

Saving, Investment, and the Financial System

PRINCIPLES OF ECONOMICS (ECON 210)

BEN VAN KAMMEN, PHD

Investment=Savings? The market for “loanable funds”

- In the previous lecture, the Solow growth model assumed that a fraction of output each period is saved, and it is automatically converted into capital the next period (“investment”).
- This really blurs the lines on the picture of what happens when households save and firms borrow from them to invest in capital.
- The “lines on this picture” are, once again, the supply and demand curves.
- In this lecture, the market in question is for loanable funds.
 - All savings are potentially loanable (“in supply”) to firms that “demand” them for investment.

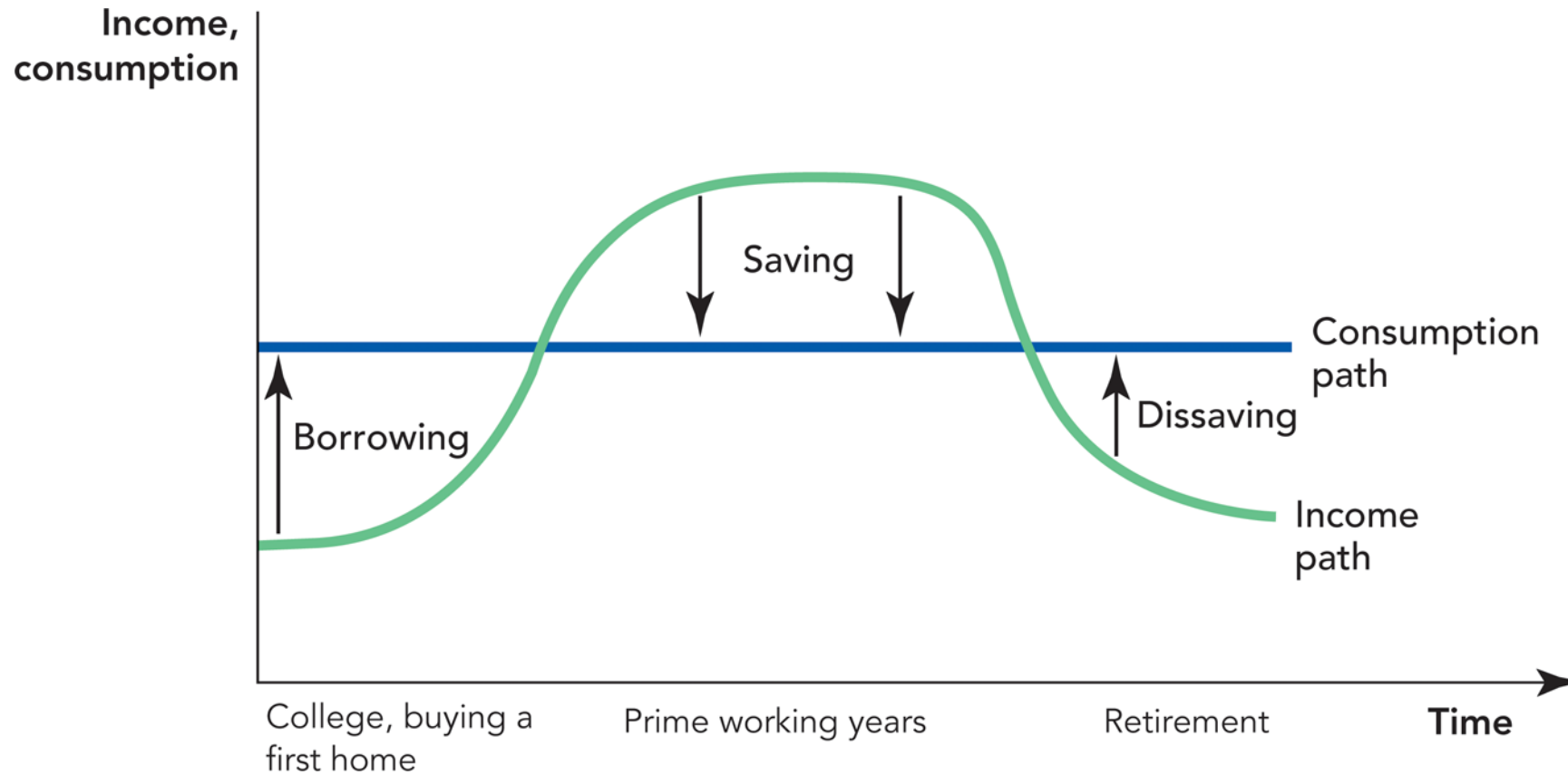
The supply of savings: why do households save?

- Households value consumption in multiple time periods.
- Households' income is not equal across time periods.
 - Simplest case is 2 periods: working adulthood and retirement.
 - All income is earned in the working period and none in retirement.
- Saving is a way to have consumption when current income is low or absent: consumption smoothing.

Saving implies delaying consumption

- *Ceteris paribus*, households prefer not to delay a good thing like consumption.
- This is sometimes called the “primacy of the present”.
 - It means that if you could choose between having \$10 today and \$10 next week, you prefer today.
- Households are “impatient” in the sense that they value present consumption more than future consumption . . .
- But households also respond to incentives.
 - They will save more willingly if they are compensated, e.g., by receiving interest on their savings.

Life cycle income and consumption



Consumption volatility

- Even a simplified, i.e., with few shocks and a predictable cyclical pattern, depiction of individual current income has a lot of variability over one's lifetime:
 - the green curve on the previous slide.
- Requiring current consumption to follow the same path would harm the individual.
 - Periods of deprivation and poverty (youth and old age) contrasted with periods of abundance and excess (middle years).
 - The “bad times” are really undesirable, and the person would want to eliminate, or at least ameliorate, them if they could.

Consumption smoothing

- Individuals prefer current consumption to follow the path of permanent income as closely as possible:
 - the blue curve on the previous slide.
 - The average income over their lifetime.
- “Smooth” over time, especially relative to current income.
- This involves some borrowing, saving, and then dissaving at the end of the cycle.

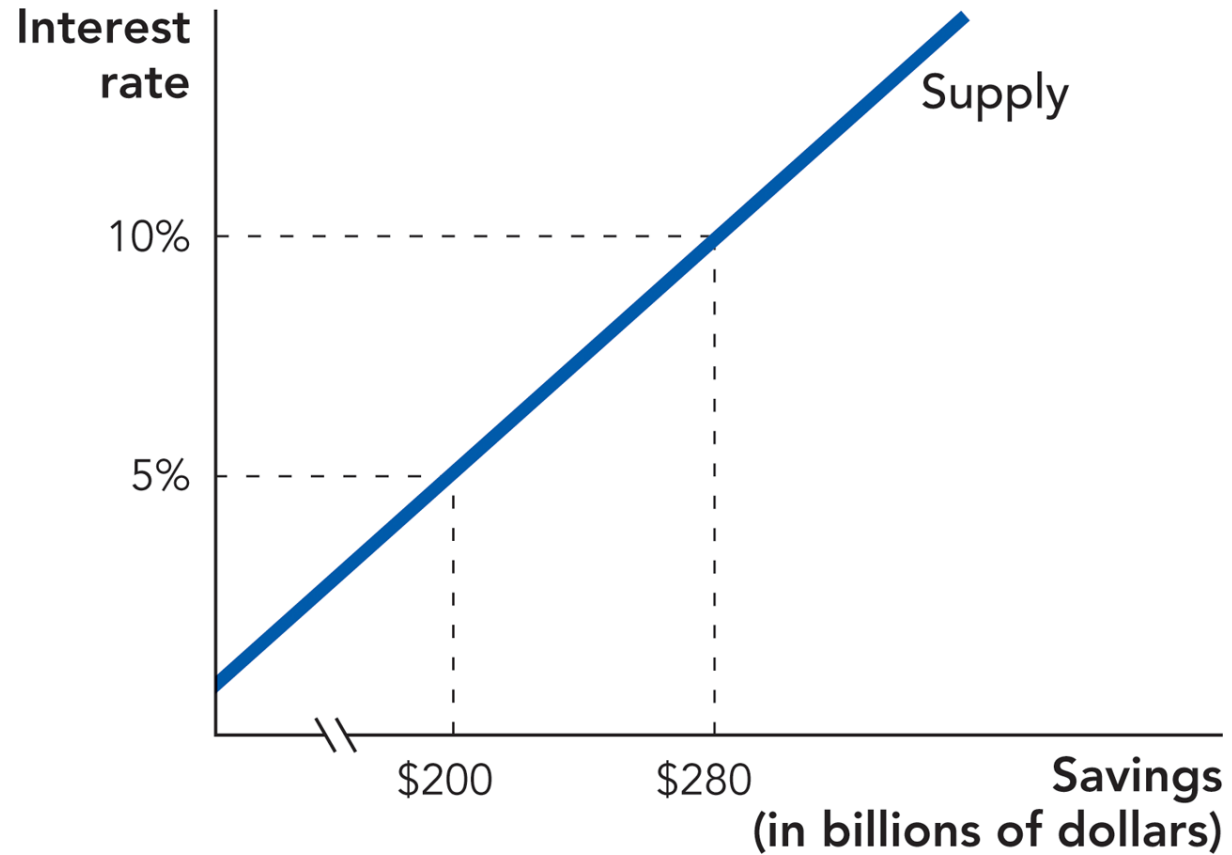
Temporal discounting

- Individuals value goods received in any time period, but they value them more the sooner they are received.
- They behave as if the following offers give them equal satisfaction:
$$\text{\$10 today} = (1 + d) * \text{\$10 tomorrow},$$
where d is a “discount factor”.
- d measures how much more you would have to give the person tomorrow to get them to delay their \$10 by 1 period (1 day).
 - Sounds an awful lot like an interest payment, huh?
- The larger d is, the more impatient the individual is.

The interest rate

- Interest is like a payment savers receive for delaying consumption.
 - The more interest that is paid, the more apt are individuals to save.
- This is what gives the supply of loanable funds its upward slope.
- Also this explains why one can think of the interest rate as the price of loanable funds.
 - This is how much is paid by the borrower to the lender, in exchange for loaning out the lender's savings.
- Interest rates are commonly expressed in percentage terms, e.g., 5%.

The supply of loans (by households)



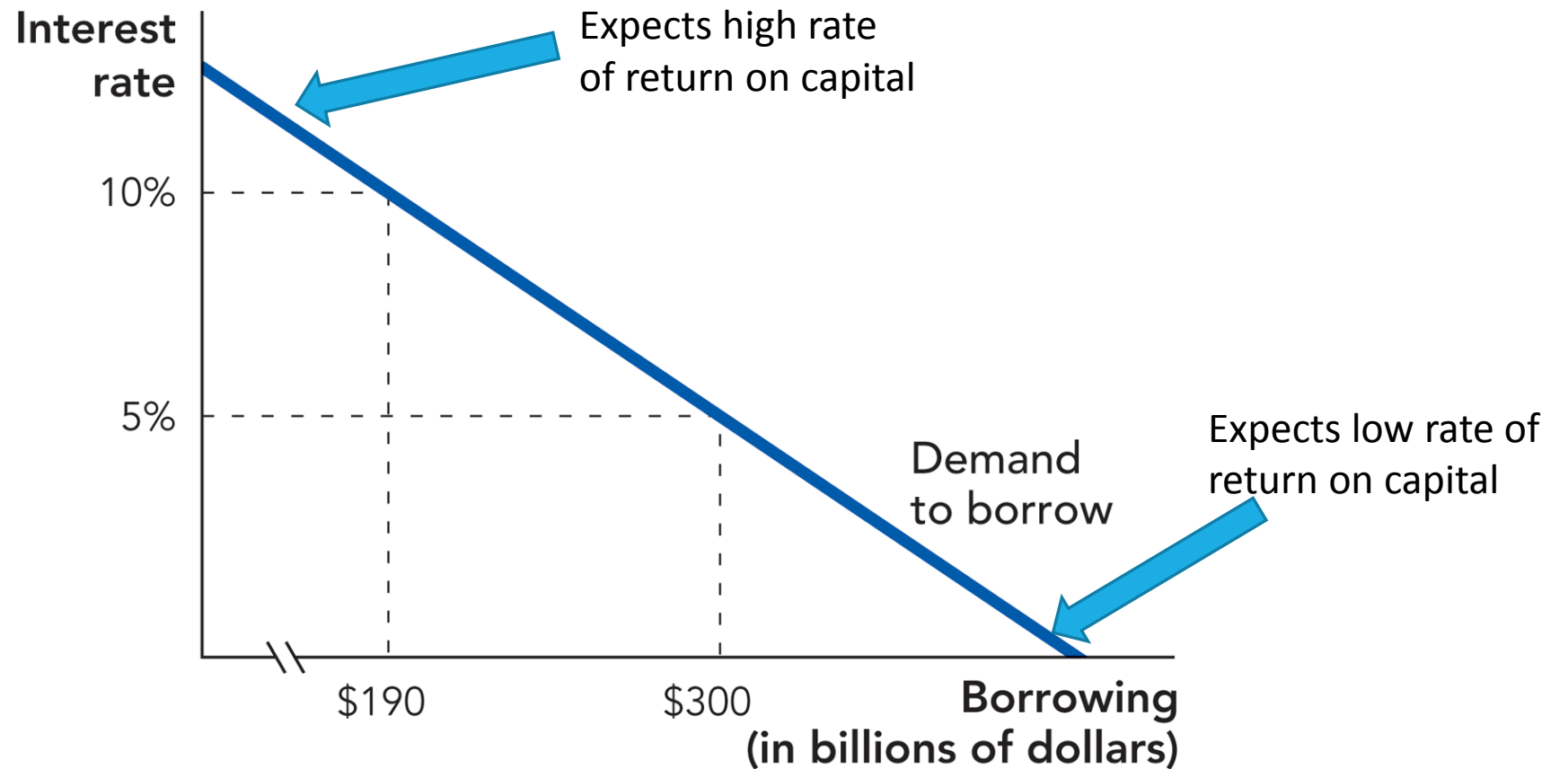
The demand for loans (by firms)

- Building a factory, buying machinery, and beginning production are prerequisites for a firm to exist.
- The cost of this capital is incurred before revenue is generated from sales, and the entrepreneur does not usually have savings to pay them.
- This constraint on investment can be relaxed by allowing the entrepreneur to use the savings of others to pay the start-up costs, in exchange for repayment with interest after revenue begins flowing.

The interest rate (demand side)

- Not all business ventures are created equal.
- Among other factors, the expected return on the capital they intend to purchase affects their capacity to repay the loan.
 - By what percentage is the revenue generated expected to exceed the cost of the capital (which includes interest payments)?
 - Each entrepreneur's willingness to pay interest varies.

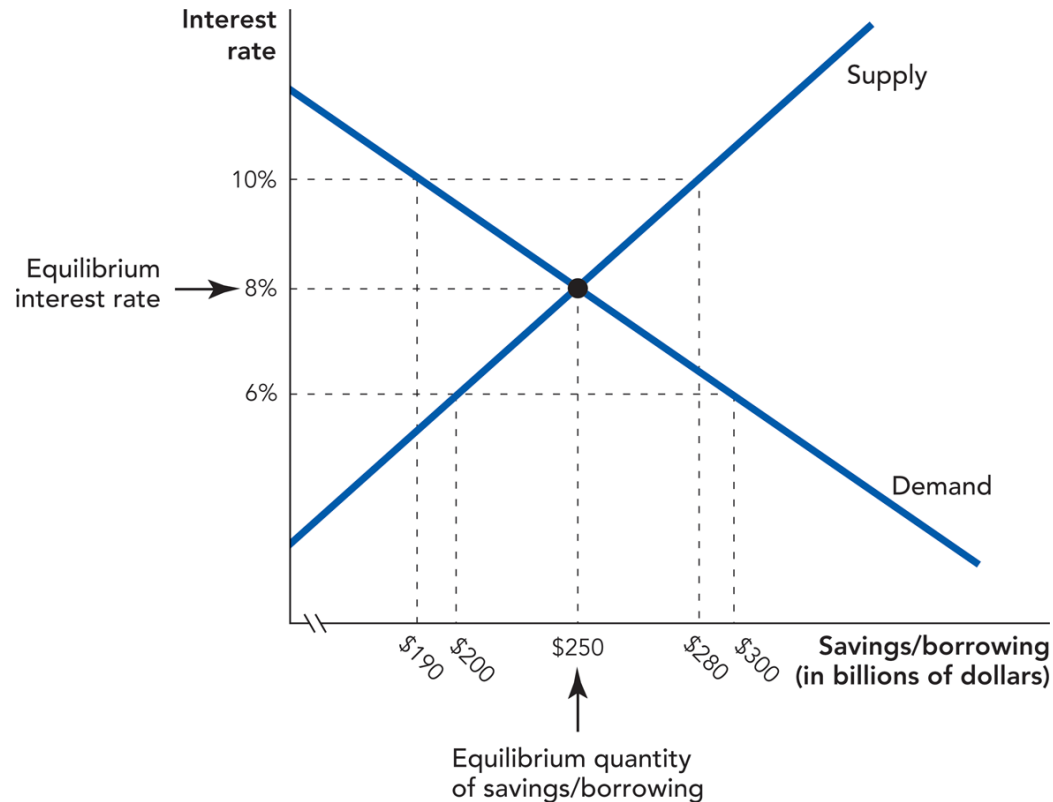
The demand for loans



The demand for loans (continued)

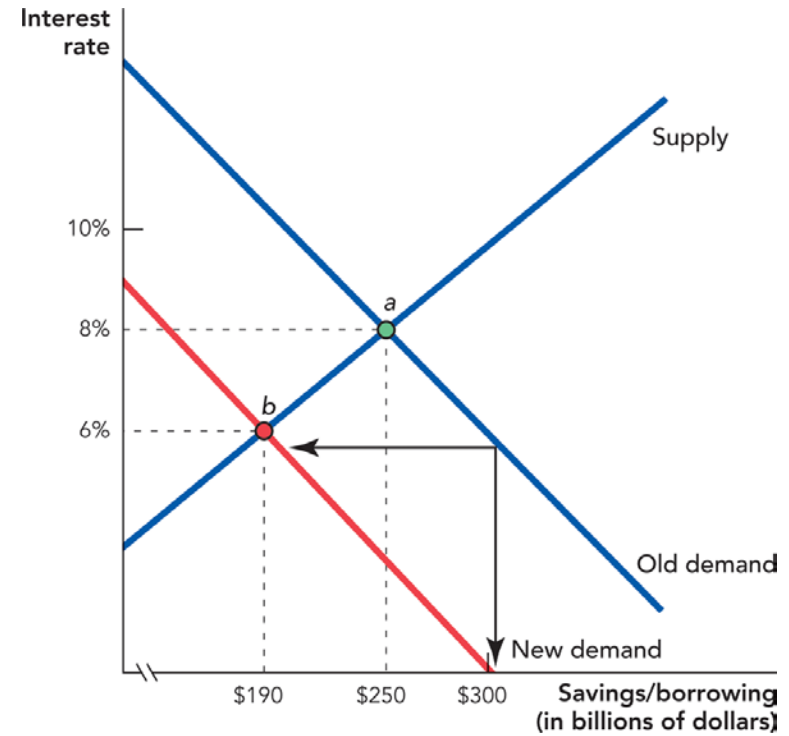
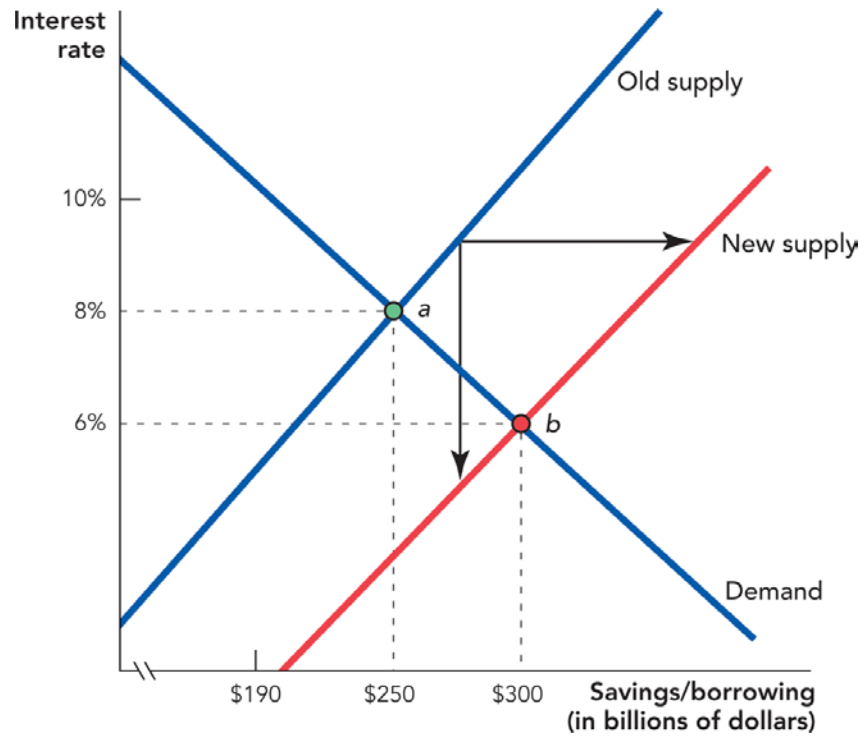
- Lining up all the available investment opportunities from highest return to lowest return shows how the demand for loans responds to the interest rate.
- Only the investments with returns expected to exceed the interest rate will be profitable.
- This reveals the demand curve for loanable funds.
- As the interest rate increases, fewer and fewer investments will be profitable and fewer loans will be demanded.

Equilibrium



- The intersection of the supply and demand curves for loanable funds determines the equilibrium.
- Equilibrium consists of an interest rate (price) and a quantity of savings/investment (quantity).
- Nothing new here: just a new application of supply and demand.

Shifts in supply and demand



Shifts in supply and demand (continued)

- The left panel shows an increase in the supply of loanable funds.
- Factors such as a longer life expectancy could explain such an increase in the willingness to save.
 - Individuals expect to have a longer period of dissaving at the end of their lives, so they have to save more to avoid “outliving” them.
- The result is more investment and a reduction in the equilibrium interest rate.

Shifts in supply and demand (continued)

- The right panel shows a decrease in the demand for loanable funds.
- A possible explanation for this is a decline in entrepreneurs' expectations about future revenues—maybe resulting from a pessimistic economic forecast.
- Fewer investments are seen as profitable at each interest rate and fewer loans are demanded.
 - The result is less investment and also a reduction in the interest rate.
 - The reduction in investment may make the pessimistic forecast self-fulfilling (or bad current conditions self-sustaining), so there may be a case for government subsidy of investment to encourage more of it.

The bond market

- Corporations borrow directly from the public.
- A bond is the acknowledgment of the debt and when it will be repaid.
 - Maturity date (at the end).
 - Coupon payments . . . with or without tangible coupons to send in.
- In addition to interest, lenders assume default risk, which is hard to estimate and varies across (even well-known) borrowers.
 - Ratings agencies, e.g., [S&P](#) attempt to compare risks of various bonds.
 - Risk premia associated with worse ratings: “junk bonds”.
- Collateral reduces risk by willingness of the borrower to transfer a valuable asset to the lender in the event of default.

Glenn Guglia: junk bond trader

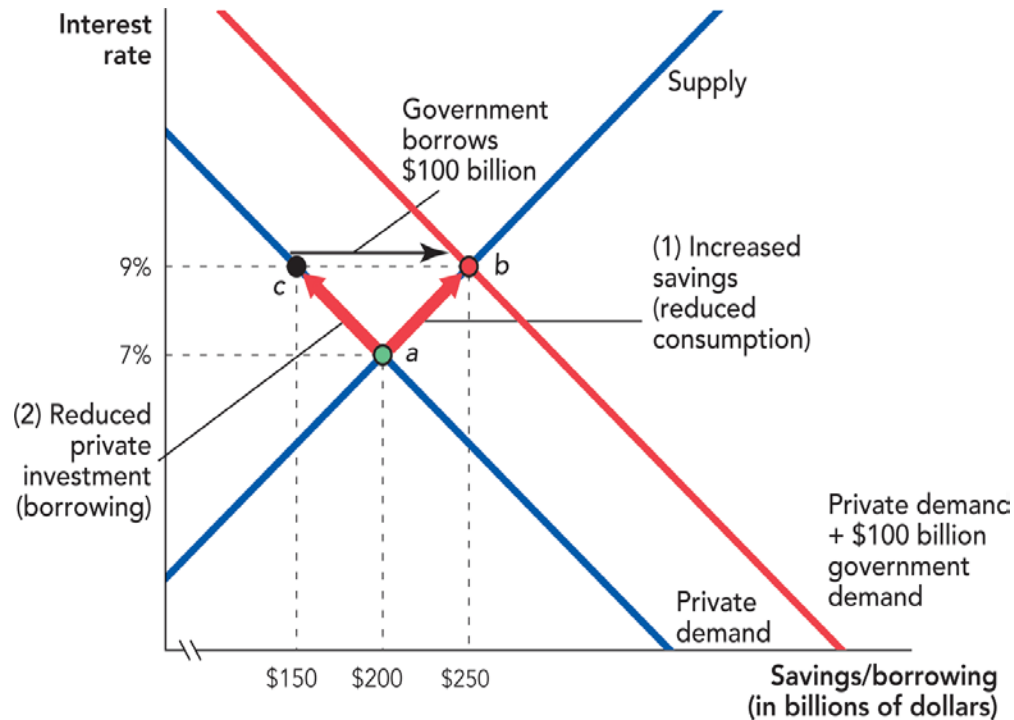


“No, Jules, it's ‘high yield’ bonds. Do I tell people you’re in junk waitressing?”

The bond market (continued)

- The bond market is the closest approximation of the textbook picture of the loanable funds market.
 - Lenders interact directly with borrowers by buying bonds (debt contracts that specify how much the borrower will pay the lender and when).
 - This works well when the borrower's reputation and creditworthiness is well-known to the lenders.
- Stock markets allow firms to diversify or invest in R&D with new capital by making an initial public offering (IPO),
 - in which they sell claims ("shares") on the investment's returns to the public.
 - Because the returns are not specified in advance, stock purchasing is a more opaque example of financial intermediation.

The bond market (continued)



- Borrowing by government also increases the demand for loanable funds (pictured).
- When government borrows from the public, e.g., to pay for a deficit in its budget, 2 things happen:
 - More is saved as equilibrium moves up the supply curve . . . but this is less consumption, too.
 - The interest rate goes up. This makes fewer private agents willing to borrow or “crowds out” private investment: the difference between points a and c on the graph.

Bond auctions

- A transparent method for soliciting lenders' reservation (minimum to get them to lend) interest rates, as well as their expectations about default risk, is to auction bonds to the lowest bidder(s).
 - “Lowest” here means in terms of the interest rate at which he is willing to lend.
- Alternatively the bond goes to the highest bidder in the sense of how much (\$) he is willing to pay for the bond.

Bond auctions (example)

- A bond has a face value of \$100, which will be received from the borrower in 1 year.
- The borrower sells the bond to the person (“lender”) who is willing to pay the most for it today, i.e., the closest to \$100.
- The interest rate can be imputed based on how much the lender pays for the bond.

$$Rate = 100 * \frac{\textit{face value} - \textit{auction price}}{\textit{auction price}}$$

- You can verify this by [querying](#) the U.S. Treasury’s recent auctions of government bonds.

Recent auctions of U.S. bonds, imputed interest rates

Security Type	Security Term	Auction Date	Issue Date	Maturity Date	Price per \$100	High Discount Rate (Treasury, rounded to nearest half of 1000th of %)	Interest Rate (Ben's calculation)	Interest Rate (Log Approximation)
Bill	52-Week	1/7/2014	1/9/2014	1/8/2015	99.873611	0.125%	0.127%	0.126%
Bill	52-Week	12/10/2013	12/12/2013	12/11/2014	99.8635	0.135%	0.137%	0.137%
Bill	52-Week	11/13/2013	11/14/2013	11/13/2014	99.8635	0.135%	0.137%	0.137%
Bill	52-Week	10/16/2013	10/17/2013	10/16/2014	99.838222	0.160%	0.162%	0.162%
Bill	52-Week	9/17/2013	9/19/2013	9/18/2014	99.878667	0.120%	0.121%	0.121%
Bill	52-Week	8/20/2013	8/22/2013	8/21/2014	99.8635	0.135%	0.137%	0.137%
Bill	52-Week	7/23/2013	7/25/2013	7/24/2014	99.883722	0.115%	0.116%	0.116%
Bill	52-Week	6/25/2013	6/27/2013	6/26/2014	99.838222	0.160%	0.162%	0.162%
Bill	52-Week	5/29/2013	5/30/2013	5/29/2014	99.8635	0.135%	0.137%	0.137%
Bill	52-Week	4/30/2013	5/2/2013	5/1/2014	99.893833	0.105%	0.106%	0.106%
Bill	52-Week	4/2/2013	4/4/2013	4/3/2014	99.858444	0.140%	0.142%	0.142%
Bill	52-Week	3/5/2013	3/7/2013	3/6/2014	99.848333	0.150%	0.152%	0.152%
Bill	52-Week	2/5/2013	2/7/2013	2/6/2014	99.853389	0.145%	0.147%	0.147%
Bill	52-Week	1/8/2013	1/10/2013	1/9/2014	99.858444	0.140%	0.142%	0.142%
Bill	52-Week	12/11/2012	12/13/2012	12/12/2013	99.838222	0.160%	0.162%	0.162%

$$Rate = 100 * \frac{100 - price}{price}$$



$$Rate = 100 * \left[\ln \left(\frac{100}{price} \right) \right]$$



How the loanable funds market works

- Banks perform the function of financial intermediation when there are substantial transaction costs involved in making a loan:
 - examining an entrepreneur's business plan,
 - assessing the appropriate amount of collateral, and
 - assessing the riskiness of the investment,is costly for most loans.
- Even if the investment is sound and the entrepreneur is earnest.

Banks: financial intermediaries

- Like most productions of goods, there are gains to be had from specialization.
- Banks act as the specialists at performing this “due diligence” and making loans to creditworthy borrowers with terms (including interest rates and collateral requirements) appropriate for the riskiness of the investment.

Banks

- The best example of a true intermediary in the financial system is a bank.
- Borrow, in the form of deposits, from savers and offer modest though nearly riskless (FDIC insured) interest.
- Lend, at higher interest rate, to cover their costs.
 - Banks specialize in this instead of each depositor duplicating the effort to evaluate borrowers.
 - Regardless of the number of depositors, the due diligence only has to be done once.
- Make longer term loans than individual depositors would be willing to.
 - “Maturity transformation”.

Banks (continued)

- Pool the default risk by making many loans to diverse borrowers (in terms of risks they face), which depositors could not do individually.
 - Pooling loans with diverse risks enables banks to lend to risky borrowers to whom individuals would not lend.
 - Since 1 risky loan makes up only a small fraction of the bank's portfolio, it can abide a few defaults more easily than an amateur lender could.

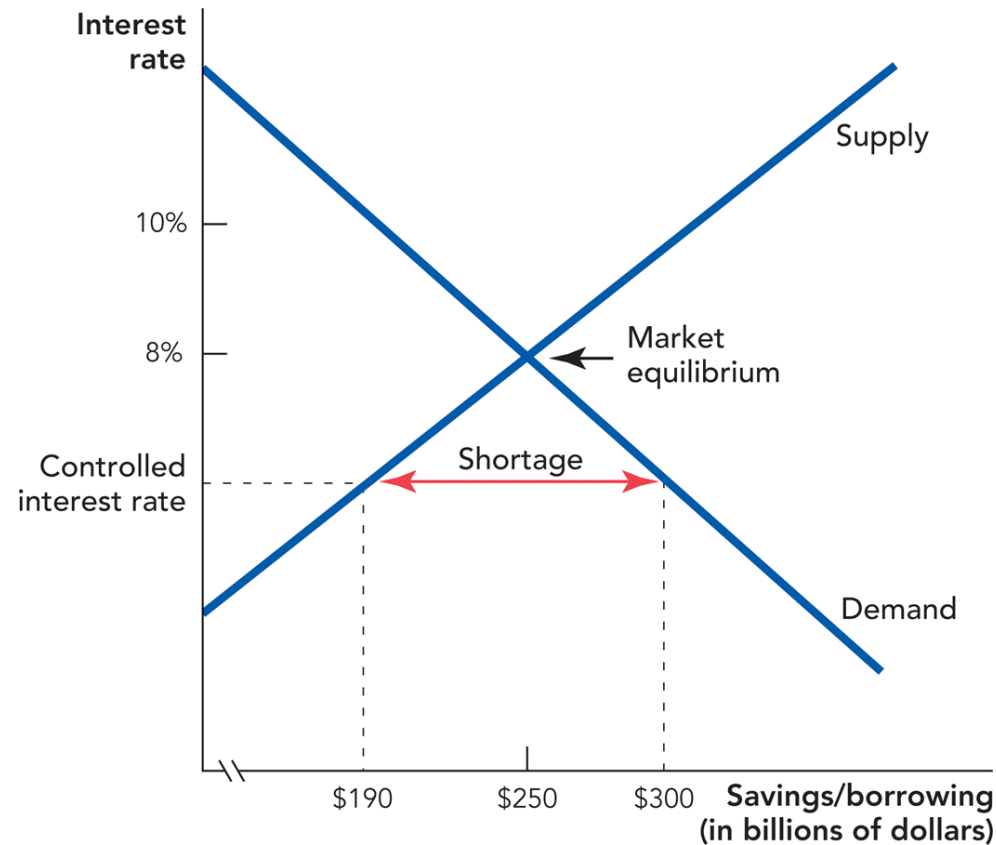
What happens when intermediation fails?

- It is already established that economic growth depends crucially on investment.
- Investment depends on an efficient transmission of savings to borrowers via financial intermediaries.
- “Failure” consists of high transaction costs involved in intermediation and lower levels of savings and loanable funds. Causes of failure include:
 - Insecure property rights,
 - Controls on interest rates,
 - Politicized lending and government-owned banks,
 - Bank failures and panics.

Insecure property rights

- Investment is discouraged by laws that fail to protect lenders/depositors from confiscation of their savings by the government and theft by borrowers.
- Individuals may still save, but they are less inclined to store their savings in a bank, where they are useful as loanable funds.
 - They may store them “under their mattress” instead, either literally or figuratively.
- This failure makes dishonesty by borrowers even more attractive, creating a vicious cycle.

Controls on interest rates



- In this class we have already examined the sub-optimality of price ceilings.
- In the context of the loanable funds market, price ceilings go by the special term of “usury laws”.
 - Usury is the legal term for the crime, dating back to the middle ages, of charging interest for a loan. Later the law was relaxed to define usury according to a legal maximum, i.e., price ceiling.
 - Aside: this is one reason why there was not very much investment or economic growth prior to the modern period in history!

Politicized lending and government-owned banks

- A big reason banks are so useful is that they identify (and lend to) borrowers that have relatively good intentions and chances of entrepreneurial success.
- In countries where the government owns the banks or exerts a lot of influence over them, banks do not lend according to the expected profitability of the loans.
 - Instead the loans go to cronies of the politicians in power or people with whom they are trading favors.
 - These are unlikely to be the borrowers with the best business plans that would add the most to output growth.
- Even if there are plenty of loanable funds, they do not go to the highest valued uses, and they do not do enough good for the macro economy.

Bank failures and panics

- A bank that is unable to provide its depositors' access to funds has failed.
 - E.g., because of insolvency, a “run” by depositors, or a problem with the liquidity of its assets.
- Widespread bank failures, such as those that occurred in the Great Depression (1929-1933) decrease the supply of loanable funds and crises can result.

Bank failures and panics (continued)

- In 1933 the [FDIC](#) was created to insure depositors against bank failure and to examine banks' balance sheets to guard against insolvency.
- Pictured (center) is the loveable bank examiner from the movie, "It's a Wonderful Life".



Investment banks

- Part of what the textbook calls the “shadow banking system”.
- Investment banks such as JPMorgan Chase, Goldman Sachs, and Morgan Stanley, do not get their loans from depositors the way commercial banks do.
 - “Big” banks, that rely on *economies of scale*, lowering transaction costs per \$ of investment.
- They have investors that are not FDIC insured and are aware of the risks of losing their investments if the bank fails.
- And it *does* happen sometimes . . .

Lehman Brothers in 2008: the largest bank failure in history

- Investment bank, Lehman Brothers, became insolvent in September 2008.
 - Because its strategy of investing in illiquid and risky areas such as commercial real estate failed dramatically amid a mortgage default crisis.
- With its assets losing so much value, Lehman's 2nd risky strategy of ultra-leveraging was exposed: they weren't holding many "reserves" to meet their own debts to investors.
- Once it was apparent Lehman was insolvent, no one (rightly) wanted to lend the firm money, and after several attempts to sell the firm Lehman declared bankruptcy on September 15.
 - This incident is depicted fairly accurately in the movie "Too Big to Fail".

Conclusion

- When financial intermediation fails, investment and economic growth fall, sometimes catastrophically.
- Financial intermediaries perform the vital function of reducing the transaction costs of turning savings into investment.
- The outcome of this process is illustrated as the equilibrium in the market for loanable funds.
 - Households supply loanable funds they have saved.
 - Temporal preferences and interest rates influence willingness.
 - Borrowers demand loanable funds to smooth life cycle consumption or make investments in capital.
 - Expected return and interest rates influence their willingness.

The demand for loans (aside)

- Some of the demand for loans comes from other households, i.e., during the borrowing phase at the beginning of the life cycle.
- Governments also borrow from households.
- But here I emphasize borrowing by firms to finance investments.

[Back.](#)

Shadow banking defined

- The accepted definition is that shadow banks are:

. . . financial intermediaries that conduct maturity, credit, and liquidity transformation without explicit access to central bank liquidity or public sector credit guarantees.

- Source: Senior Treasury Dept. personnel in *Federal Reserve Bank of New York Economic Policy Review* ([2013](#)).

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