I

Figure 4-5 The Balance Sheet of the Central Bank and the Effects of an Expansionary Open Market Operation

The **assets** of the central bank are the bonds it holds.

The liabilities are the stock of money in the economy.

An open market operation in which the central bank <u>buys bonds</u> and issues money increases both assets and liabilities by the same amount.

Balance Sheet

Assets	Liabilities
Bonds	Money (currency)

The Effects of an Expansionary Open Market Operation

Assets	Liabilities
Change in bond holdings: +$1 million	Change in money stock: +$1 million
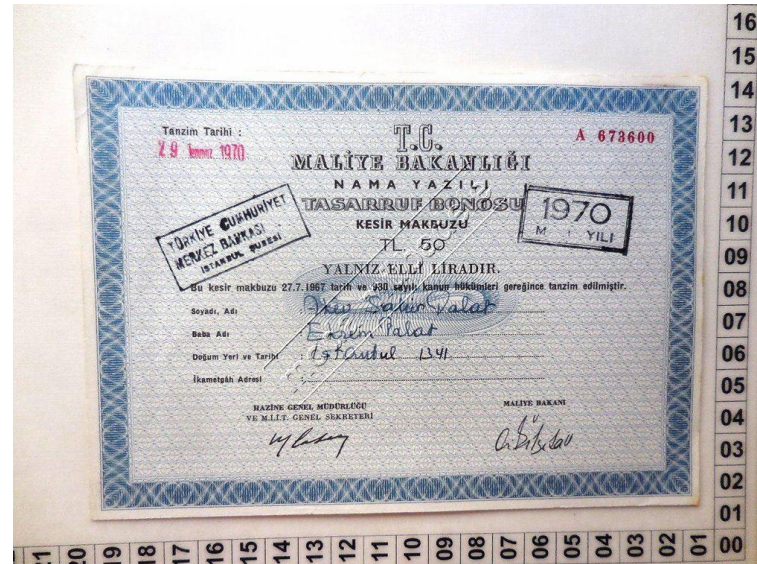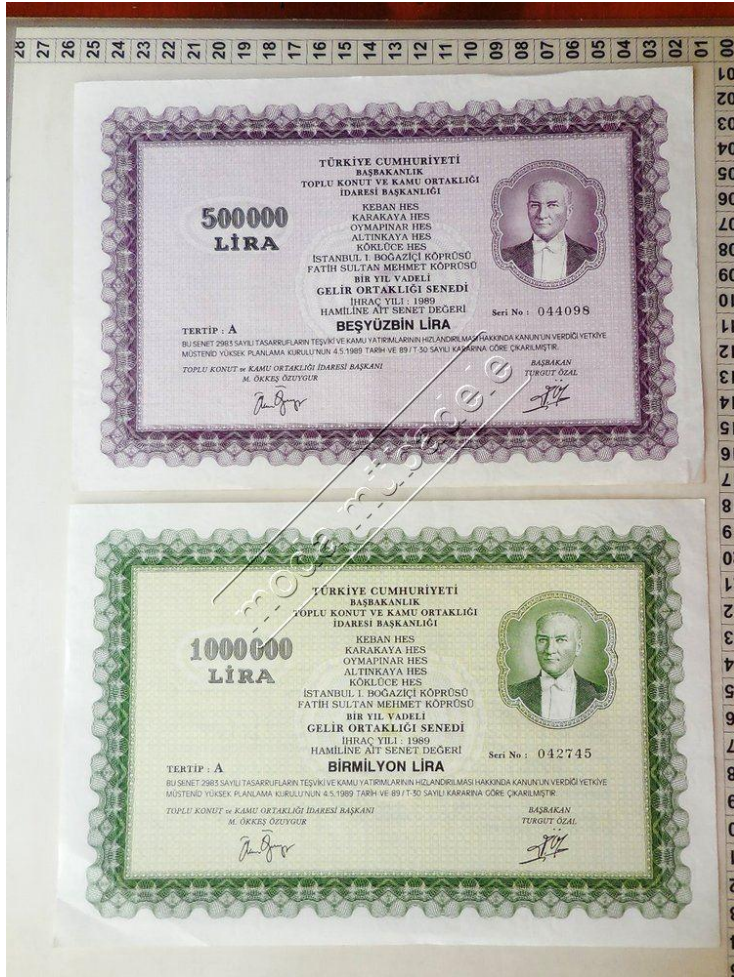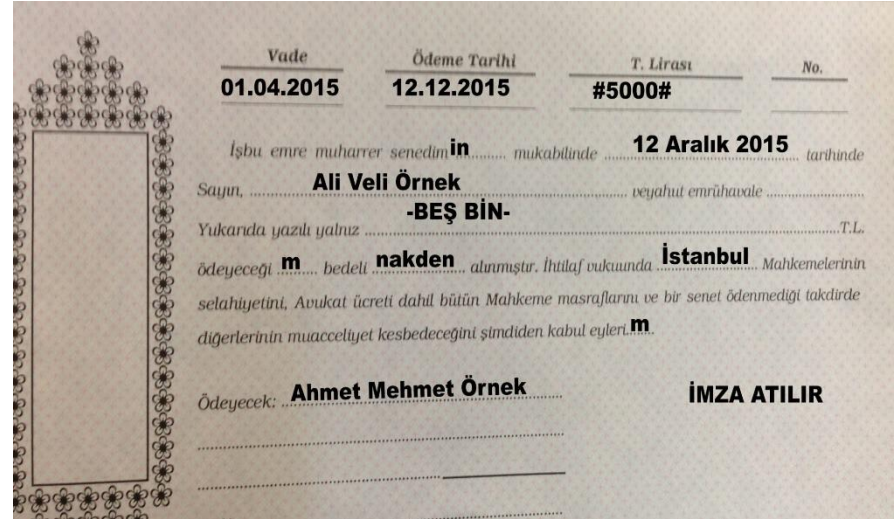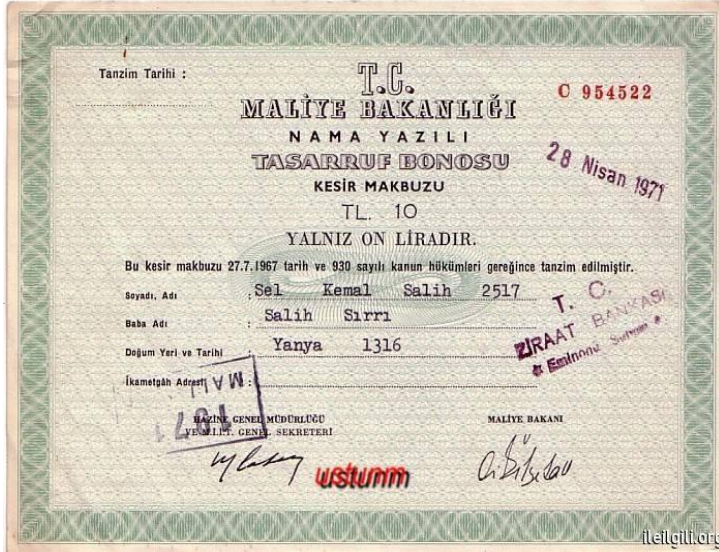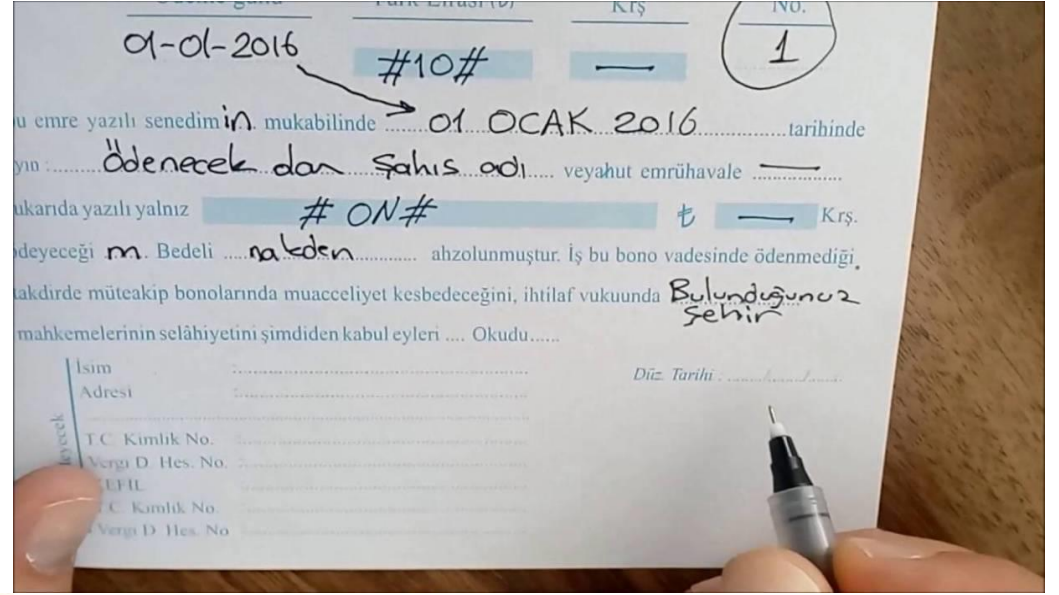
4-2 Determining the Interest Rate: I

- Suppose a bond such as a **Treasury bill**, or **T-bill,** promises to pay $100 a year from now.

- If the price of the bond today is $$P_B$, then the interest rate on the bond is:

$$i = \frac{\$100 - \$P_B}{\$P_B}$$

- *The higher the price of the bond, the lower the interest rate.*

- *The higher the interest rate, the lower the price today.*

4-2 Determining the Interest Rate: I

- Rather than the money supply, the central bank could have chosen the interest rate and then adjusted the money supply so as to achieve the interest rate it had chosen.

- Choosing the interest rate, instead of the money supply, is what modern central banks, including the Fed, typically do.

$$M^s \leftrightarrow i$$

$$i \leftrightarrow M^s$$

4-3 Determining the Interest Rate: II

- **Financial intermediaries**: Institutions that receive funds from people and firms and use these funds to buy financial assets or to make loans to other people and firms.

- Banks are financial intermediaries that have money, in the form of *checkable deposits,* as their liabilities.

- Banks keep as **reserves** some of the funds they receive.

- The liabilities of the central bank are the money it has issued, called **central bank money**.

4-3 Determining the Interest Rate: II

Figure 4-6 The Balance Sheet of Banks, and the Balance Sheet of the Central Bank Revisited

(a)

Central Bank

Assets	Liabilities
Bonds	Central Bank Money = Reserves + Currency

Demand for central bank money
= demand for currency (by people)
+ demand for reserves (by banks)

(b)

Banks

Assets	Liabilities
Reserves Loans Bonds	Checkable deposits

4-3 Determining the Interest Rate: II

- Assume (for simplicity) banks do not not make loans, they hold only reserves and bonds as assets
- Assume (for simplicity) people hold no currency (i.e. demand for currency is 0) ,

so the demand for money by people is the demand for checkable deposits:

$$M^d = \$Y \, L(i) => demand\ for\ checkable\ deposits \quad (4.3)$$

θ : *Reserve ratio*: the amount of reserves banks hold per dollar of checkable deposits

- The demand for reserves by banks depends on the amount of checkable deposits:

$$H^d = \theta M^d = \theta \$Y \, L(i) \tag{4.4}$$

- H^d is demand for high-power money or the monetary base (para tabanı).

4-3 Determining the Interest Rate: II

- Let H denote the supply of central bank money, then the equilibrium condition:
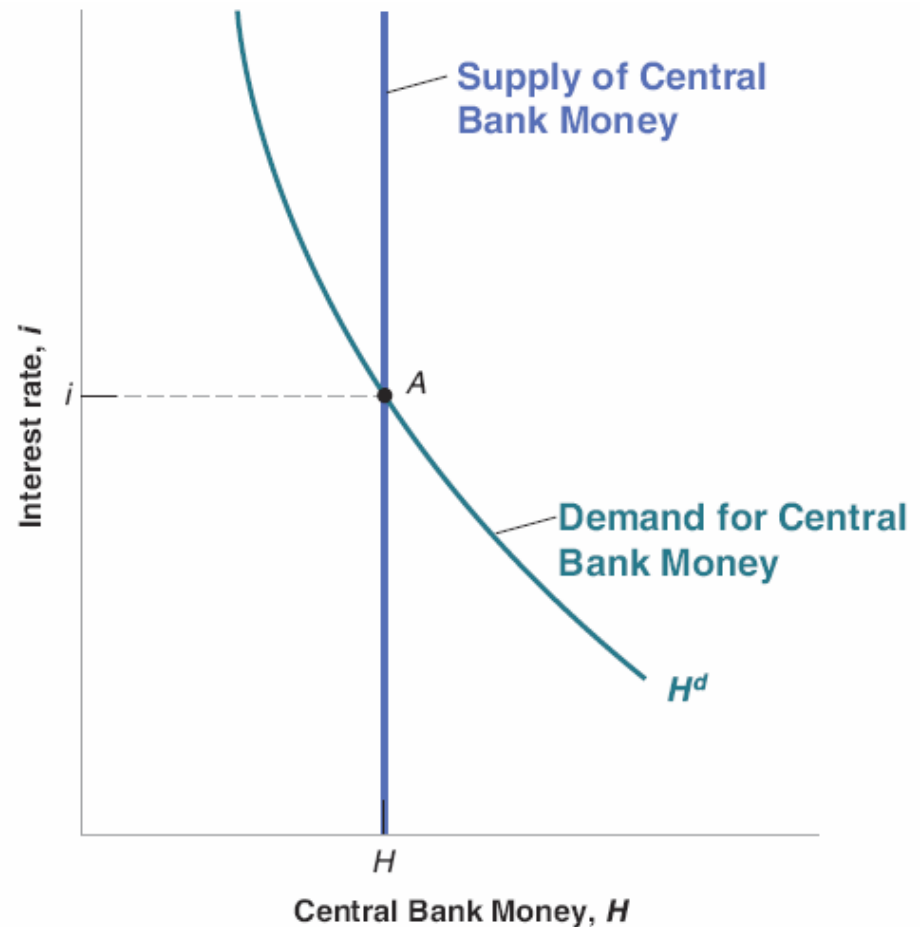
$$H = H^d \tag{4.5}$$

- Or using equation (4.4):

$$H = \theta \$Y \, L(i) \tag{4.6}$$

- An increase in H leads to a decrease in the interest rate, and a decrease in H leads to an increase in the interest rate.

4-3 Determining the Interest Rate: II

Figure 4-7 Equilibrium in the Market for Central Bank Money and the Determination of the Interest Rate

The equilibrium interest rate is such that the supply of central bank money is equal to the demand for central bank money.

4-3 Determining the Interest Rate: II

- The **federal funds market** is an actual market for bank reserves.

- The **federal funds rate** is the interest rate determined in the federal funds market.

- The federal funds rate is the main indicator of U.S. monetary policy because the Fed can choose the federal funds rate it wants by changing H.

4-4 The Liquidity Trap

- **Zero lower bound**: The interest rate cannot go below zero.
- The economy is in a **liquidity trap** when the interest rate is down to zero, monetary policy cannot decrease it further.
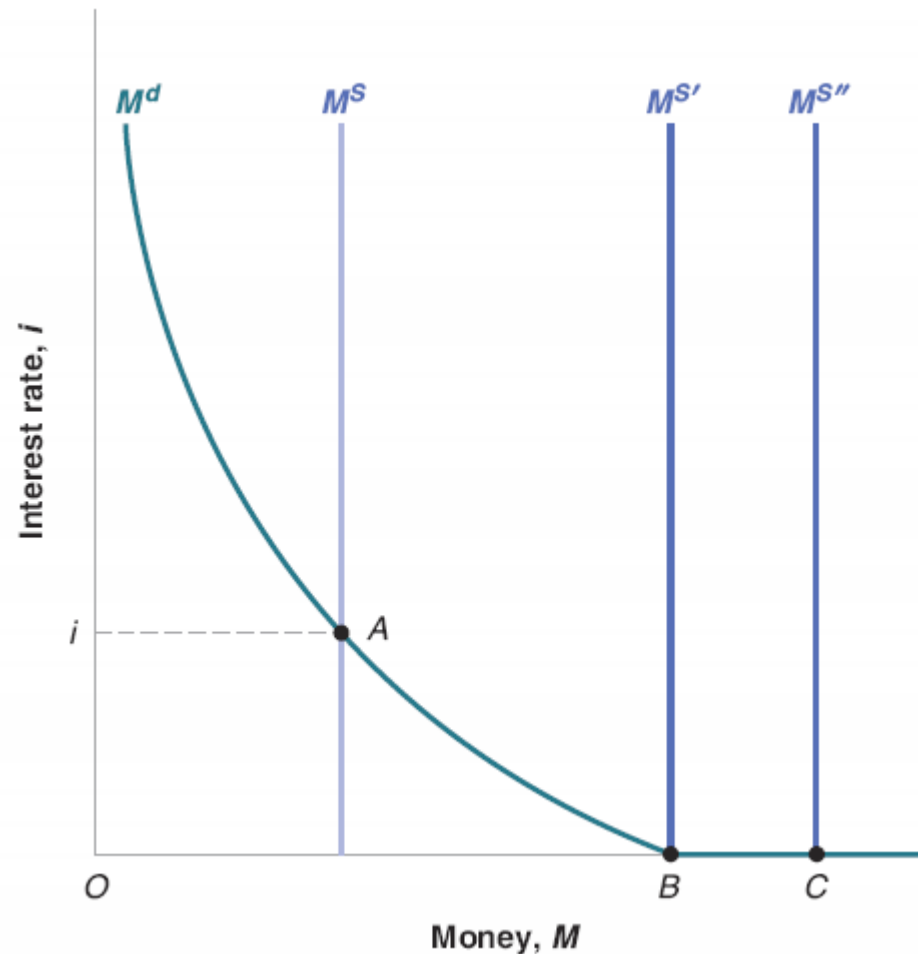
4-4 The Liquidity Trap

Figure 4-8 Money Demand, Money Supply, and the Liquidity Trap

When the interest rate is equal to zero, and once people have enough money for transaction purposes, they become indifferent between holding money and holding bonds.
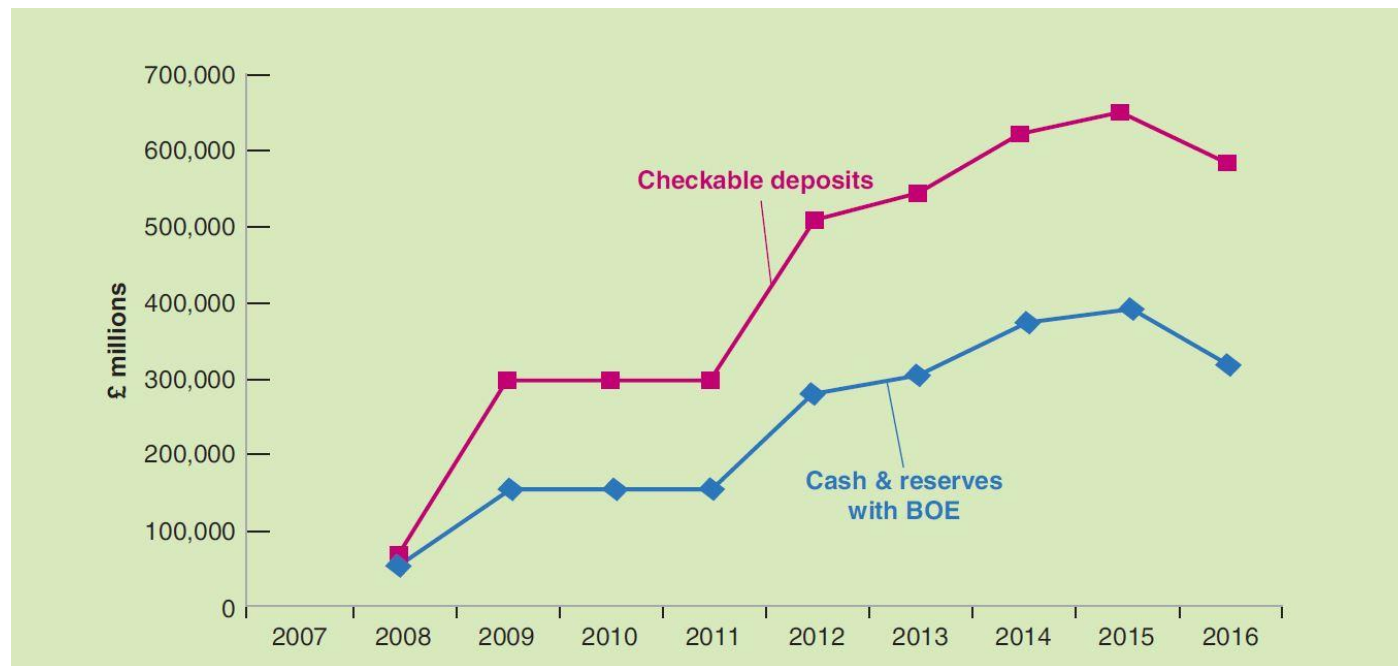
The demand for money becomes horizontal.

This implies that, when the interest rate is equal to zero, further increases in the money supply have no effect on the interest rate, which remains equal to zero.

FOCUS: The Liquidity Trap in the United Kingdom

- The large increase in the supply of central bank money between 2007 and 2014 was absorbed by households and banks.

Figure 1 Checkable Deposits and Reserves with BoE, 2007−2016.

Source: Bank of England, Bankstats (Monetary & Financial Statistics).

APPENDIX: The Determination of the Interest Rate When People Hold Both Currency and Checkable Deposits

- Assume that overall money demand is:
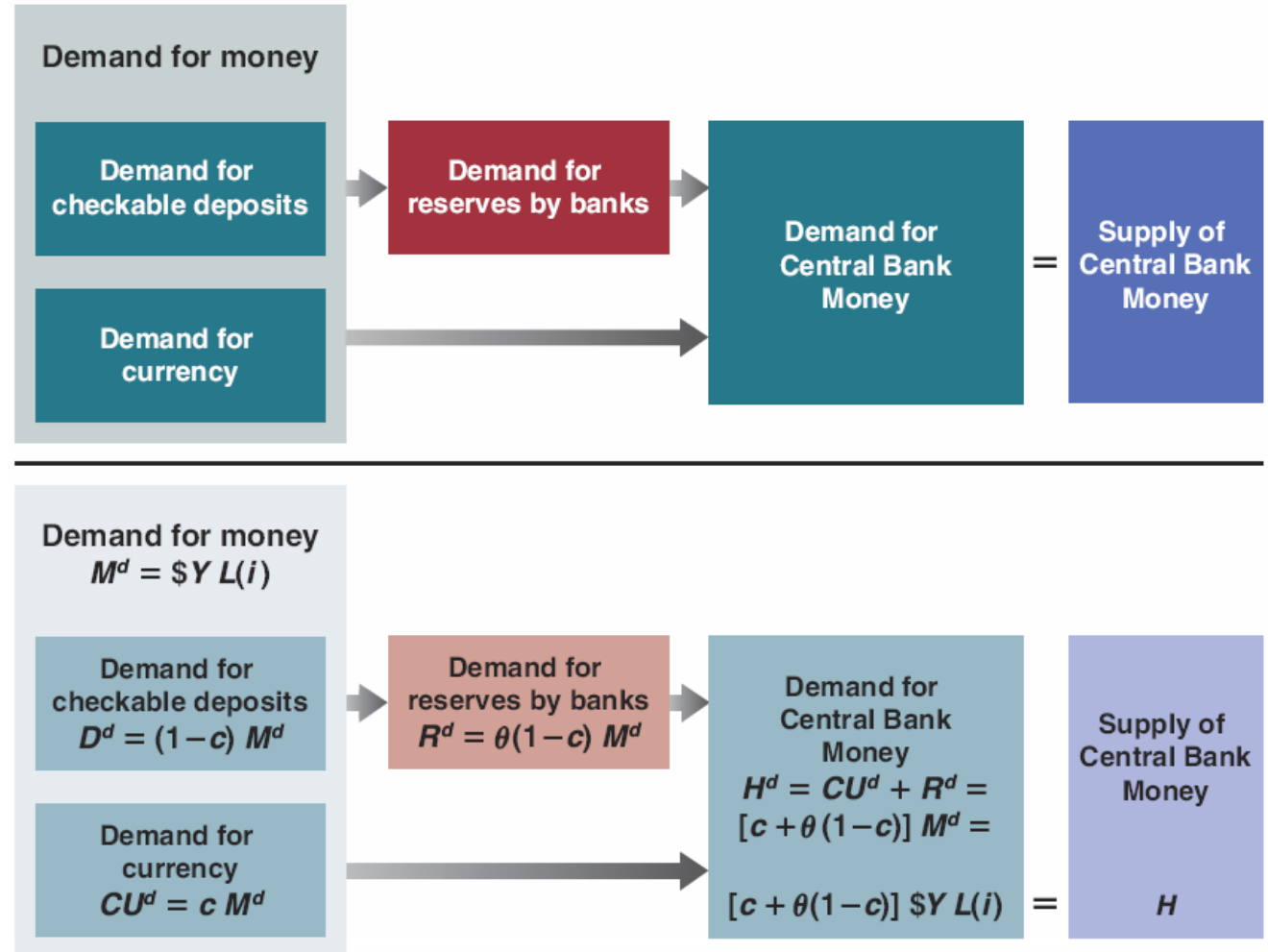
$$M^d = \$Y \, L(i) \qquad (4.\text{A}1)$$
$$(-)$$

- Also assume that people hold a fixed proportion of their money in currency c, and $(1-c)$ in checkable deposits, so the demand for currency and the demand for checkable deposits are respectively:

$$CU^d = cM^d \qquad (4.\text{A}2)$$
$$D^d = (1-c)M^d \qquad (4.\text{A}3)$$

APPENDIX: The Determination of the Interest Rate When People Hold Both Currency and Checkable Deposits

Figure 4-A1
Determinants of the Demand and the Supply of Central Bank Money.

APPENDIX: The Determination of the Interest Rate When People Hold Both Currency and Checkable Deposits

- Let R be the reserves of banks, D be the dollar amount checkable deposits, and θ be the reserve ratio:

$$R = \theta D \qquad (4.A4)$$

- Combining (4.A2) and (4.A4) gives the demand for reserves by banks:

$$R^d = \theta(1 - c)M^d \qquad (4.A5)$$

APPENDIX: The Determination of the Interest Rate When People Hold Both Currency and Checkable Deposits

- Demand for central bank money is:

$$H^d = CU^d + R^d \qquad (4.A6)$$

so that:

$$H^d = cM^d + \theta(1 - c)M^d = [c + \theta(1 - c)]M^d$$

which gives the demand for central bank money:

$$H^d = [c + \theta(1 - c)]\$Y L(i) \qquad (4.A7)$$

APPENDIX: The Determination of the Interest Rate When People Hold Both Currency and Checkable Deposits

- The equilibrium condition is that the supply of central bank money be equal to the demand for central bank money:

$$H = H^d \tag{4.A8}$$

  or using equation (4.9):

$$H = [c + \theta(1 - c)]\$YL(i) \tag{4.A9}$$

APPENDIX: The Determination of the Interest Rate When People Hold Both Currency and Checkable Deposits

- *The supply of central bank money (the left side of equation (4.A9) is equal to the demand for central bank money (the right side of equation (4.A9), which is equal to the term in brackets times the overall demand for money.*