

Lecture Notes on

**MONEY, BANKING,
AND FINANCIAL MARKETS**

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Chapter 5: The Behavior of Interest Rates

1. Loanable Funds Framework

Demand Curve

Supply Curve

Market Equilibrium

2. Changes in Equilibrium Interest Rates

Shifts in Demand

Shifts in Supply

Example: Interest Rates and the Business Cycle

By studying Mishkin's Chapter 4, we learned how interest rates could be measured for a wide variety of credit market instruments. But what economic factors serve to determine these interest rates in the first place?

To answer this question, we will now imagine for simplicity that there is just one type of bond and hence one interest rate for the economy as a whole.

The most important lesson from Chapter 4 is that bond prices and interest rates are negatively related. This fact implies that if we can understand what makes bond prices rise and fall, then we can also explain what makes interest rates change. In particular, any economic factor that makes bond prices rise will simultaneously cause interest rates to fall; and any economic factor that makes bond prices fall will simultaneously cause interest rates to rise.

Thus, Chapter 5 develops a framework—called the “loanable funds” framework—that can be used to analyze how bond prices and interest rates are determined and why bond prices and interest rates might change over time. The beauty of this loanable funds framework is that it is based on the same kind of demand and supply analysis that is used in basic microeconomics.

The chapter shows how demand and supply curves for bonds can be derive and then reviews how the intersection of those curves determines the equilibrium bond price—and hence the equilibrium interest rate.

Using this demand-and-supply framework, the chapter goes on to identify factors that change the equilibrium interest rate either by shifting the demand curve or shifting the supply curve.

And, finally, the chapter presents an example in which this demand-and-supply framework is used to analyze how interest rates behave over the business cycle.

1 Loanable Funds Framework

What economic factors serve to determine the behavior of interest rates?

We can use the loanable funds framework to answer this question.

The loanable funds framework involves applying basic demand-and-supply analysis to the bond market, drawing on our previous insight: that bond prices and interest rates are negatively related.

1.1 Demand Curve

To make things concrete and simple, let's suppose that the only credit market instrument in the economy is a one-year discount bond with face value of \$1,000.

We already know that if

P = today's bond price

F = face value of the bond (\$1000 in this case)

i = yield to maturity

then

$$i = \frac{F - P}{P} = \frac{\$1000 - P}{P}.$$

Next, suppose that the price of the bond today is $P = \$950$. Then

$$i = \frac{\$1000 - \$950}{\$950} = \frac{\$50}{\$950} = 0.053 = 5.3\%.$$

Again to make things concrete, suppose that at this price, the quantity of bonds demanded is \$100 billion.

Now suppose that the price of the bond today is $P = \$900$. Then

$$i = \frac{\$1000 - \$900}{\$900} = \frac{\$100}{\$900} = 0.111 = 11.1\%.$$

As the interest rate on the bond goes up, it seems natural to assume that the quantity demanded will rise. So suppose that at this price, the quantity demanded is \$200 billion.

We can plot these points on a graph like the one shown in Mishkin's Figure 1 (p.89).

The demand curve slopes down because:

As the interest rate rises, the bond becomes more attractive to investors.

As the bond price falls, investors demand more bonds.

1.2 Supply Curve

Now let's consider the properties of the demand curve for bonds.

As before, suppose first that the price of the bond today is $P = \$950$, so that the interest rate is $i = 5.3\%$. Suppose that at this price, the quantity of bonds supplied is \$500 billion.

Now suppose that the price of the bond today is $P = \$900$, so that the interest rate is $i = 11.1\%$. As the interest rate rises, it seems natural to assume that the quantity supplied will fall, since it is getting more expensive to borrow by issuing bonds. So suppose that at this price, the quantity supplied is \$400 billion.

Again, we can plot these points on a graph like Mishkin's Figure 1.

The supply curve slopes up because:

As the interest rate rises, issuing the bond becomes more expensive and hence less attractive for borrowers.

As the bond price falls, borrowers issue fewer bonds.

1.3 Market Equilibrium

Just as in any market, equilibrium in the market for bonds occurs at the point where the demand and supply curves intersect.

Bond Price P

Interest Rate i

\$950

5.3%

\$900

11.1%

\$850

17.6%

\$800

25.0%

\$750

33.0%

Demand Curve
For Bonds

B^d

\$100

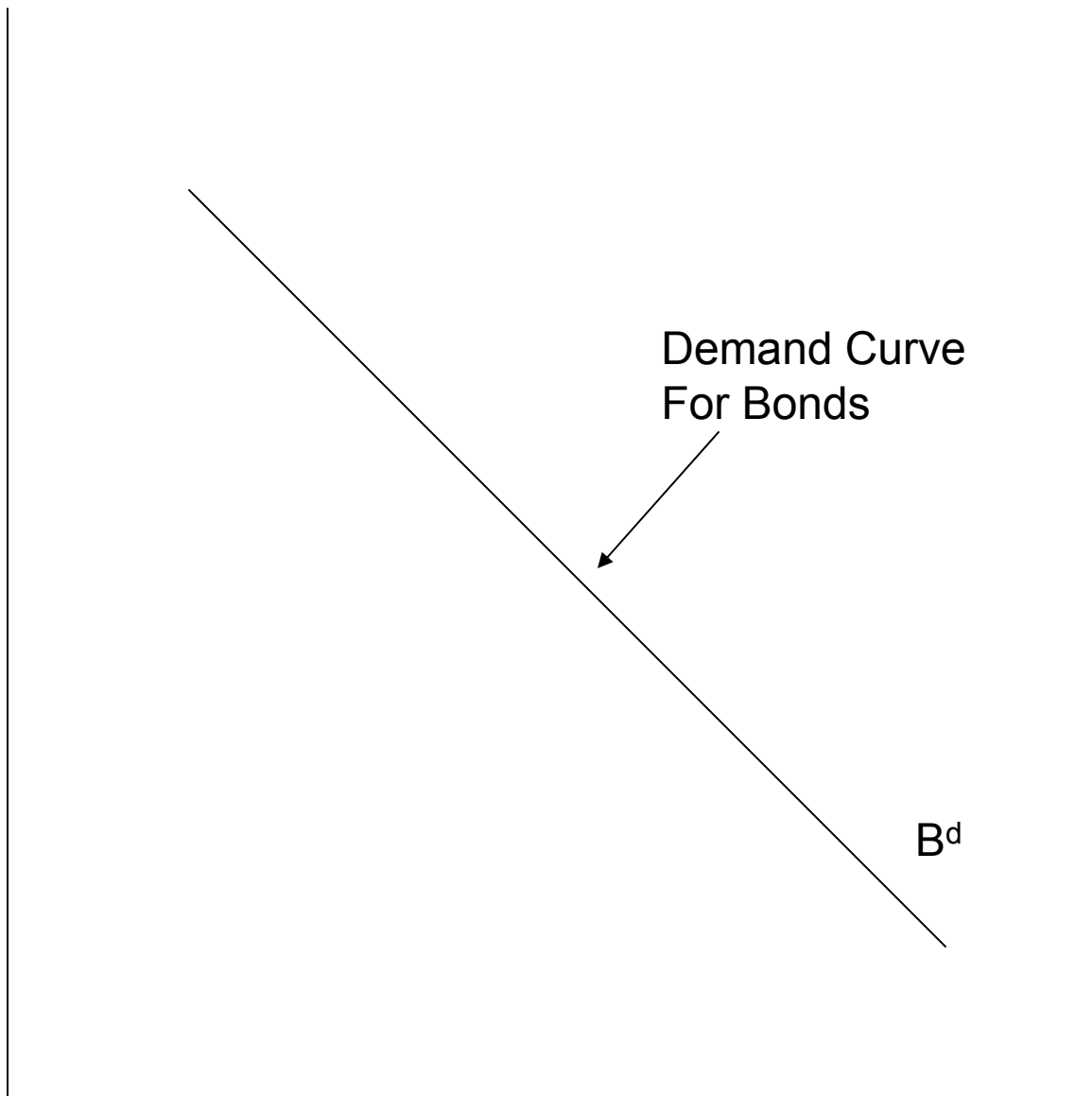
\$200

\$300

\$400

\$500

Quantity of Bonds
(billions)



\$950

\$900

\$850

\$800

\$750

5.3%

11.1%

17.6%

25.0%

33.0%

Demand Curve
For Bonds

B^d

\$100

\$200

\$300

\$400

\$500

Quantity of Bonds
(billions)

Bond Price P

Interest Rate i

Supply Curve for Bonds

\$950

5.3%

\$900

11.1%

\$850

17.6%

\$800

25.0%

\$750

33.0%

B^s

B^d

\$100

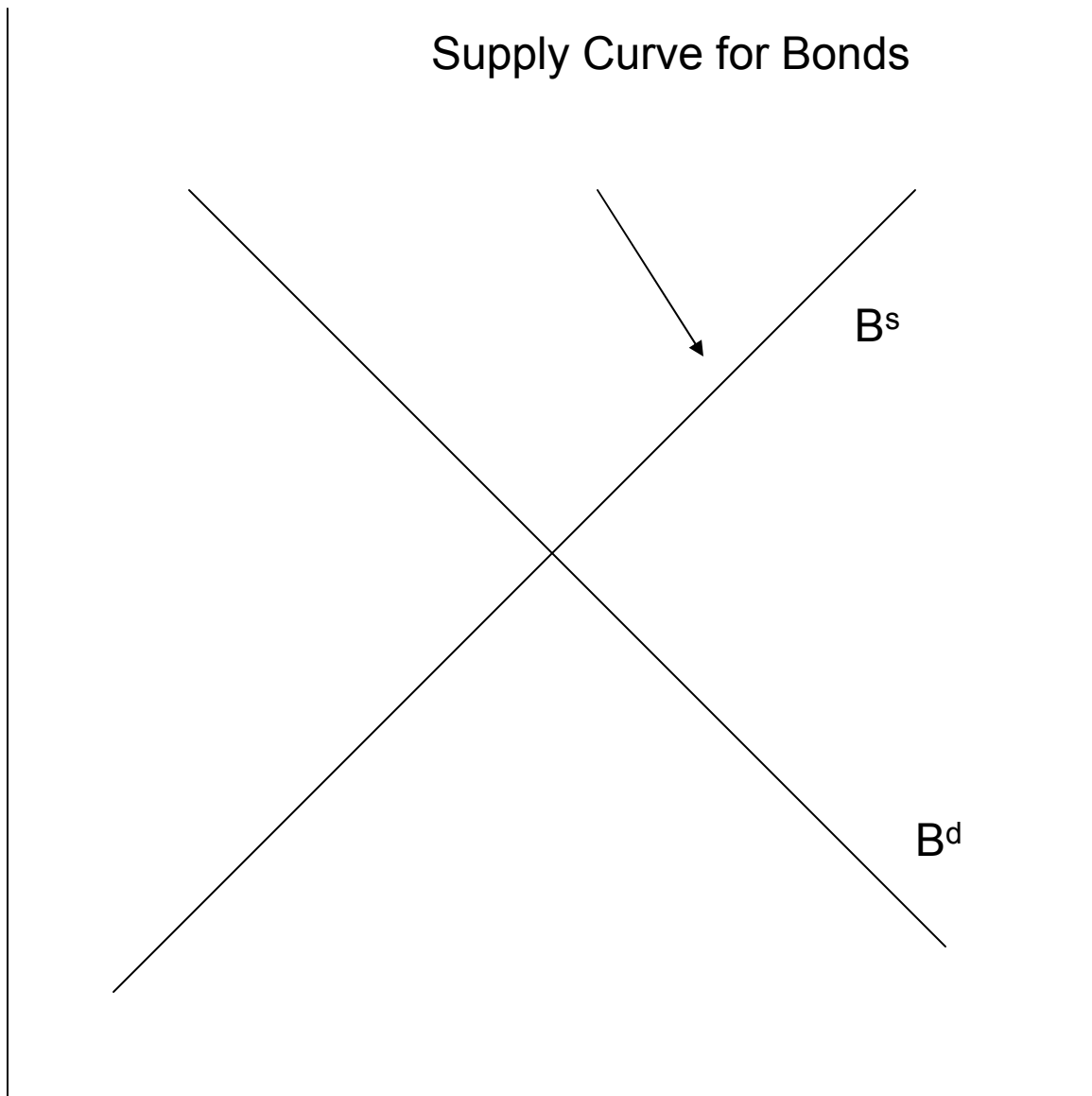
\$200

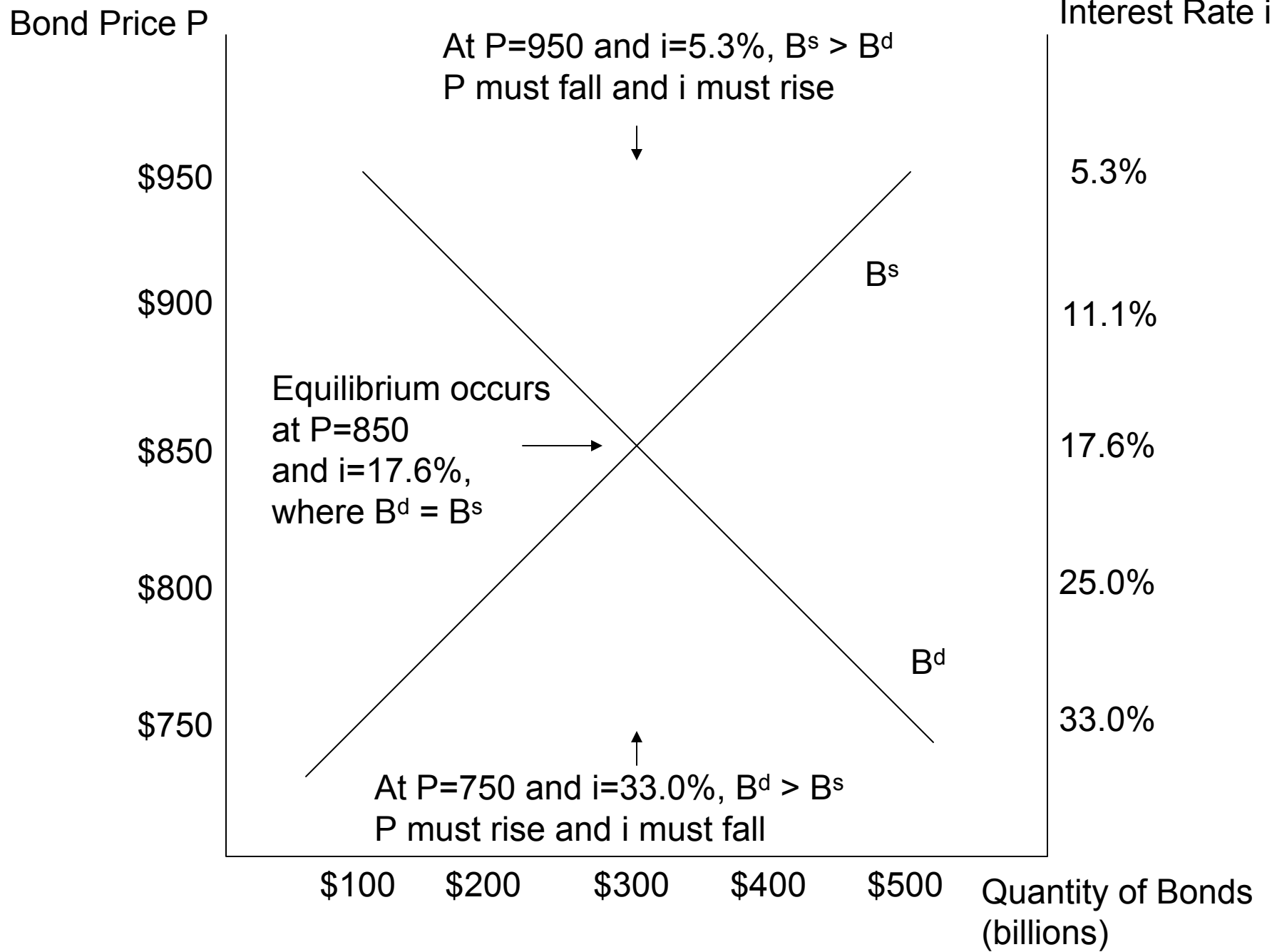
\$300

\$400

\$500

Quantity of Bonds
(billions)





In Mishkin's Figure 1, the market clearing price is $P^* = \$850$ and the market clearing interest rate is $i^* = 17.6\%$.

To see that the interest rate will always tend to move towards i^* , consider the alternative scenarios:

At $P = \$950$ and $i = 5.3\%$, supply exceeds demand.

Under these conditions of excess supply, borrowers would like to sell more bonds than investors are willing to buy.

Bond prices must fall.

Interest rates must rise.

At $P = \$750$ and $i = 33.0\%$, demand exceeds supply.

Under these conditions of excess demand, investors would like to buy more bonds than borrowers are willing to supply.

Bond prices must rise.

Interest rates must fall.

Figure 1 is a conventional demand-and-supply diagram with price on the vertical axis and quantity of the horizontal axis.

One disadvantage to using this graph to think about interest rates, however, is that interest rates run the wrong way on the vertical axis: as we move up the axis, interest rates fall.

We might consider fixing this by redrawing the graph so that interest rates rise as we move up the vertical axis.

Mishkin does this in his Figure 2 (p.92).

But now another problem arises: in Figure 2, the demand curve for bonds slopes up and the supply curve for bonds slopes down, exactly the opposite of what we are used to seeing.

We can remedy this problem by introducing the concept of "loanable funds."

Supplying a bond = demanding a loan = demanding loanable funds.

Demanding a bond = supplying a loan = supplying loanable funds.

Hence, in terms of loanable funds:

The demand curve slopes down.

Interest Rate i

33.0%

25.0%

17.6%

11.1%

5.3%

\$100

\$200

\$300

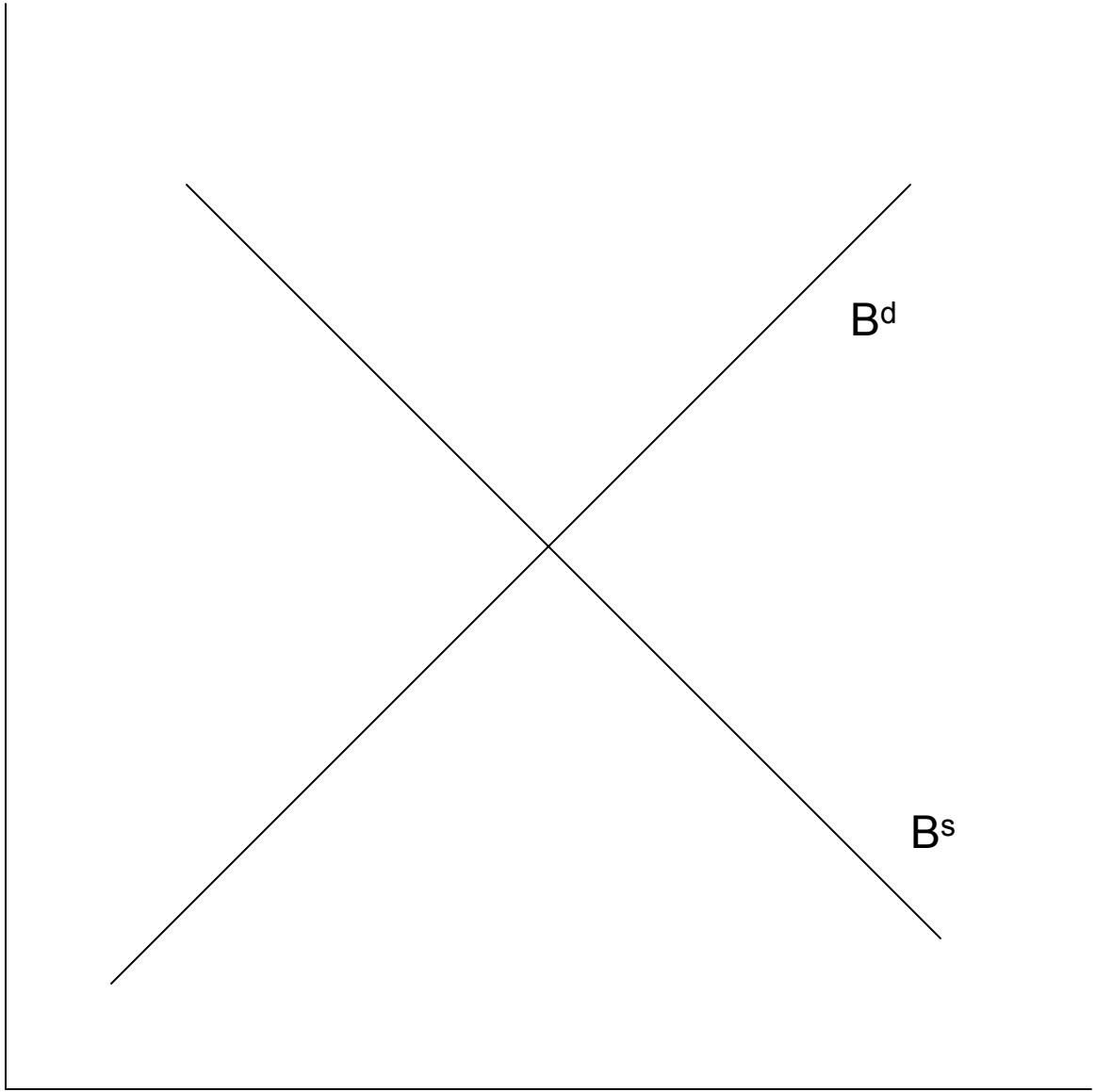
\$400

\$500

Quantity of Bonds
(billions)

B^d

B^s



Interest Rate i

33.0%

25.0%

17.6%

11.1%

5.3%

Demanding a bond
= supplying loanable funds

$B^d = L^s$

Supplying a bond
= demanding loanable funds

$B^s = L^d$

\$100

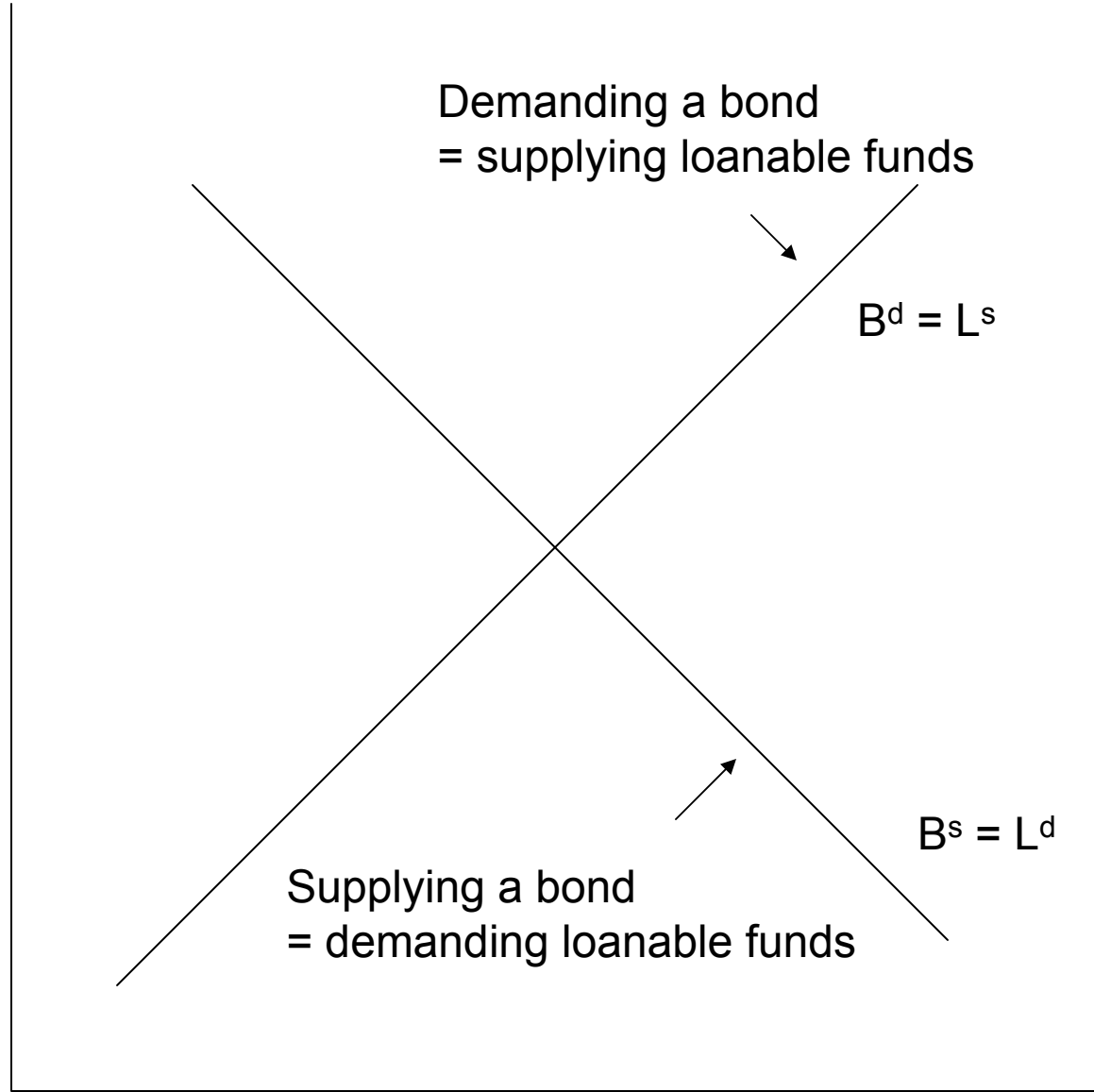
\$200

\$300

\$400

\$500

Quantity of Bonds B
and Loanable Funds L



The supply curve slopes up.

This insight gives our demand-and-supply approach its name: the “loanable funds framework.”

2 Changes in Equilibrium Interest Rates

Now that we’ve developed the loanable funds framework to see how the equilibrium interest rate is determined by the intersection of demand and supply curves for loanable funds, we can go on to identify economic factors that change the equilibrium interest rate either by shifting the demand curve or shifting the supply curve.

2.1 Shifts in the Demand for Loanable Funds

The principal factor shifting the demand for loanable funds is the expected profitability of investment opportunities.

When firms have access to more profitable investment opportunities, they want to borrow more at any given interest rate.

This shifts the demand curve for loanable funds out, while the supply curve for loanable funds remains unchanged.

The interest rate rises.

2.2 Shifts in the Supply of Loanable Funds

Several factors shift the supply of loanable funds:

Changes in wealth

Changes in the relative risk of bonds.

Changes in the liquidity of bonds.

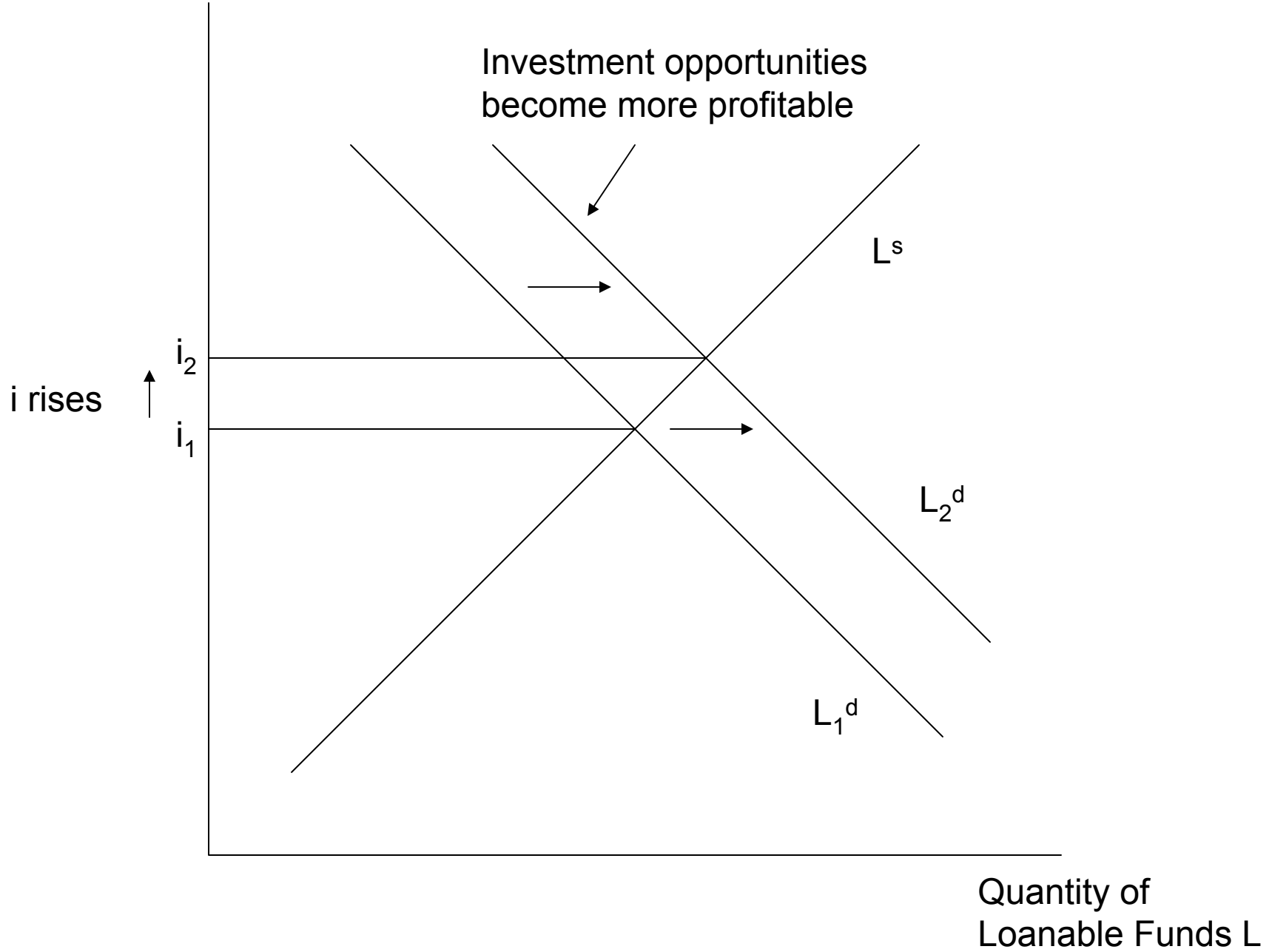
Wealth:

When wealth increases, the demand for bonds at any given interest rate increases.

Hence, the supply of loanable funds at any given interest rate increases.

Risk:

Interest Rate i



When the relative riskiness of bonds decreases, the demand for bonds at any given interest rate increases.

This could happen because bonds become less risky.

Or because other assets—like stocks—become more risky.

Hence, the supply of loanable funds at any given interest rate increases.

Liquidity:

When bonds become more liquid—easier to buy and sell—they become more attractive as a store of value.

Hence, when bonds become more liquid, the demand for bonds increases.

Hence, the supply of loanable funds at any given interest rate increases.

Hence, when wealth increases, bonds become less risky relative to other assets, or bonds become more liquid, the supply curve for loanable funds shifts out, while the demand curve for loanable funds remains unchanged.

The interest rate falls.

2.3 Example: Interest Rates and the Business Cycle

During a business cycle expansion, investment opportunities become more profitable.

Hence, the demand curve for loanable funds shifts out.

During a business cycle expansion, wealth increases.

Hence, the supply curve for loanable funds shifts out.

In the graph, the interest rate rises.

But, in general, i could rise, fall, or stay unchanged, depending on the relative magnitudes of the shifts in L^d and L^s .

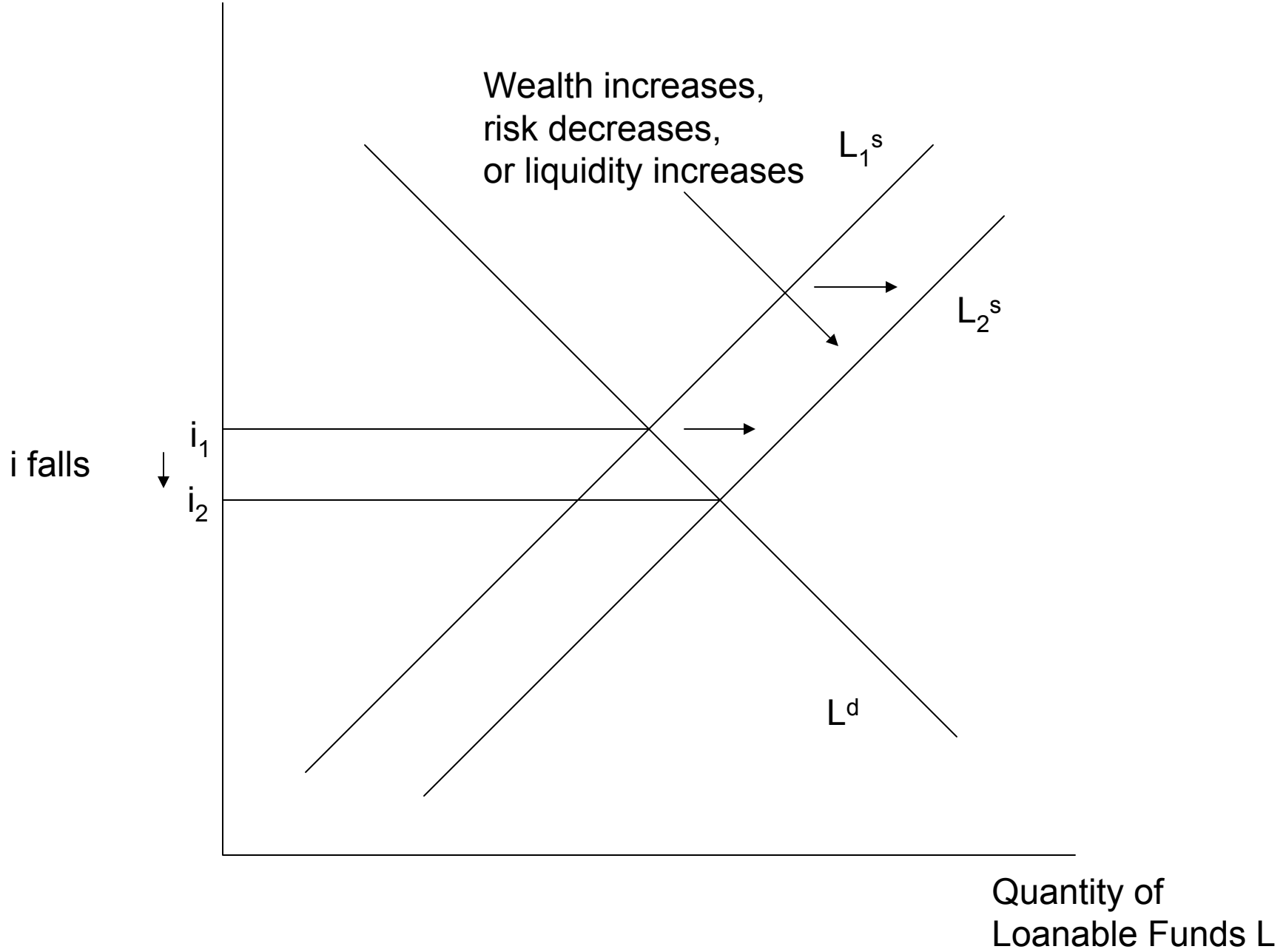
However, see Mishkin's Figure 8 (p.102):

Plots the 3-month US Treasury bill rate, 1951-2002.

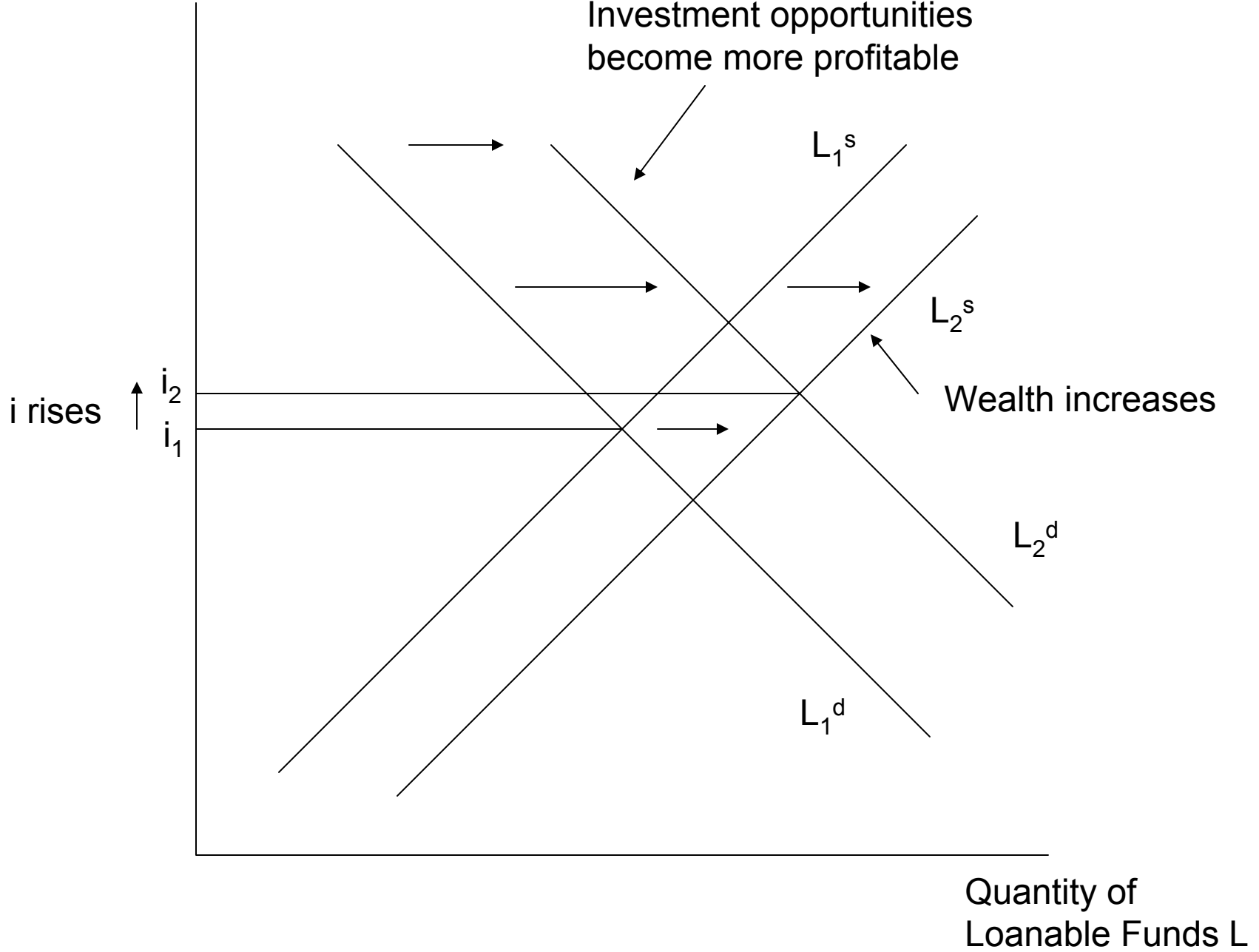
Shaded areas are recessions; other areas are expansions.

Evidently, in the US, interest rates tend to rise during expansions and fall during recessions.

Interest Rate i



Interest Rate i



This suggests that, as in our graph, the shifts in the demand for loanable funds resulting from changes in the profitability of investment opportunities are larger than the shifts in the supply of loanable funds resulting from changes in wealth.

Often, if you read the Wall Street Journal, you'll hear that bond traders become nervous when good economic news comes out and that they celebrate when bad economic news comes out.

At first glance, the traders' behavior might seem strange: why would someone be nervous about good news and happy about bad news.

But our more detailed analysis provides a way of understanding this behavior:

Since interest rates tend to rise during expansions and fall during recessions, bond prices tend to fall during expansions and rise during recessions.

That implies that good economic news, suggesting that the economy is expanding, will typically be greeted by falling bond prices.

And bad economic news, suggesting that a recession is more likely, will typically be greeted by rising bond prices.

Hence, the negative relationship between bond prices and interest rates, along with the fact that interest rates tend to rise during economic expansions and fall during recessions, explains why bond traders often seem to dislike good news and like bad news.

3 Conclusion

This chapter develops the loanable funds framework, which combines basic demand-and-supply analysis applied to the bond market with our previous insight that bond prices and interest rates are inversely related.

The loanable funds framework allows us to identify the economic determinants of equilibrium interest rates.