Money, Banking and Financial Markets

Welcome to all!

Course Description

- The purpose of this course is to offer a good understanding of **(i)** the determination of interest rates, **(ii)** the functions and operation of different financial intermediaries, and **(iii)** the functions and goals of central banks.

- Lectures in this course are self-contained. As a supplement economic experiments will be used.

- Attending the lectures is not mandatory but highly recommended.

References and Textbooks

- **Required Textbook:**

The Economics of Money, Banking and Financial Markets, Fourth Canadian Edition

By F. Mishkin and A. Serletis Pearson Education Canada; 4 edition (2010), ISBN-10: 0321673425.

- Additional readings and handouts will be assigned and posted in **Blackboard.**

Instructor

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- **<u>Office Hours</u>**
- Tuesdays and Thursdays: 3:00 p.m. to 5:00 p.m. and Wednesdays: 1:00 p.m. to 3:00 p.m.
- In case you cannot make the designated hours email me for an appointment.

Grading Scheme

1. Two Assignments   **25%**

2. Midterm (70 minutes, February 14th: tentative) **25%**

3. Final Examination   **50%**

4. Bonus points from in-class popup quizzes **5%**

What is Education?
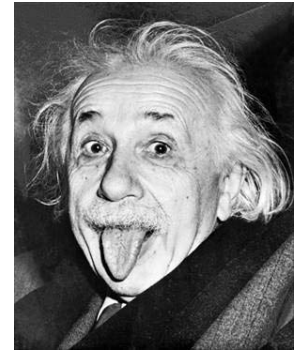
What is Education...
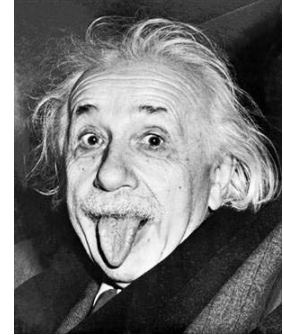
Einstein on his 72nd birthday , 1951

Albert Einstein:

"Education is what remains after one has forgotten everything he learned in school."

What is Teaching?
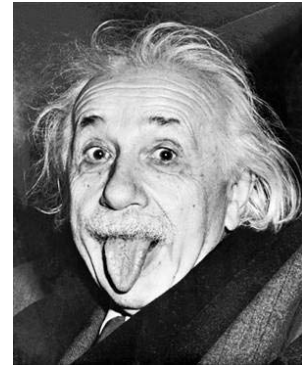
What is Teaching...

Albert Einstein:

"Teaching should be such that what is offered is perceived as a valuable gift and not as a hard duty."

"I never teach my pupils; I only attempt to provide the conditions in which they can learn."

What is Understanding?

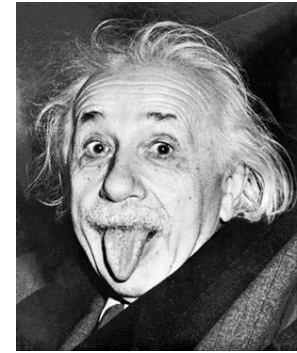# *What is Understanding...*

Albert Einstein:

"You do not really understand something unless you can explain it to your grandmother."
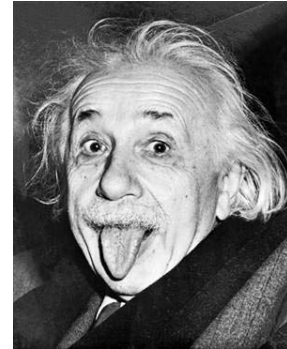
Questioning...

Albert Einstein:

"The important thing is not to stop questioning. Curiosity has its own reason for existing."

Value of Science...

Albert Einstein:

"One thing I have learned in a long life: that all our science, measured against reality, is primitive and childlike and yet it is the most precious thing we have."

Practical Advice

- Attending the lectures helps knowing important points and possible misunderstandings that may arise when you do the readings.

- Many problem sets will be provided and exams will draw upon them. Practicing them is a key to a good grade.

- Come to my office hours and ask your questions regularly.

- Please share your suggestions with me.

Introduction

❖ **Chapter 1** is set to answer the following question:

Why Study Money, Banking, and Financial Markets?

How would you define Money?

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What is the difference between Money and Wealth?

What is Money?

❖ **Money** is any object or record, that is generally accepted as payment for goods and services and repayment of debts in a given country or socio-economic context.

❖ It is the main medium of exchange in modern economic systems.

❖ **History**

● Non-monetary exchange: Barter

● Commodity money

● Standardized coinage

● Bills of exchange

An Important Message of This Course:

The Difference (and relationship) between Real and Nominal Economic Indicators

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What is the objective of Financial Markets in an economy?

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Role of Financial Markets

❖Financial markets channel funds from savers to investors, thereby promoting economic efficiency.

❖Financial markets are a key factor in producing economic growth

❖Financial markets affect personal wealth and behavior of business firms

- **Banking system** is one of the main institutions active in financial markets.

What is the role of Interest Rate in an economy?

The Bond Market & Interest Rate**s**

❖ **A security** (financial instrument) is a claim on the issuer's future income or assets

❖ **An asset** is any financial claim that is subject to ownership

❖ **A bond** is a debt security that promises periodic payments for a specified time

❖ An **interest rate** is the cost of borrowing or the price paid on the rental of funds

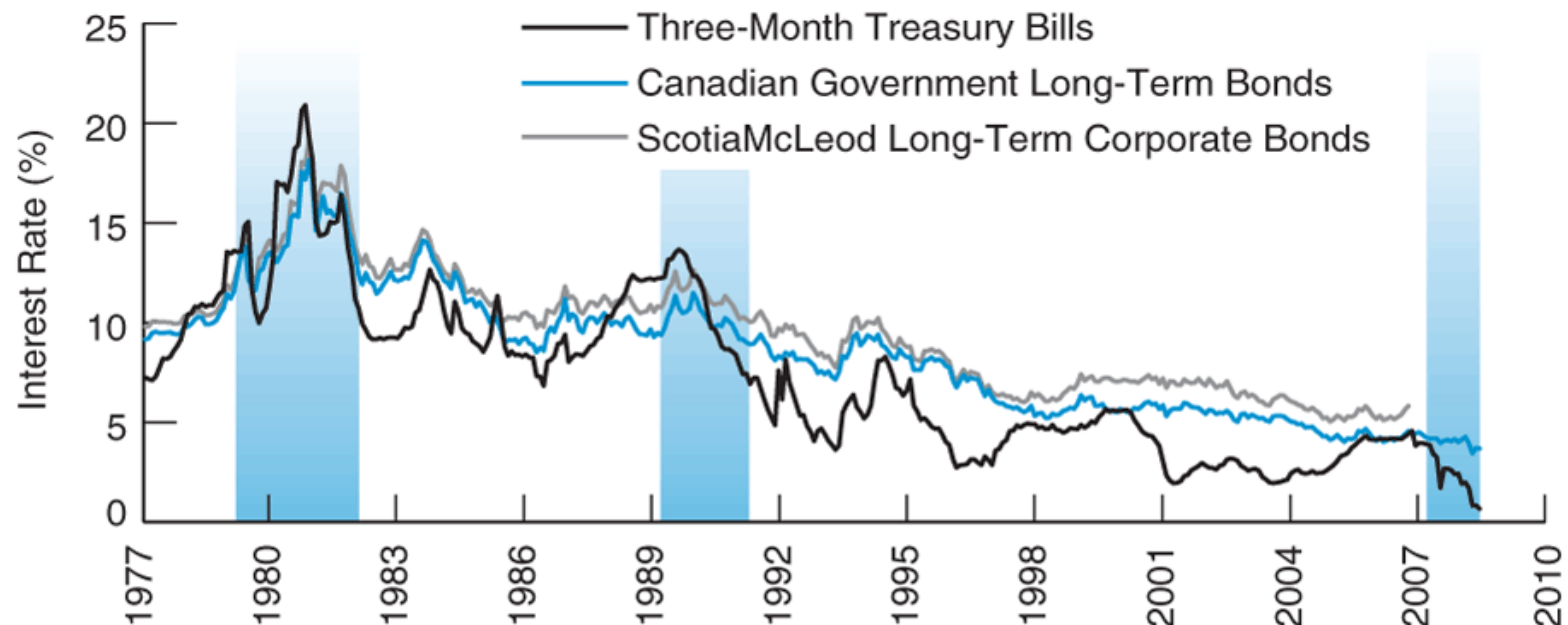# The Bond Market & Interest Rates

FIGURE 1-1 Interest Rates on Selected Bonds, 1977–2009

Note: Shaded areas represent recessions.

Source: Statistics Canada CANSIM II Series V122531, V122544, and V122518.

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Financial Institutions (Some Definitions)

- **Financial Intermediaries** - institutions that borrow funds from people who have saved and make loans to other people.

- **Banks:** institutions that accept deposits and make loans

- **Other Financial Institutions**: insurance companies, finance companies, pension funds, mutual funds and investment banks

- **Financial Crises**: disruption of the financial markets that lead to decline in asset prices.

- Financial Innovation: in particular, the advent of the information age and e-finance.

The Stock Market

❖ A stock represents a share of ownership in a corporation

❖ A stock is a security that is a claim on the earnings and assets of that corporation

FIGURE 1-2 Stock Prices as Measured by the S&P/TSX Composite Index, 1956–2009

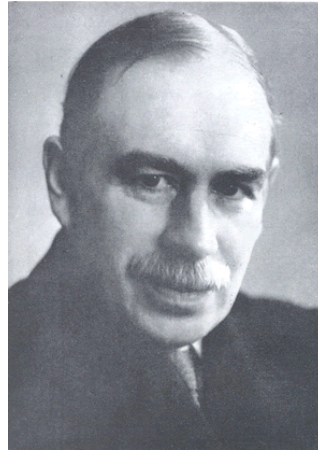*Source:* Statistics Canada CANSIM II Series V122620.

Question

- The **financial crisis of 2007** is considered by economists the worst financial crisis since the Great Depression (1930s).

- It was triggered by a **liquidity shortfall** in the US banking system causing , and has resulted in the collapse of large financial institutions, banks and stock markets around the world.

How do you compare the collapse of Stock Market (Financial Crisis) with the collapse of Production Plants and Production Factor shortage (e.g. Oil Shock)?

Money within Economic Theory

- **Real business cycle theory** (**RBC theory**) are a class of macroeconomic models in which business cycle fluctuations to a large extent can be accounted for by real (in contrast to nominal) shocks.

- Unlike other theories of the business cycle, RBC theory sees recessions and periods of economic growth as the response to changes in the **real economic environment**.

- Hence, government should concentrate on the long-run structural policies and not intervene through **discretionary fiscal or monetary** policy to smooth out economic short-term fluctuations.

Real Business Cycle Theory vs. Keynesian Economics

Left to Right: Kydland, Prescott, Keynes, Krugman, Stiglitz

http://www.ufollow.com/authors/paul.krugman/

See for Stiglitz

http://www2.gsb.columbia.edu/faculty/jstiglitz/index.cfm

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Money and Monetary Policy

- Evidence suggests that **money plays an important role** in generating business cycles. Recessions (unemployment) and booms (inflation) lead to changes in aggregate economic activity

- *Monetary Theories* tie changes in the money supply to changes in aggregate economic activity and the price level.

FIGURE 1-3 Money Growth (M2++ (Gross) Annual Rate) and the Business Cycle in Canada, 1968–2008

Note: Shaded areas represent recessions.

Source: Statistics Canada CANSIM II Series V41552801.

Question

What do you expect to happen if Money Supply (M2) increases?

- **M2:** represents money and "close substitutes" for money. Economists use M2 when looking to quantify the amount of money in circulation and trying to explain different economic monetary conditions.

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Money and Inflation

- Aggregate price level is the average price of goods and services in an economy. A continual rise in the price level (inflation) affects all economic players

- Data shows a connection between the money supply and the price level
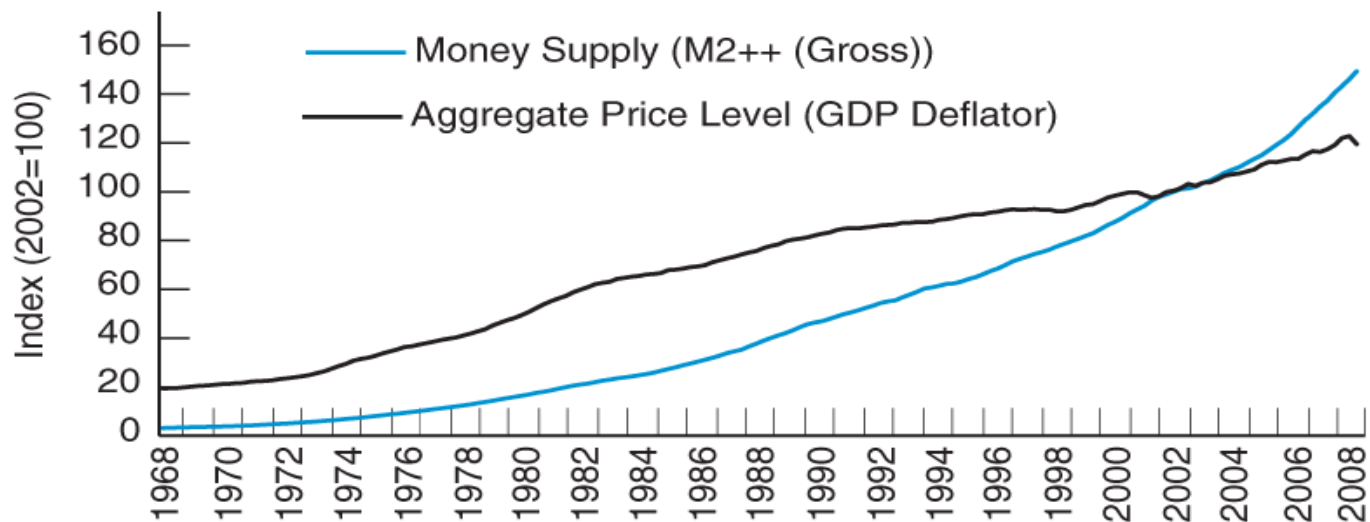
FIGURE 1-4 Aggregate Price Level and the Money Supply in Canada, 1968–2008

Source: Statistics Canada CANSIM II Series V1997756 and V41552801.

Money Growth and Inflation

Average Inflation Rate (%)
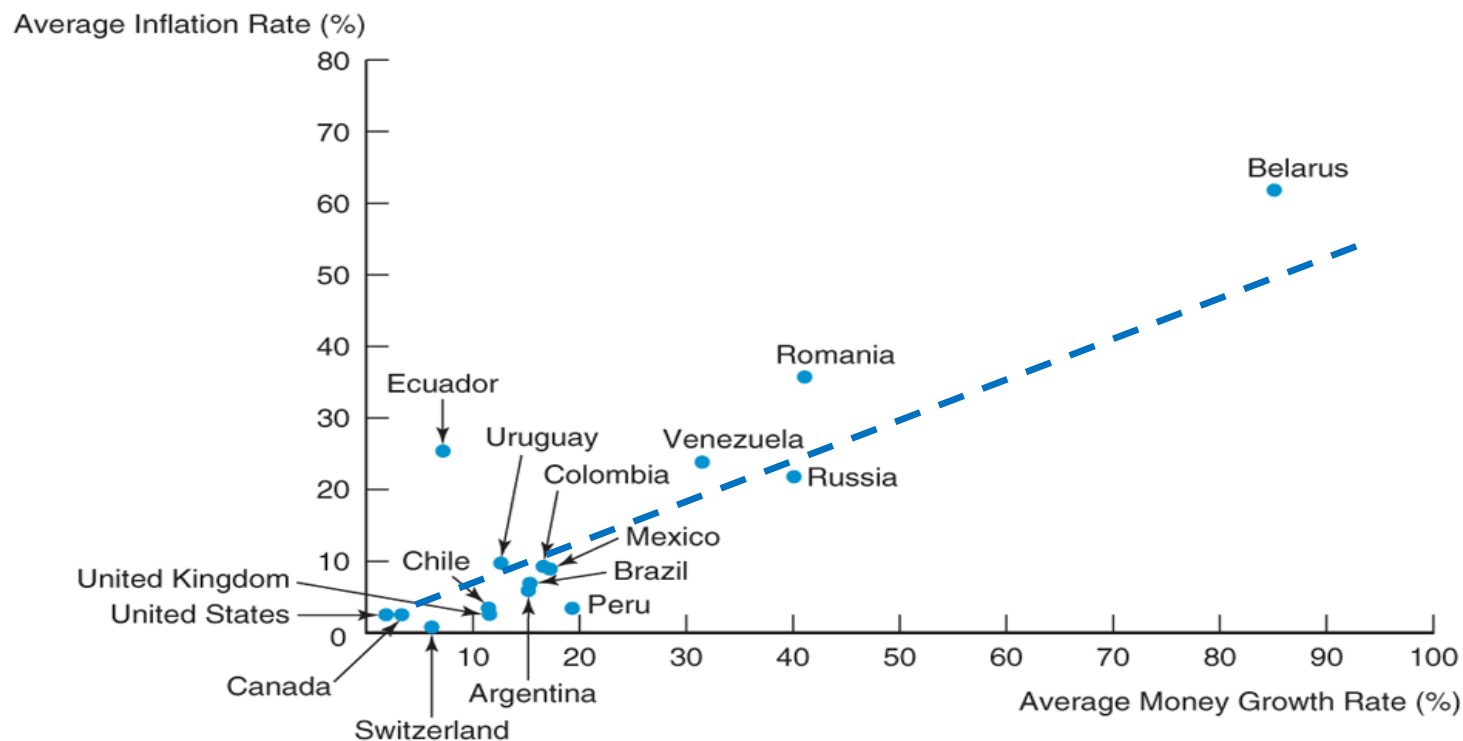
FIGURE 1-5 Average Inflation Rate Versus Average Rate of Money Growth for Selected Countries, 1995–2007

Source: IMF International Financial Statistics.

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Question

What is the relationship between Money Supply (M2)and interest rate?

- In the short run, Fall of Interest rate gives incentive to…

- In the short run, Fall of Money supply gives incentive to…

Money and Interest Rates

- (Nominal) Interest rates are the price of Money

- Prior to 1980, the rate of money growth and the interest rate on long-term bonds were closely tied

- Since then, the relationship is less clear but still an important determinant of interest rates

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Money Growth and Interest Rates
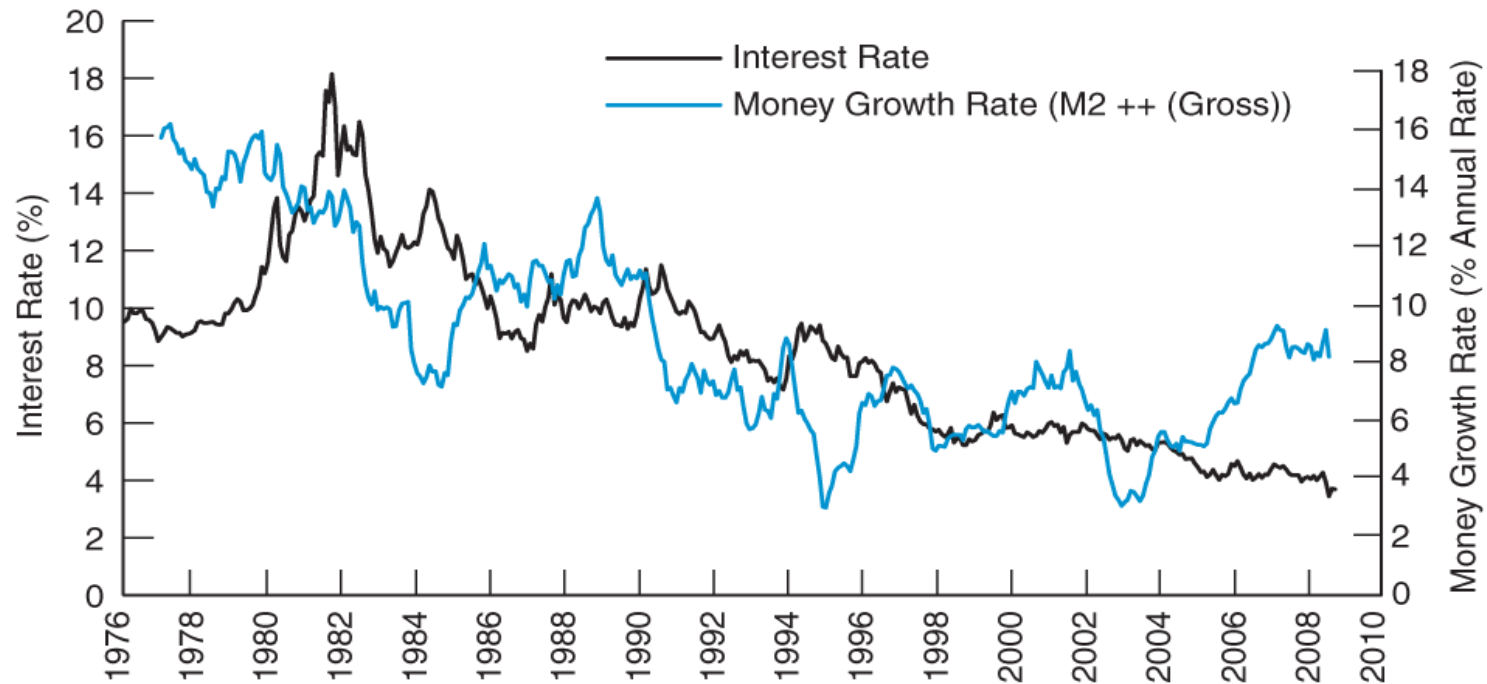
FIGURE 1-6 M2 ++ (Gross) Money Growth (Over 12 Months) and Interest Rates (Long-Term Government of Canada Bonds), 1977–2008

Source: Statistics Canada CANSIM II Series V41552801 and V122544.

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Monetary and Fiscal Policy

❖ Monetary policy is the management of the money supply and interest rates

  ● Conducted by the Bank of Canada

❖ Fiscal policy is government spending and taxation

  ● Budget deficit/surplus is the excess of expenditures/revenue over revenues/expenditures for a particular year

  ● Any deficit must be financed by borrowing

Fiscal Policy
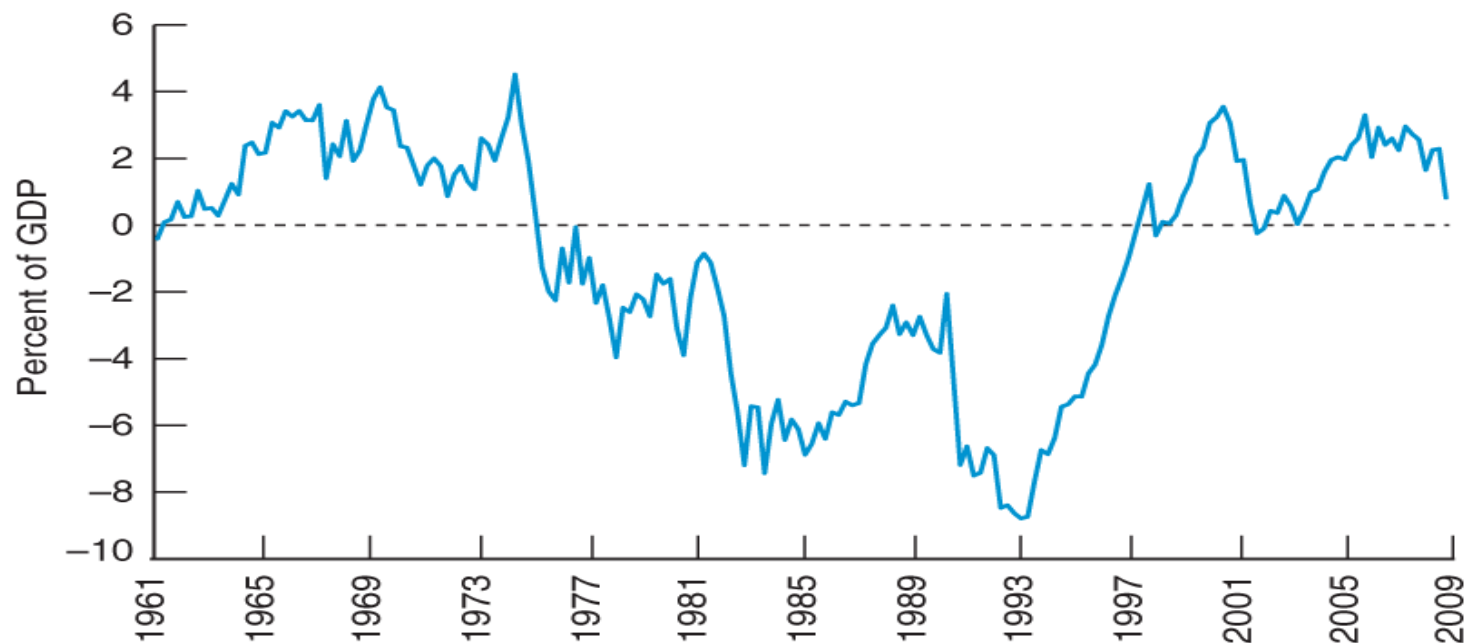
FIGURE 1-7 Government Budget Surplus or Deficit as a Percentage of Gross Domestic Product, 1961–2008

Source: Statistics Canada CANSIM II Series V498316, V498326, and V498086.

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International Finance

- In **International Finance** saving and borrowing occurs among sovereign states, usually each having their own currency.

- Increasing **integration of financial markets**: Canadian companies borrow in foreign markets and foreign markets borrow from Canada

- Banks and other financial institutions increasingly international – foreign exposures.

Foreign Exchange Market

- The foreign exchange market is where one country's currency is exchanged for another

- The exchange rate is the price of one country's currency in terms of another

- Appreciation (depreciation) is a rise (fall) in the value of a country's currency

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Foreign Exchange Market

For 1 CAD: ... USD

FIGURE 1-8   Exchange Rate for the Canadian Dollar, 1971–2008

Source: Statistics Canada CANSIM II Series V37426.

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The Importance International Financial System

- Larger capital flows between countries $\Rightarrow$ Greater importance of foreign financial systems on domestic economy.

- Potentially larger role for international institutions (e.g. IMF)

- Importance of the choice of **Exchange Rate Regime** (Fix versus Floating).

- Return to discussion of International Financial Systems in Chapter 19 onwards.

Main Approach

- Simplified Microeconomic-based approach to the demand for assets

- Partial equilibrium framework (basic supply and demand approach to understand behavior in financial markets)

- Complementary models dealing with issues such as transactions cost and asymmetric information applied to financial structure

- Use of real world data in combination with simplified models (taught through experiments)

Learning Tools

❖ Theory and Applications

❖ Case studies and numerical exercises

❖ Special-interest boxes

❖ Financial News boxes

❖ Economic Experiments

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George Akerlof (1940) American Economist

An Overview of the Financial System

References and Goals

❖ **The Economics of Money, Banking and Financial Markets**

Fourth Canadian Edition by F. Mishkin and A. Serletis, 4th Canadian Edition.

❖ **Chapter 2**:

An Overview of the Financial System

Reminder Question…

- Suppose we have two people in the society who live for two periods:

- Citizen Blue and Citizen Red.

- **Citizen Blue** is endowed with 2 units of consumption in the period 1 and 3 units of consumption in the period 2.

- **Citizen Red** is endowed with 1 units of consumption in the period 1 and 2 units of consumption in the period 2.

- Both citizens preferring having a constant consumption over time.

- *Any suggestion?*

An Overview of the Financial System

- Primary function of the Financial System is financial Intermediation
- The channeling of funds from households, firms and governments who have surplus funds (savers) to those who have a shortage of funds (borrowers).
- **Direct finance vs. Indirect finance**

INDIRECT FINANCE

FUNDS → Financial Intermediaries → FUNDS

FUNDS

Lender-Savers
1. Households
2. Business firms
3. Government
4. Foreigners

FUNDS → Financial Markets → FUNDS

Borrower-Spenders
1. Business firms
2. Government
3. Households
4. Foreigners

DIRECT FINANCE
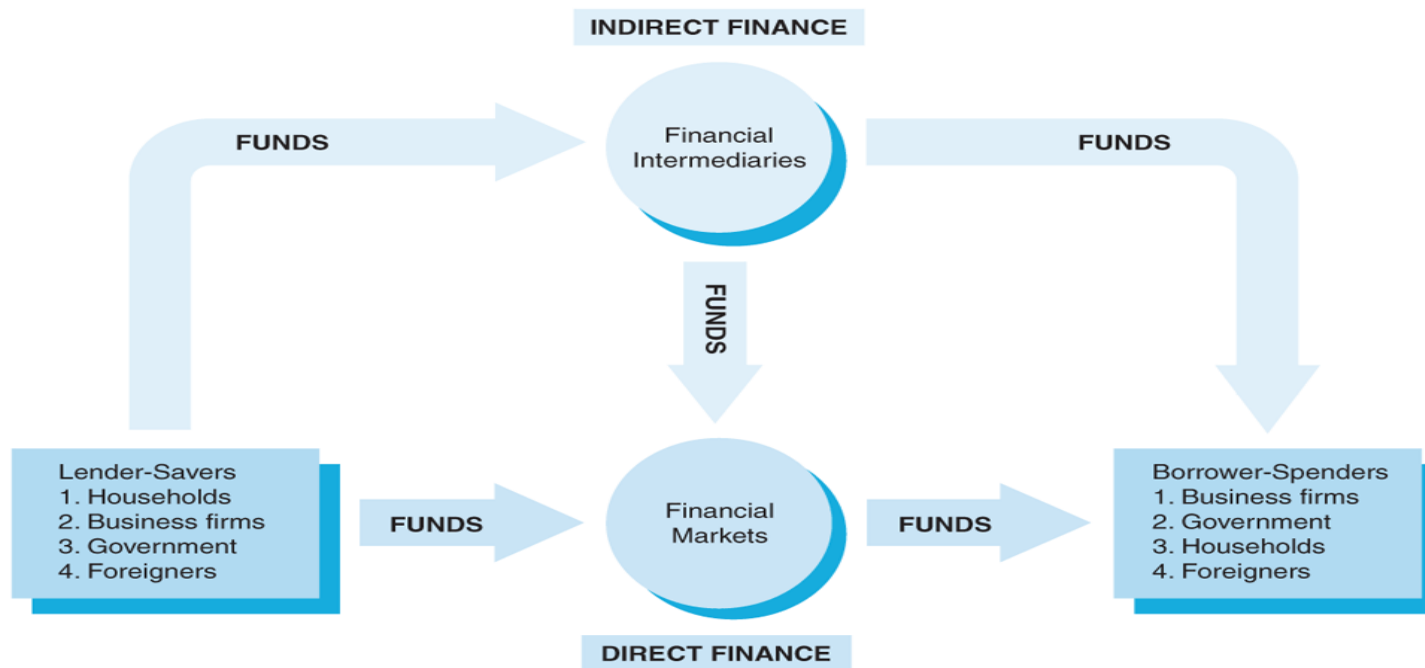
FIGURE 2-1 Flows of Funds Through the Financial System

4

Structure of Financial Markets-1

❖ **Debt Markets**

- Short-term (maturity < 1 year) – the Money Market

- Long-term (maturity > 10 year) – the Capital Market

- Medium-term (maturity >1 and < 10 years)

Structure of Financial Markets-2

❖ **Equity Markets – Common stocks**
  - Some make dividend payments
  - Equity holders are residual claimants

- Primary Market - New security issues sold to initial buyers
- Secondary Market - Securities previously issued are bought and sold
- Brokers and Dealers

Structure of Financial Markets-2

❖ **Exchanges**

- Trades conducted in central locations (e.g., Toronto Stock Exchange and New York Stock Exchange)

- **Over-the-Counter (OTC) Markets**

- Dealers at different locations buy and sell

Over-the-Counter (OTC) Markets

- **Over-the-counter** (**OTC**) or **off-exchange** trading is to trade financial instruments such as stocks, bonds, commodities or derivatives directly between two parties.

- It is contrasted with exchange trading, which occurs via facilities constructed for the purpose of trading such as futures exchanges or stock exchanges, through financial intermediaries (such as banks).

Structure of Financial Markets-2

❖ **Money and Capital Markets**

- Money market – trade in short-term debt instruments (maturity < 1 year)

- Capital Market – trade in longer term debt (maturity > 1 year)

Financial Market Instruments-1

Money Market Instruments:

- Government of Canada Treasury Bills

- Certificates of Deposit

- Commercial Paper

- Repurchase Agreements

- Overnight Funds

Financial Market Instruments-2

TABLE 2-1	Principal Money Market Instruments			
	Amount Outstanding ($ millions)			
Type of Instrument	**1980**	**1990**	**2000**	**2008**
Treasury bills				
Government of Canada	13 709	113 654	76 633	116 706
Provincial governments	905	12 602	17 541	24 646
Municipal governments	113	514	188	155
Short-term paper				
Commercial paper	2 555	12 971	24 330	13 063

Source: Statistics Canada CANSIM II series V37377, V122256, V122257, and V122652.

What Does *Overnight Rate* Mean?

- The interest rate at which a depository institution lends immediately available funds (balances within the central bank) to another depository institution overnight.

- It provides for an efficient method whereby banks can access short-term financing from central bank depositories.

- As the overnight rate is influenced by the central bank, it is a good predictor for the movement of **short-term interest rates**.

Financial Market Instruments-3

❖ Capital Market Instruments – debt and equity instruments with maturities greater than 1 year:

- Stocks

- Mortgages

- Corporate bonds

- Government of Canada bonds

Financial Market Instruments-3

❖ Additional Capital Market Instruments Include:

- Canada Savings Bonds

- Provincial and Municipal Government Bonds

- Government Agency Securities

- Consumer and Bank Commercial Loans

Financial Market Instruments-4

Look at the Fluctuations...

TABLE 2-2 Principal Capital Market Instruments

Type of Instrument	Amount Outstanding ($ billions)			
	1980	1990	2000	2008
Corporate stocks (market value)	42.9	109.8	242.1	324.1
Residential mortgages	91.9	245.3	431.2	863.8
Corporate bonds	30.0	72.8	187.6	274.6
Government of Canada securities (marketable)	27.8	124.5	301.9	223.1
Bank commercial loans	58.7	102.7	132.0	185.0
Consumer loans	39.2	90.9	189.8	398.6
Nonresidential and farm mortgages	15.1	56.1	49.7	77.1

Source: Statistics Canada CANSIM II series V122642, V122746, V122640, V37378, V122631, V122707, V122656, V122657, V122658, V122659, V800015, and the authors' calculations.

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Internationalization of Financial Markets
International Bond Market

❖ Foreign bonds - sold in a foreign country and denominated in that country (borrowing from abroad: FID)

❖ **Examples:**

● Eurobonds – denominated in a currency other than the country in which it is sold

● Eurocurrencies – foreign currencies deposited in banks outside the home country

World Stock Markets

TABLE 2-3	Top 10 Stock Exchanges in the World (by Domestic Market Capitalization at Year-End 2008)	
Exchange	**Value (in billions of US$)**	**Rank in 2008**
NYSE	9 209	1
Tokyo	3 116	2
Nasdaq	2 396	3
Euronext	2 102	4
London	1 868	5
Shanghai	1 425	6
Hong Kong	1 329	7
Deutsche Börse	1 111	8
Toronto	1 033	9
BME Spanish Exchanges	948	10

Source: World Federation of Exchanges, *2008 Market Highlights*, www.world-exchanges.org/statistics.

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Function of Financial Intermediaries-1

Financial Intermediaries

- Engage in process of indirect finance
- Are needed because of transactions costs and asymmetric information
- Transaction costs – time and money spent carrying out financial transactions
- Asymmetric information – inequality of information between counterparties

Function of Financial Intermediaries-2

1. Reduce Transactions Costs

- Financial intermediaries make profits by reducing transactions costs

- They reduce transactions costs by developing   expertise and taking advantage of economies of scale

2. Risk Sharing

- Create and sell assets with low risk characteristics and then use the funds to buy assets with more risk (also called asset transformation)

- Lower risk by helping people to diversify portfolios

Asymmetric Information

Two types of asymmetric information

A. Adverse Selection (Akerlof's Lemons applied to finance)

- Asymmetric Information <u>before</u> transaction occurs
- Potential borrowers most likely to produce adverse outcomes are ones most likely to seek loans and be selected

B. Moral Hazard

- Asymmetric information <u>after</u> transaction occurs
- Hazard that borrower has incentives to engage in undesirable activities making it more likely that loan won't be paid back
- E.g. Borrowed funds are used for another purpose.

Types of Financial Intermediaries-1

- Depository Institutions
  - Chartered Banks
  - Trusts and Mortgage Loan Companies (TMLs)
  - Credit Unions and Caisses Populaires (CUCPs)

- Contractual Savings Institutions
  - Life Insurance Companies
  - Property and Casual Insurance Companies
  - Pension Funds and Government Retirement Funds

Types of Financial Intermediaries-2

- Investment Intermediaries

    - Finance Companies

    - Mutual Funds

    - Money Market Mutual Funds

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Size of Financial Intermediaries

TABLE 2-5	Relative Shares of Financial Institutions and Pension Plans Regulated by OSFI (as of March 31, 2008)		
Type of Intermediary	**Number**	**Total assets ($ millions)**	**Percent (%)**
Chartered Banks			
Domestic	20	2 596 712	67.92
Foreign bank subsidiaries	24	139 523	3.65
Foreign bank branches	29	79 191	2.07
Trust and Loan Companies			
Bank-owned	31	243 163	6.36
Other	39	23 292	0.61
Cooperative Credit Associations	8	21 152	0.55
Life Insurance Companies			
Canadian-incorporated	46	456 440	11.94
Foreign branches	48	15 275	0.40
Fraternal Benefit Societies			
Canadian-incorporated	10	5 809	0.15
Foreign branches	8	1 775	0.05
Property and Casualty Insurance Companies			
Canadian-incorporated	96	78 256	2.05
Foreign branches	100	30 873	0.81
Pension Plans	1 350	131 765	3.44
Total		3 823 226	100.00

Source: Office of the Superintendent of Financial Institutions Canada (OSFI), *2007–2008 Annual Report*.

Regulation of Financial Markets

Primary Reasons for Regulation

1. Increase information to investors

    - Decreases adverse selection and moral hazard problems

    - Securities commissions force corporations to disclose information

2. Ensuring the soundness of intermediaries

    - Prevents financial panics

    - Restrictions on entry/assets/activities, disclosure, deposit insurance, limits on competition

3. Financial Regulation Abroad

Principal Regulatory Agencies

TABLE 2-6	Principal Regulatory Agencies of the Canadian Financial System	
Regulatory Agency	**Subject of Regulation**	**Nature of Regulations**
Provincial securities and exchange commissions	Organized exchanges and financial markets	Requires disclosure of information and restrict insider trading
Bank of Canada	Chartered banks, TMLs, and CUCPs	Examines the books of the deposit-taking institutions and coordinates with the federal agencies that are responsible for financial institution regulation: OSFI and CDIC
Office of the Superintendent of Financial Institutions Canada (OSFI)	All federally regulated chartered banks, TMLs, CUCPs, life insurance companies, P&C insurance companies, and pension plans	Sets capital adequacy, accounting, and board-of-directors responsibility standards; conducts bank audits and coordinates with provincial securities commissions
Canada Deposit Insurance Corporation (CDIC)	Chartered banks, TMLs, CUCPs	Provides insurance of up to $100 000 for each depositor at a bank, examines the books of insured banks, and imposes restrictions on assets they can hold
Québec Deposit Insurance Board	TMLs and credit cooperatives in Québec	Similar role as the CDIC
Canadian Life and Health Insurance Compensation Corporation (CompCorp)	Life insurance companies	Compensates policyholders if the issuing life insurance company goes bankrupt
P&C Insurance Compensation Corporation (PACIC)	Property and casualty insurance companies	Compensates policyholders if the issuing P&C insurance company goes bankrupt

25

What is Money?

References and Goals

❖ **The Economics of Money, Banking and Financial Markets**

Fourth Canadian Edition by F. Mishkin and A. Serletis, 4th Canadian Edition.

❖ **Chapter 3**:

What Is Money?

What is meant by money in this course?

❖ **Money**: anything that is generally accepted in payment for goods or services or in the repayment of debts; a stock concept

As opposed to:

❖ **Wealth:** the total collection of pieces of property that serve to store value (stock).

❖ **Income:** flow of earnings per unit of time (flow).

Functions of Money

- **Medium of Exchange**: promotes economic efficiency by minimizing the time spent in exchanging goods and services

- **Unit of Account**: used to measure value in the economy

- **Store of Value:** used to save purchasing power; most liquid of all assets but loses value during inflation

Money as Medium of Exchange-1

- **Why Money promotes Efficiency?**
- Suppose there is no money in an economic system.
- The alternative is to express the 'value' of a given item in terms of other goods.

- For instance 1 kg of tomatoes will be bear such price-tag:
- 4 kg of potatoes; 5 bottles of Pepsi; 3 litres of milk etc.

- Which, you agree, is inefficient in the sense of causing **considerable transaction costs.**

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Money as Medium of Exchange-2

- If money is **not** unique as a store of value, why do people hold money?

  - The answer is liquidity, the relative ease and speed which an asset can be converted into a medium of exchange.

  - **Trivia**: The first ATM machine, installed in NYC in 1961 (City Bank), had to be removed lack of public acceptance.

Money as Unit of Account

- Every 'magnitude' has a unit of measurement, so that quantities can be measured and compared.

- Examples are Pound and Kilogram for weight, kilometre and mile for distance.

- Money is the unit of measurement of values allowing us to compare the worth of different items exchanged in the market.

Money as Store of Value

- Given certain characteristics of money such as:
- Easily transported
- Non-perishable
- Easily-stocked

- It is used as the **'Carrier of Value'.**

- **Note:** The value of money however fluctuates with the general price level. In extreme conditions (hyperinflation) it may lose its value completely…

Example: German Hyperinflation

"A timely warning of the potentially dire consequences when central banks hit the printing presses." —THE WEEK

WHEN MONEY DIES

THE NIGHTMARE OF DEFICIT SPENDING, DEVALUATION, AND HYPERINFLATION IN WEIMAR GERMANY

ADAM FERGUSSON

ECON3307.2: Economics of Money and Banking
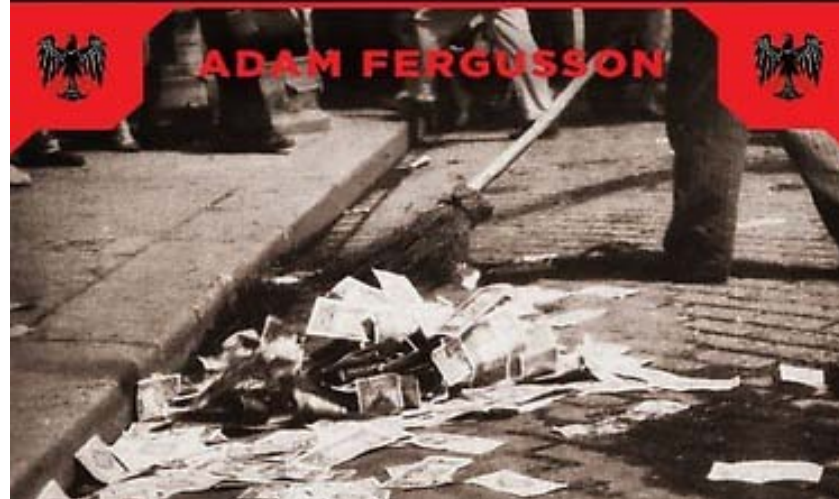
Sample of German Bills…

Ten-mark banknote, Germany, February 1920

Fifty-mark banknote,, July 1920

500-mark banknote, July 1922

1000-mark banknote, September 1922

20,000-mark banknote, February 1923

20,000-mark banknote, February 1923

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Sample of German Bills...

200,000-mark banknote, August 1923

One million mark banknote, September 1923

ECON3307.2: Economics of Money and Banking

Sample of German Bills…

Twenty million mark banknote, July 1923

Fifty million mark banknote*, September 1923*

German Hyperinflation-2

An interesting documentary about German Hyperinflation after WWI:

- http://www.youtube.com/watch?v=6YJfOZkriyk&feature=player_embedded#!

- http://www.youtube.com/watch?v=h7YCcZUXmw&feature=player_embedded

Evolution of Exchange Instruments

- No Money: Barter

- Commodity Money

- Fiat Money: Currency

- Cheques

- Electronic Payment and E-Money

Aggregation of Money-Supply Components

❖ Various definition for the aggregate level of money supply (the sum of the different components) is used.

❖ **Float:** funds in transit between the time a cheque is deposited and the time the payment is settled. It is also counted as curency.

❖ Some measures of Money Supply used by central banks:
- M1+
- M2
- M3

TABLE 3-1 Measures of Monetary Aggregates

M2 (gross)

Currency outside banks

Personal deposits at chartered banks

Non-personal demand and notice deposits at chartered banks

M3 (gross) = M2 (gross) plus the following:

Non-personal term deposits at chartered banks

Foreign currency deposits of residents at chartered banks

M2+ (gross) = M2 (gross) plus the following:

Deposits at trust and mortgage loan companies (TMLs)

Deposits at credit unions and *caisses populaires* (CUCPs)

Life insurance company individual annuities

Personal deposits at government-owned savings institutions

Money market mutual funds

M2++ (gross) = M2+ (gross) plus the following:

Canada Savings Bonds and other retail instruments

Non–money market mutual funds

M1+ (gross)

Currency outside banks

All chequable deposits at chartered banks, TMLs, and CUCPs

M1++ (gross) = M1+ (gross) plus the following:

All non-chequable deposits at chartered banks, TMLs, and CUCPs.

Notes: Monetary aggregates exclude inter-bank deposits and include continuity adjustments. In January 2007, the monetary aggregates were redefined to reflect: (i) the elimination of demand deposits and (ii) the inclusion of private-sector float.

Money Supply and Weighted Aggregation

❖ The Bank of Canada's money supply measures are 'simple-sum' indices, the index

$$M = x_1 + x_2 + \ldots + x_n$$

Where x_j is one of the n monetary components of the monetary aggregate M

❖ **Weighted monetary aggregates** seem to predict inflation and the business cycle somewhat better than the conventional measures.

● $$M = \alpha_1 x_1 + \alpha_2 x_2 + \ldots + \alpha_n x_n$$

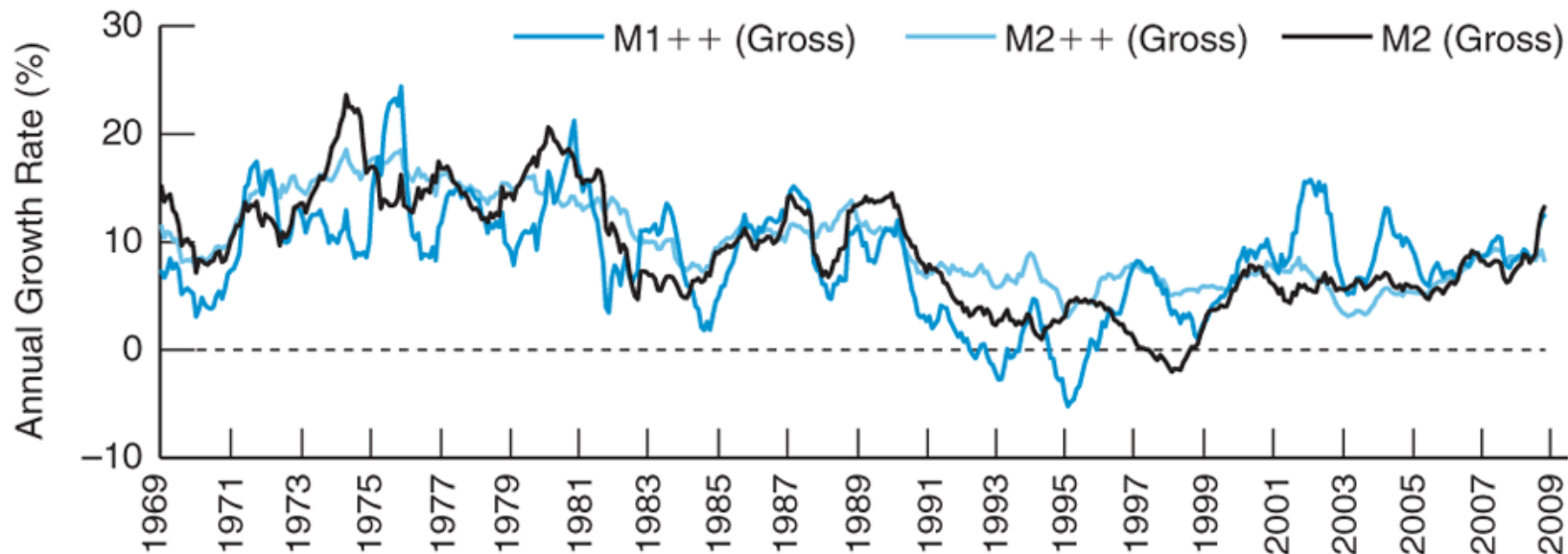# Measures of Money: How comparable they are?

FIGURE 3-1 Growth Rates of M2 (Gross), M1++ (Gross), and M2++ (Gross), 1969–2008

Source: Statistics Canada CANSIM II Series V41552796, V37152, V41552801.

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How Reliable are the Money Data?

- Revisions are issued because by Canadian Central Bank:

  - Small depository institutions report infrequently

  - Therefore adjustments must be made for seasonal variation: *simple extrapolation might be misleading*.

- We probably should not pay much attention to short-run movements in the money supply numbers but should be concerned only with longer-run movements.

Electronic Money and Demand for Currency

Debit Card and Cash Usage: A Cross-Country Analysis

Gene Amromin and Sujit Chakravorti

Federal Reserve Bank of Chicago, WP 2007-04

Abstract

- During the last decade, debit card transactions grew rapidly in most advanced countries. While check usage declined and has almost disappeared in some countries, the stock of currency in circulation has not declined as fast.

- The authors using data from 13 countries over 15 years, find that the demand for low denomination notes and coins decreases as debit card usage increases because merchants need to make less change for customer purchases.

- On the other hand, the demand for high denomination notes is generally less affected suggesting that these denomination notes are also used for non transactional purposes.

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What is the importance of this Question (replacement of currency by electronic money)?

-For Monetary Policy

-For Economy in General

The Importance of This Question

- First, greater usage of cash substitutes affects how much cash the central bank should supply, i.e. it impacts **Monetary Policy**.

- The consequence of lower demand for cash is a decrease in **Seigniorage Revenue** for the governments.

- Second, some economists have suggested social welfare would improve if fewer cash transactions occurred. *Any suggestion?*

What is Seigniorage?

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Seigniorage-1

- Suppose a government converts gold into currency at the market rate by printing paper notes. A person exchanges **one ounce of gold** for its value in currency.

- They keep the currency for one year, and then exchange it all for an amount of gold at the new market value. This second exchange may yield *more or less* than one ounce of gold if the value of the currency relative to gold has changed during the interim.

- (Assume that the value or direct purchasing power of one ounce of gold remains constant through the year.)

Seigniorage-2

- If the value of the currency relative to gold has decreased, then the person receives less than one ounce of gold. Seignorage occurred.

- If the value of the currency relative to gold has increased, the redeemer receives more than one ounce of gold. Seignorage did not occur.

- Seignorage, therefore, is the positive return on issuing notes and coins, or "carry" on money in circulation.

Sample

- Thirteen countries: Austria, Belgium, Canada, Finland, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States.

- Time: from 1988 to 2003.

Cross-Country Payment Trend Comparisons-1

- First, debit card usage grew rapidly during the 1990s in most countries in the sample.

- In 1988, all countries except for Finland had less than 10 debit card transactions per person per year.

- By 2004, all countries except Japan had more than 10 transactions per person per year and several had more than 60.

Cross-Country Payment Trend Comparisons-2

- The second common trend is that check usage continues to decrease in most countries and has disappeared in many countries.

- There are eight countries where on average less than two checks per person were written in 2004.

- Even in countries with a relatively high number of check transactions such as Canada (43 checks/person), France (66 checks/person), the United Kingdom (35 checks/person), and the United States (119 checks/person), check usage continues to decline.

Cross-Country Payment Trend Comparisons-3

- Third, cash has not disappeared from these countries although several cash substitutes exist.

- While general-purpose stored-value cards have not been widely adopted, other general purpose payment instruments, e.g. credit and debit cards, can now be used for transactions in environments that were until recently "cash only."

- Mass transit and fast food restaurants represent just two of the more ubiquitous industries where such switch took place.

Table 1: 2004 Per Capita Payments by Type of Instrument

	Checks	Debit and Credit Cards	Direct Credits	Direct Debits	2004 Total	2001 Total
Austria	1	21	109	75	206	213
Belgium	2	64	76	20	162	151
Canada	43	143	25	19	230	220
Finland	0	112	110	16	238	221
France	66	75	42	41	224	219
Germany	1	27	75	73	177	163
Italy	8	19	18	8	53	50
Japan	1	24	10	NAV	36	31
Netherlands	0	80	78	65	222	214
Sweden	0	109	51	16	177	146
Switzerland	0	49	79	7	135	130
United Kingdom	35	94	44	43	216	203
United States	119	132	17	20	288	275

Source: BIS CPSS Red Books and ECB Blue Books various years.

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Table 2: Cash Holdings (USD) per Capita and Currency/GDP in 1998

Country	Currency/Capita	Currency/GDP
Finland	613	0.024
United Kingdom	738	0.03
Canada	806	0.039
France	847	0.034
Sweden	1226	0.044
Italy	1251	0.06
Netherlands	1311	0.053
Belgium	1365	0.056
Austria	1677	0.064
United States	1850	0.059
Germany	1875	0.072
Switzerland	3408	0.091
Japan	3620	0.116

Source: BIS CPSS Red Books and ECB Blue Books various years.

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Table 3: Highest Denomination and ATM notes in 13 OECD countries

| National Currency | Highest Denomination | | Most common ATM note | | October 19, 2000 |
	NCU	US $	NCU	US $	Exchange rate (NCU/$)
Austria Schillings	5,000	$305	100 - 1,000	$6 - $61	16.40
Belgium Francs	10,000	$208	1000	$21	48.08
Canada Dollars	1,000	$658	20	$13	1.52
Finland Markkaa	1,000	$141	100	$14	7.09
France Francs	500	$64	100	$13	7.82
Germany Deutsche Marks	1,000	$429	10 - 100	$4 - $43	2.33
Italy Lire	500,000	$217	10K - 50K	$4 - $22	2307.65
Japan Yen	10,000	$93	10000	$93	107.73
Netherlands Guilders	1,000	$381	100	$38	2.63
Sweden Kronor	1,000	$99	100 - 500	$10 - $49	10.12
Switzerland Francs	1,000	$559	20 - 200	$11 - $112	1.79
United Kingdom Pounds	50	$72	10 - 20	$14 - $29	0.69
United States Dollars	100	$100	20	$20	1.00

Source: CPSS Red and ECB Blue Books and correspondence with central banks

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Table 4: Debit Terminals/10,000 Residents and Debit Cards per Capita in 2003*

Country	Debit Terminals/10000	Debit Cards per Capita
Japan	1.57	3.06
Germany	6.01	1.10
Austria	9.03	1.02
Belgium	10.96	1.33
Switzerland	11.16	0.83
Netherlands	11.53	1.34
Sweden	12.17	0.63
United States	13.23	0.89
Canada	14.24	1.17
United Kingdom	14.54	1.06
Italy	16.14	0.49
France	16.63	0.74
Finland	17.66	0.79

*For Canada, 2000 figures are taken because more recent figures are not available

Source: CPSS Red and ECB Blue Books

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Figure 1: Per Capita Debit Card Volume

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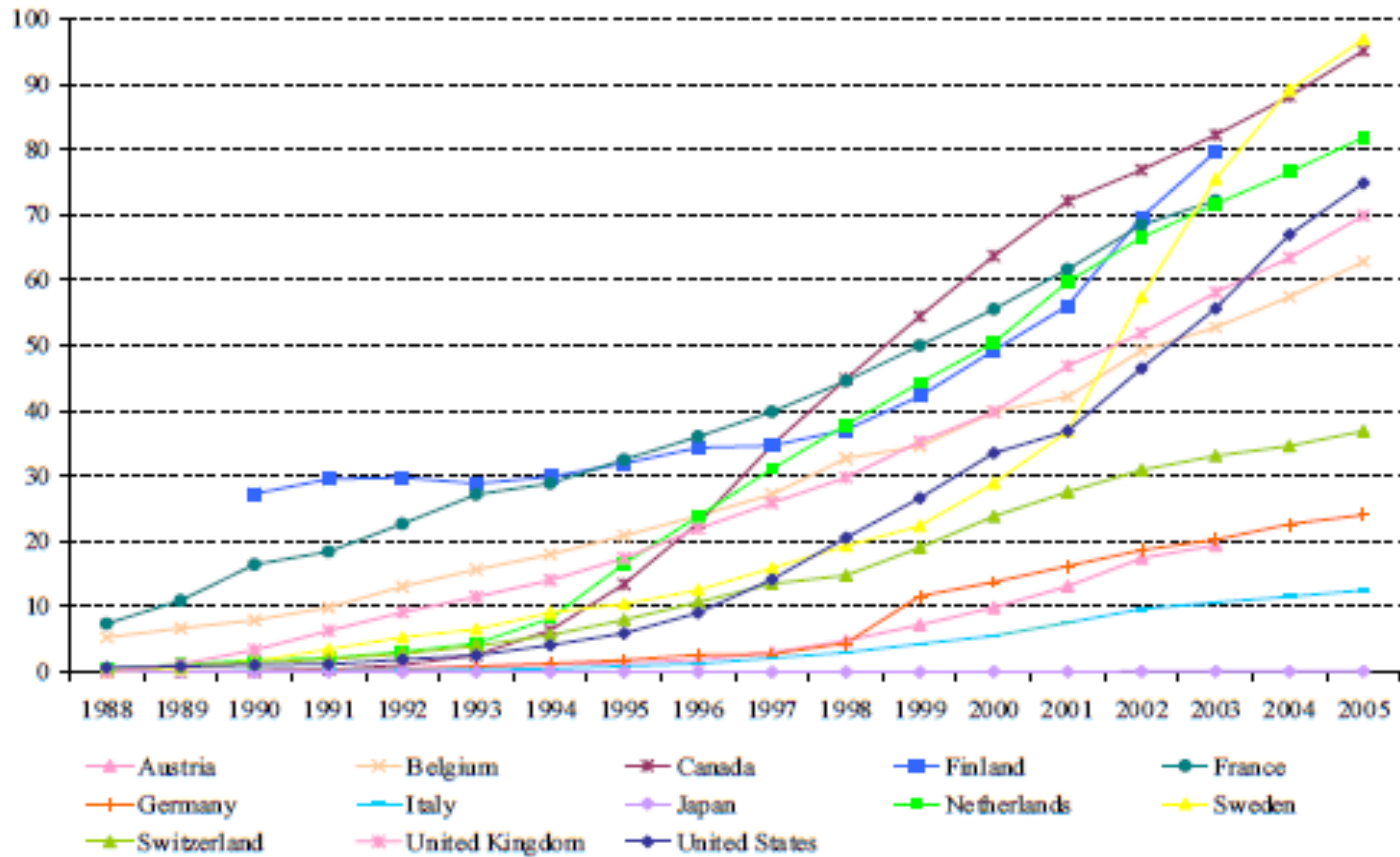
Figure 2: Currency Holdings/GDP

ECON3307.2: Economics of Money and Banking
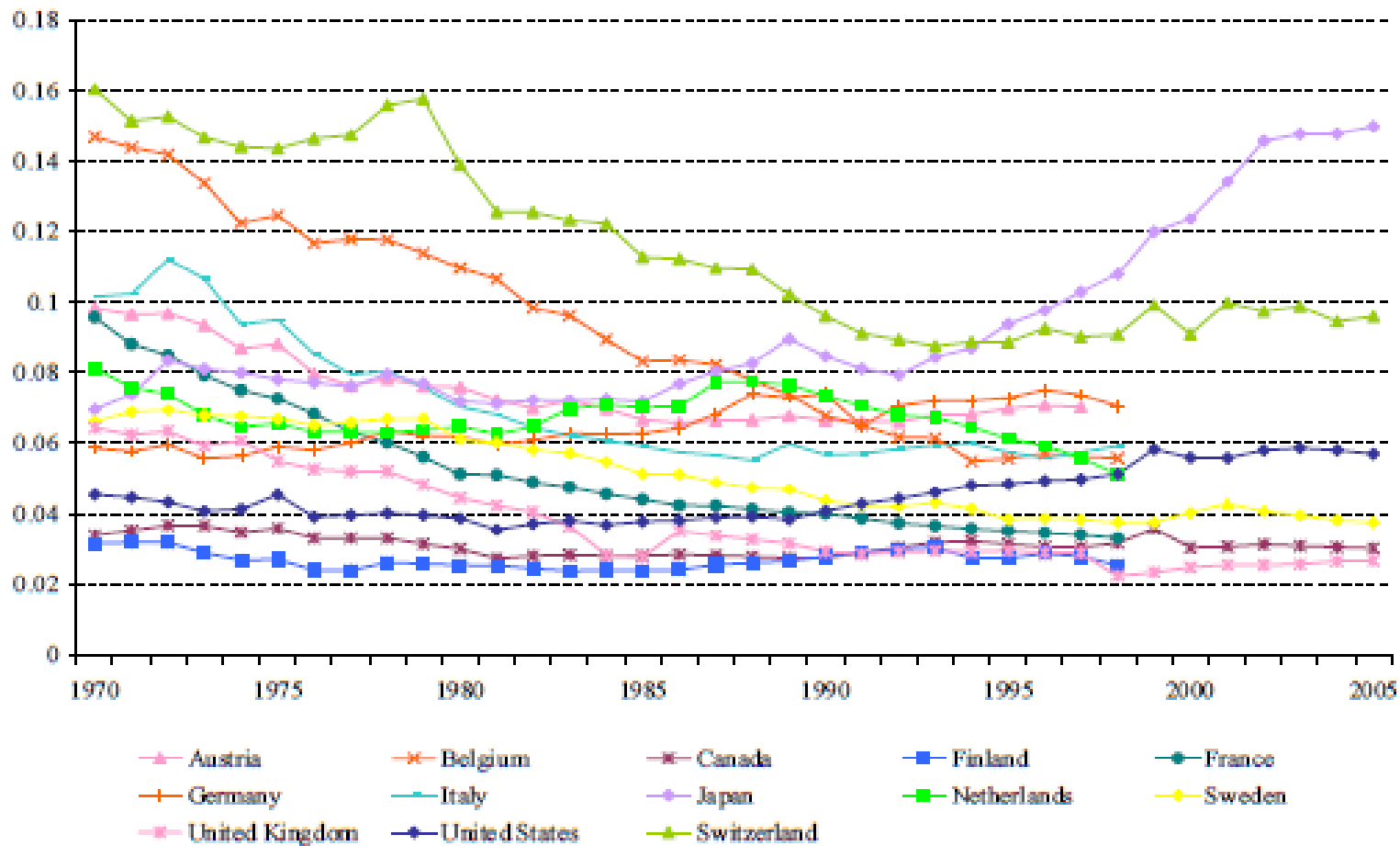
Conclusion-1

- This paper finds that over the years the demand for low denomination bank notes steadily fell.

- However, the demand for higher denominations remained unaffected.

What is your explanation?

Conclusion-2

- One main explanation is that high denomination currency-bills are used for purposes other than exchange.

- (For instance in Canada, $50 and $100 bills are usually not accepted by small retailers).

- They are help by foreign citizens and banks as well as underground economy.
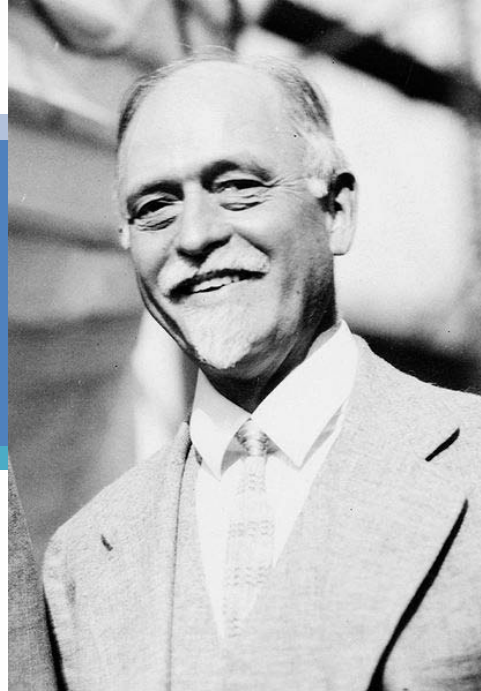
Irving Fisher (1867 – 1947) American Economist

Understanding Interest Rates

References and Goals

❖ **The Economics of Money, Banking and Financial Markets**

Fourth Canadian Edition by F. Mishkin and A. Serletis, 4th Canadian Edition.

❖ **Chapter 4**:

Understanding Interest Rates

Intertemporal Choice

- Interest rates are the price **paid or received in** intertemporal trades of values.

- Their impact of decision making and economy is non-negligible.

- Interest rates are also used for discounting future values. IR are **market discount rates**.

- There is also a subjective version of it.

Introduction-1

Which option you choose?

A) $200 now

B) $210 in a month

Introduction-2

Rank your preferences

A) $200 now

B) $210 in a month

C) $212 in 35 days

Response...

- **(i)** A, B, C?

- **(ii)** C, B, A?

- **(iii)** A, C B?

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Introduction-3

Which option is more likely about a student in SMU?

A) Willing to pay $5 to postpone an exam <u>by one day</u> on the day it is supposed to occur.

B) Willing to pay $3 to postpone an exam <u>by one day</u> at the beginning of the term.

Introduction-4

What is the amount of money you would require in

- **(i) one month**
- **(ii) one year**
- **(ii) ten years**

to make you indifferent to receiving **$15 now?**

Future Value

- Let $i = 0.10$

- In one year $100 \times (1+0.10) = \$110$

- In two years $110 \times (1+0.10) = \$121$

- or $100 \times (1+0.10)^2$

- In three years $121 \times (1+0.10) = \$133$

- or $100 \times (1+0.10)^3$

- In general $100 dollars in n years:

- $100 \times (1+i)^n$

Simple Present Value

- PV = today's (present) value

- CF = future value (cash flow or payment)

- i = interest rate

$$PV = \frac{CF}{(1+i)^n}$$

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Summary

Debt-Instrument	Characterised by
Simple Loan	Time of reimbursement, Amount
Fixed-payment Bond	Date of maturity, Fixed-payments
Coupon Bond	Date of maturity, Fixed-payments, Face-value
Discount Bond	Date of maturity, Face-value
Perpetuity (Consol)	Fixed-payments

Four Types of Credit Market Instruments I

1. **Simple Loan:** The lender provides the borrower with the principal that is repaid at the maturity date with interest.

2. **Fixed Payment Loan:** The lender provides the principal which is repaid by making the same payment (parts of principal + interest) every period for a pre-set periods of time.

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Four Types of Credit Market Instruments II

3. Coupon Bond: A coupon bond pays the owner of the bond a fixed interest payment (coupon payment) every year until the maturity date, when a specified final amount (face value: not necessarily equal the purchase price) is repaid.

4. Discount Bond (zero-coupon bond)**:** A discount bond is bought at a price below its face value (at a discount), and the face value is repaid at the maturity date.

❖ **Special case: Consol bond (perpetuity)**

Yield to Maturity

- The yield to maturity is the interest rate that equates the present value of cash flow payments to be received from a debt instrument with its value (market price) today.

- **Question:**

- **What the Yield to Maturity of Simple Loans?**

Simple Loan—Yield to Maturity

- For simple loans, the simple interest rate equals the yield to maturity.
- PV = amount borrowed = $100
- CF = cash flow in one year = $110
- n= number of years = 1

$$\$100 = \frac{\$110}{(1+i)^1}$$

$$(1+i)^1 \times \$100 = \$110$$

$$(1+i) = \frac{\$110}{\$100}$$

Fixed Payment Loan – Yield to Maturity

- The same cash flow payment every period throughout the life of the loan

- LV= loan value

- FP = fixed yearly payment

- n= number of years until maturity

$$LV = \frac{FP}{1+i} + \frac{FP}{(1+i)^2} + ... + \frac{FP}{(1+i)^n}$$

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Coupon Bond—Yield to Maturity I

- Using the same strategy used for the fixed-payment loan

- P=price of coupon bond

- C = yearly coupon payment

- F= face value of the bond

- n= years to maturity

$$P = \frac{C}{1+i} + \frac{C}{(1+i)^2} + \frac{C}{(1+i)^3} + \ldots + \frac{C}{(1+i)^n} + \frac{F}{(1+i)^n}$$

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Coupon Bond—Yield to Maturity II

TABLE 4-1	Yields to Maturity on a 10% Coupon-Rate Bond Maturing in Ten Years (Face Value = $1000)	
Price of Bond ($)	**Yield to Maturity (%)**	
1200	7.13	**Why?**
1100	8.48	
1000	10.00	
900	11.75	
800	13.81	

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Coupon Bond—Yield to Maturity III

Three facts about coupon bonds:

1. When the coupon bond is priced at its face value, the yield to maturity equals the coupon rate.

2. The price of a coupon bond and the yield to maturity are negatively related.

3. The yield to maturity is greater than the coupon rate when the bond price is below its face value.

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Yield on a Discount Bond

- Yield on a discount basis:

$$i_{db} = \frac{F - P}{P} \, x \, \frac{365}{\text{days to maturity}}$$

i_{db} = yield on a discount basis

F= face value

P= purchase price

❖*Some use 360 instead of 365 in the formula*.

1 Year Discount Bond—Yield to Maturity

- For any **one year** discount bond:

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

F = face value of the discount bond

P = current price of the discount bond.

The yield to maturity equals the face value divided by the initial price.

As with a coupon bond, the yield to maturity is negatively related to the current bond price.

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Consol or Perpetuity

- A bond with no maturity date that does not repay principal but pays fixed coupon payments forever.

$$P_c = \frac{C}{i_c}$$

$P_c = \text{price of the consol}$

$C = \text{yearly interest payment}$

$i_c = \text{yield to maturity of the consol}$

$$\text{Can rewrite the above equation as}: i_c = \frac{C}{P_c}$$

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Explaining the Formula

- Present Value of a Consol is:

$$PV = \sum_{t=1}^{\infty} \frac{CF}{(1+i)^t} = CF \times \sum_{t=1}^{\infty} \frac{1}{(1+i)^t}$$

- On the other hand, we have that:

$$\frac{1}{r} + \frac{1}{r^2} + \frac{1}{r^3} + \cdots = \sum_{t=1}^{\infty} \frac{1}{r^t} = \frac{1}{r-1}$$

- Hence:

$$\sum_{t=1}^{\infty} \frac{1}{(1+i)^t} = \frac{1}{(1+i-1)} = \frac{1}{i} \qquad PV \ of \ Consol = \frac{CF}{i}$$

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Summary

Debt-Instrument	Characterised by
Simple Loan	Time of reimbursement, Amount
Fixed-payment Bond	Date of maturity, Fixed-payments
Coupon Bond	Date of maturity, Fixed-payments, Face-value
Discount Bond	Date of maturity, Face-value
Perpetuity (Consol)	Fixed-payments

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Understanding Rate of Return…

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Rate of Return: Perpetuity or Resold Bonds

$$RET = \frac{C}{P_t} + \frac{P_{t+1} - P_t}{P_t}$$

RET = return from holding the bond from time t to t+1

P_t = price of bond at time t

P_{t+1} = price of the bond at time t+1

C = coupon payment

$\dfrac{C}{P_t}$ = current yield = i_c

$\dfrac{P_{t+1} - P_t}{P_t}$ = rate of capital gain = g

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Rate of Return and Interest Rates I

❖ Note that the Rate of Return differs from the Yield to Maturity only if the bound is not kept until maturity.

❖ **A rise in interest rates is associated with a fall in bond prices**, resulting in a capital loss if time to maturity is longer than the holding period.

❖ The more distant a bond's maturity, the greater the size of the percentage price change associated with an interest-rate change.

❖ Even if a bond has a substantial initial interest rate, its return can be negative if interest rates rise.

Rate of Return and Interest Rates II

- The more distant a bond's maturity, the lower the rate of return that occurs as a result of an increase in the interest rate.

- Even if a bond has a substantial initial interest rate, its return can be negative if interest rates rise.

Rate of Return and Interest Rates III

TABLE 4-2	One-Year Returns on Different-Maturity 10%-Coupon-Rate Bonds When Interest Rates Rise from 10% to 20%				
(1) Years to Maturity When Bond Is Purchased	(2) Initial Current Yield (%)	(3) Initial Price ($)	(4) Price Next Year* ($)	(5) Rate of Capital Gain (%)	(6) Rate of Return (2 + 5) (%)
30	10	1000	503	−49.7	−39.7
20	10	1000	516	−48.4	−38.4
10	10	1000	597	−40.3	−30.3
5	10	1000	741	−25.9	−15.9
2	10	1000	917	−8.3	+1.7
1	10	1000	1000	0.0	+10.0

*Calculated with a financial calculator using Equation 3.

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Interest-Rate Risk

- Prices and returns for long-term bonds are more volatile than those for shorter-term bonds.

- There is no interest-rate risk for any bond whose time to maturity matches the holding period.

Real vs. Nominal Interest Rate…

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Real and Nominal Interest Rates

- Nominal interest rate makes no allowance for inflation.

- Real interest rate is adjusted for changes in price level so it more accurately reflects the cost of borrowing.

- Ex ante real interest rate is adjusted for expected changes in the price level.

- Ex post real interest rate is adjusted for actual changes in the price level.

Fisher Equation

$$i = i_r + \pi^e$$

- i = nominal interest rate

- i$_r$ = real interest rate

- π^e = expected inflation rate

- When the real interest rate is low, there are greater incentives to borrow.

- Low interest rates reduces the incentives to lend.

- The real interest rate is a better indicator of the incentives to borrow or lend.

Indexed Bonds

- December 10, 1991, when the government of Canada began to issue indexed bonds.

- Index is Consumer Price Index (CPI), it is comparable to the US Inflation Protected Treasury Bill.

- Indexed bonds are bonds whose interest and principal payments are adjusted for changes in the price level.

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Question…

What is the amount of money you would require in

- (i) one month

- (ii) one year

- (ii) ten years

to make you indifferent to receiving **$15 now?**

Compute the Yield to Maturity supposing that your answers are Face Value of a Discount Bond.

Comment!

$$i_{db} = \frac{F - P}{P} \times \frac{365}{\text{days to maturity}}$$

35

Answer

$$i_{db} = \frac{F - P}{P} \times \frac{365}{Days\ to\ Maturity}$$

$$i_{db} = \frac{20 - 15}{15} \times \frac{365}{30} = 406\%$$

$$i_{db} = \frac{50 - 15}{15} \times \frac{365}{365} = 233\%$$

$$i_{db} = \frac{100 - 15}{15} \times \frac{365}{3650} = 57\%$$

What do you think of the Implication?

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Introduction-Question

- **Richard Thaler (1981)** asked subjects this question .

- The median responses : **$20**/**$50**/**$100** imply an average (annual) discount rate of **345%** over a one-month horizon, 120% percent over a one-year horizon, and **19%** over a ten-year horizon.

- **Class Median**: **19.5**/**55**/**225**

- **Class Mean**: **19.6**/**77.5**/<u>**807.7**</u> ☺

Mental Accounting

- A concept first named by Richard Thaler (1980), **mental accounting** attempts to describe the process whereby people code, categorize and evaluate economic outcomes.

- One detailed application of mental accounting, the behavioral life cycle hypothesis (Shefrin & Thaler, 1988), posits that people mentally frame assets as belonging to either current income, current wealth or future income and this has implications for their behavior as the accounts are largely non-fungible and marginal propensity to consume out of each account is different leading to various forms of inconsistencies.

Mental Accounting

- See video-lectures by Richard Thaler:

- http://www.youtube.com/watch?v=3MV8dbPeHxs

- http://video.ft.com/v/62699245001/May-8-Long-View-Part-9-Why-the-bubble-burst
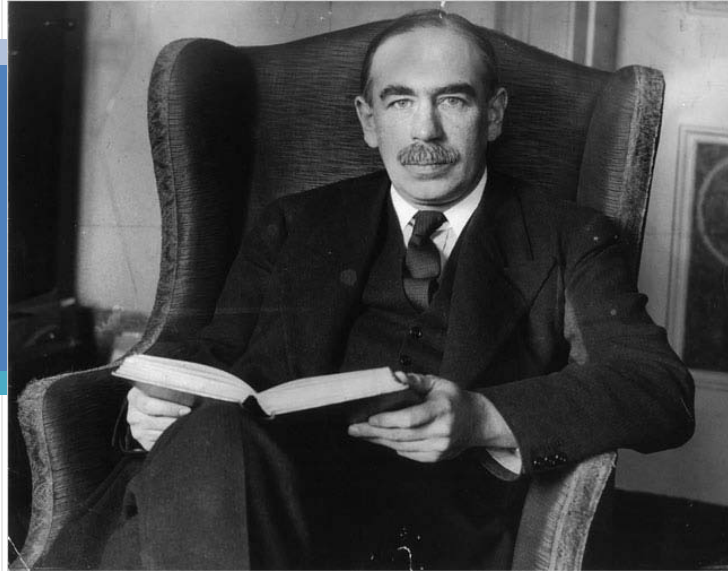
John Maynard Keynes (1883 –1946), British Economist

The Behaviour of Interest Rates-1

References and Goals

❖ **The Economics of Money, Banking and Financial Markets**

Fourth Canadian Edition by F. Mishkin and A. Serletis, 4th Canadian Edition.

❖**Chapter 5**:

The Behaviour of Interest Rates

Approach: Partial Equilibrium

❖ **Partial Equilibrium** is an approach is studying a market, where the equilibrium values (price and quantity) are obtained independently from other markets.

❖ In other words clearance on the market of some specific goods is assumed to be unaffected (and not affecting) other markets.

❖ It is a simplification compared to **General Equilibrium** (conceiving inter-related markets).

Questions...

What is a Market?

How can we characterise a Market?

What is Market Equilibrium?

Market

- Market is a stance, sellers and buyers meet to exchange goods and/or services that are not free (have a price). Market need not be a location.

- Exchange can be made without using money.

- There are as many markets as we *have (can define)* distinct goods and services.

- In Economics, Market is characterised by Supply and Demand.

Market Equilibrium

- *Market Equilibrium* is an economic concept characterised by *a pair of Price and Quantity* such that market clears with no excess demand and no excess supply.

- If a market is in *disequilibrium* it means at the current price there are either *excess demand* (quantity demanded being larger than quantity supplied) or *excess supply* (quantity supplied being larger than quantity demanded).

- *Price adjustment* is the *mechanism* through which Equilibrium is re-established.

Demand for a give good (service) is...

- A Function specifying quantity demanded for every given price of the good or service under consideration, as well as a number of other factors, for a given period of time.

- Law of demand postulates that this relationship is negative.

- *What are the other factors that impact quantity demanded of a givens asset, besides its own price?*

Determinants of Asset Demand

i. **Wealth** - the total resources owned by the individual, including all assets.

ii. **Expected Return** - the return expected over the next period on one asset relative to alternative assets.

iii. **Risk** - the degree of uncertainty associated with the return on one asset relative to alternative assets.

iv. **Liquidity** - the ease and speed with which an asset can be turned into cash relative to alternative assets

Demand Curve-1

Linear Demand Curve
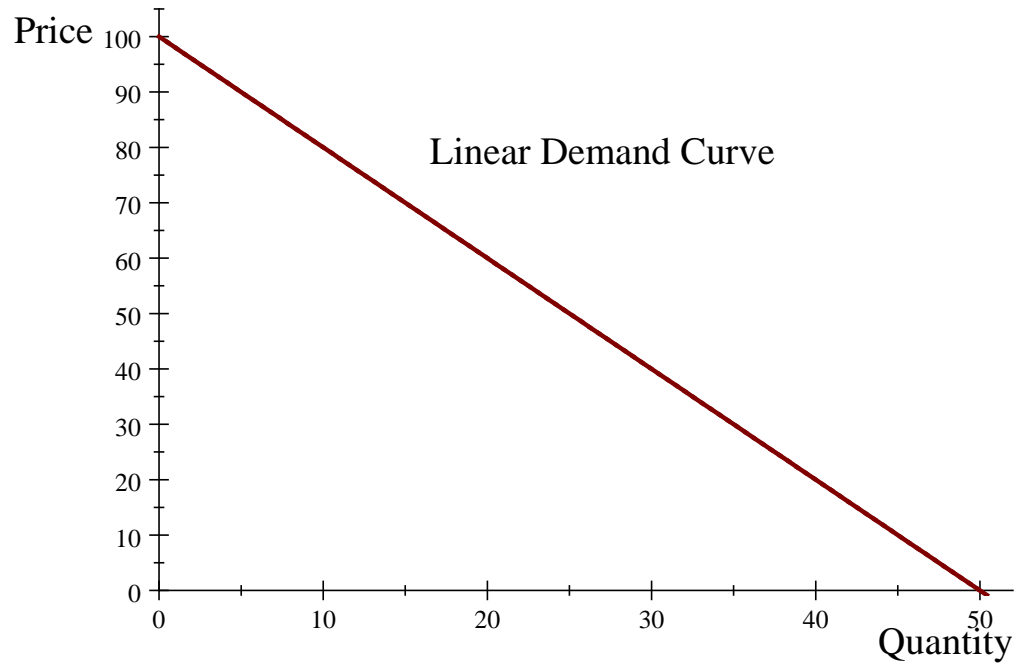
Theory of Asset Demand

1. The quantity demanded of an asset is **positively related to wealth**.

2. The quantity demanded of an asset **is positively related to its expected return** relative to alternative assets.

3. The quantity demanded of an asset is **negatively related to the risk of its returns** relative to alternative assets.

4. The quantity demanded of an asset is **positively related to its liquidity** relative to alternative assets.

Shifts in Demand for Bonds-1

- **Wealth**: in a fiscal expansion or growing wealth ⇨ shifts Demand curve to the right.

- **Expected Returns:** higher expected interest rates (future) ⇨ lower expected return for long-term bonds ⇨ shifts Demand Curve to the left.

- **Expected Inflation:** increase in the expected inflation rate⇨ lowers expected return for bonds ⇨ demand curve to shift to the left. ***Why?***

- **Risk:** increase in riskiness of bonds ⇨ demand curve shift to the left

- **Liquidity:** increased liquidity of bonds ⇨Demand curve shifting right

Shifts in Demand for Bonds-2
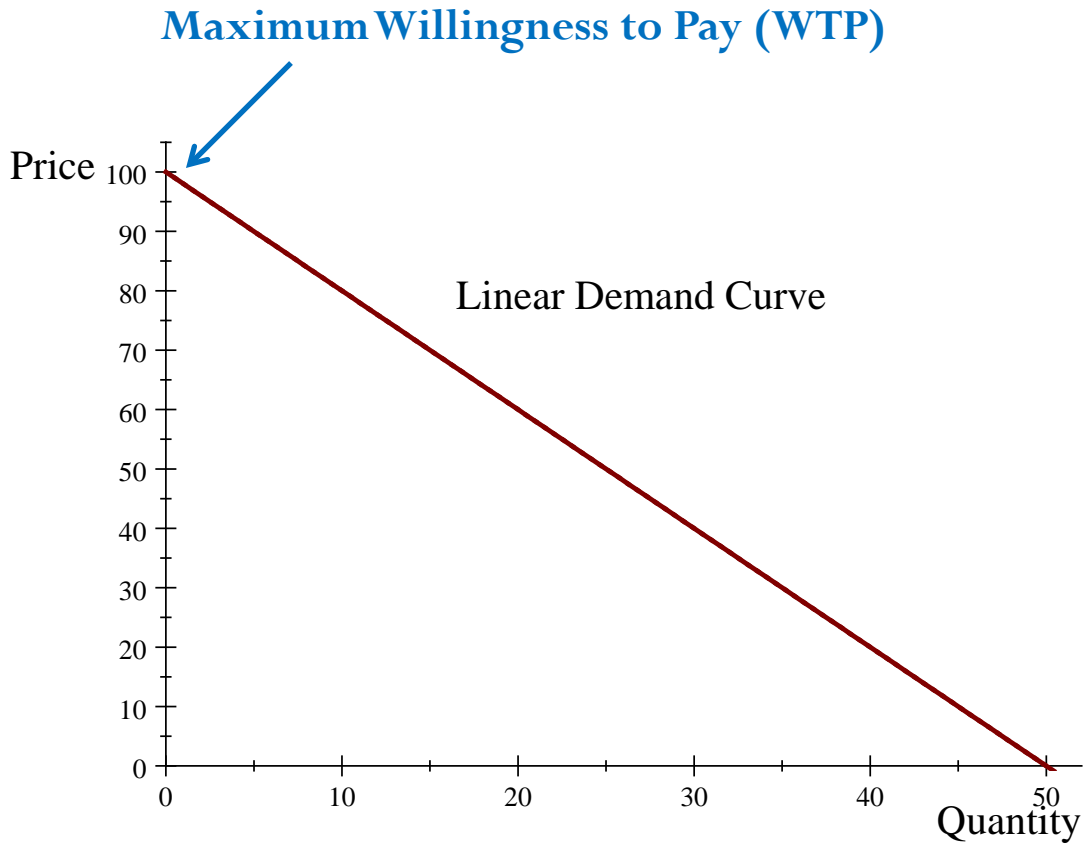
Shifts in Demand for Bonds-3

Increase in Wealth (disposable income): Shift to the Right.

Demand Curve Shift
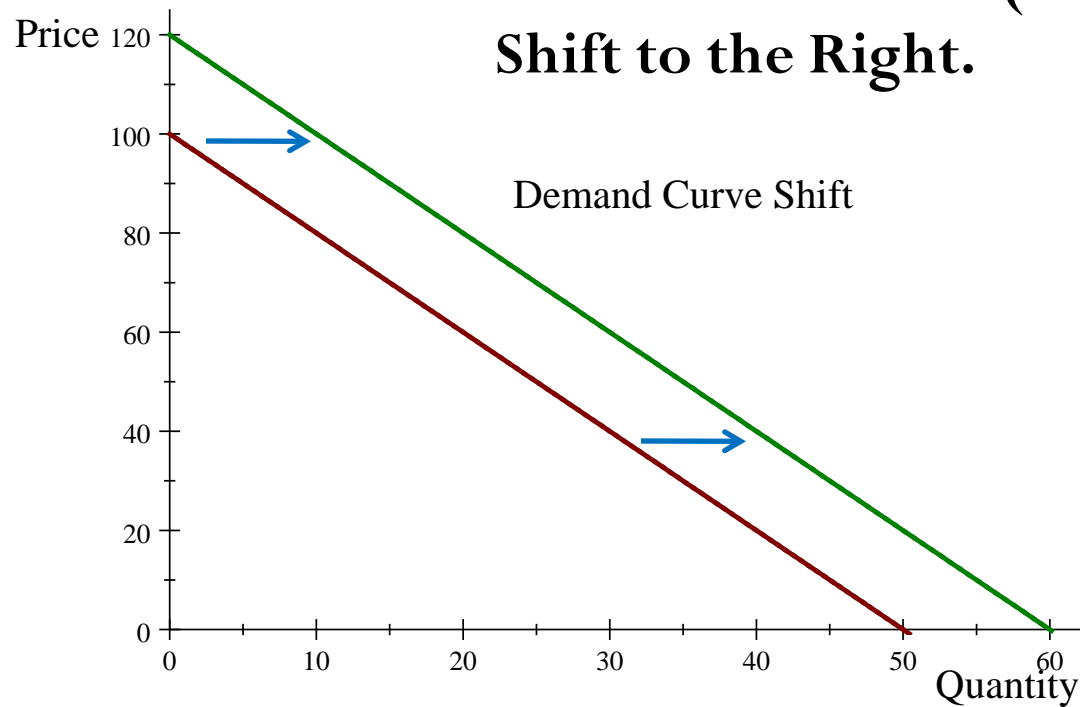
Shifts in Demand for Bonds-4

Decrease in Expected Interest Rate:
Shift to the Right.

Recall that i ↓ leads to RET ↑

Linear Demand Shift
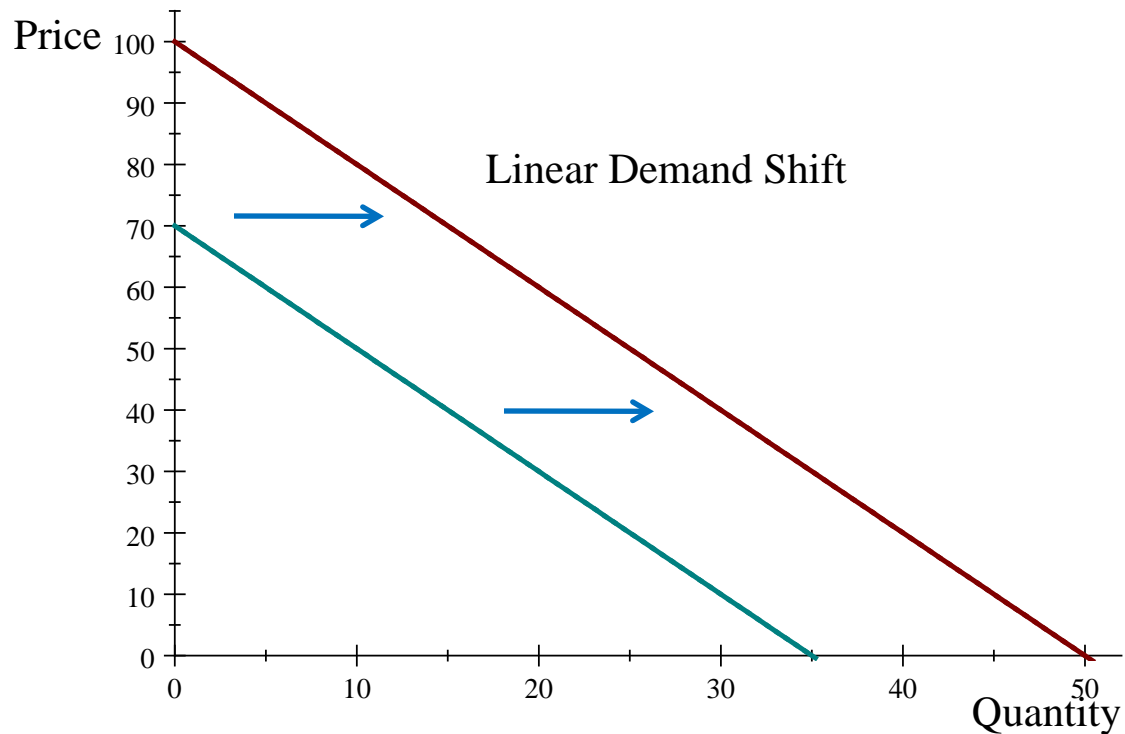
Shifts in Demand for Bonds-5

Decrease in Expected Inflation:
Shift to the Right.
Recall that π↓ leads to Real RET↑
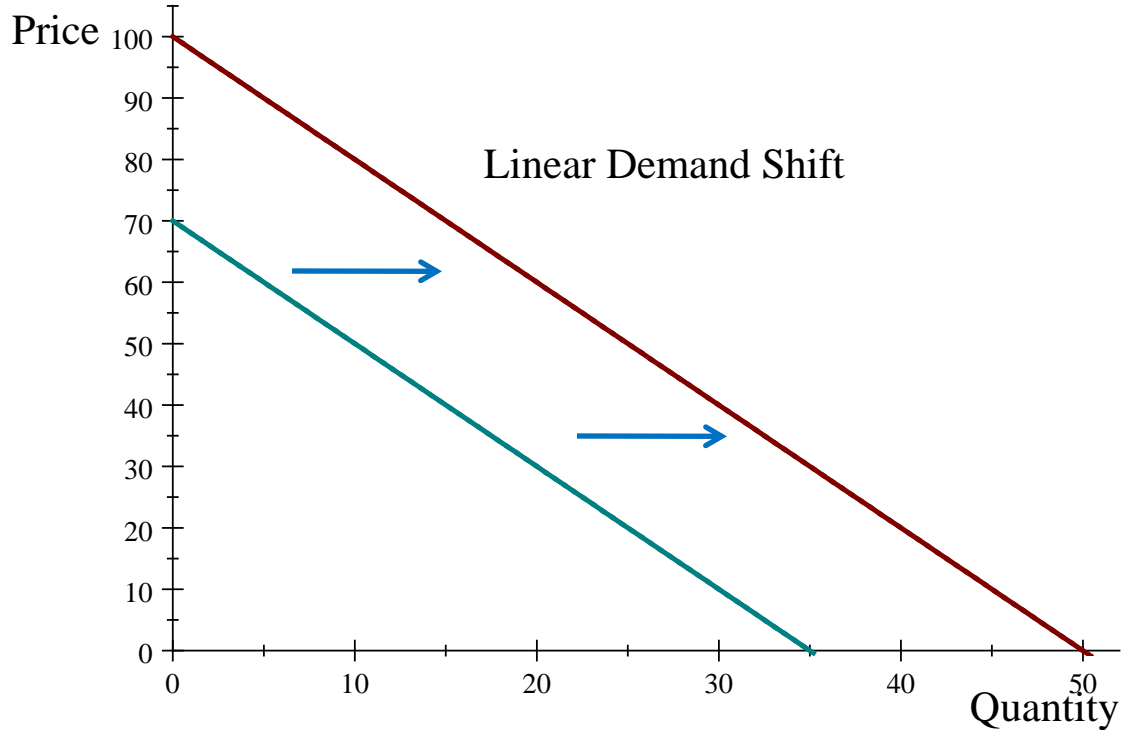
Shifts in Demand for Bonds-6

Decrease in Riskiness of the asset:
Shift to the Right.

Linear Demand Shift
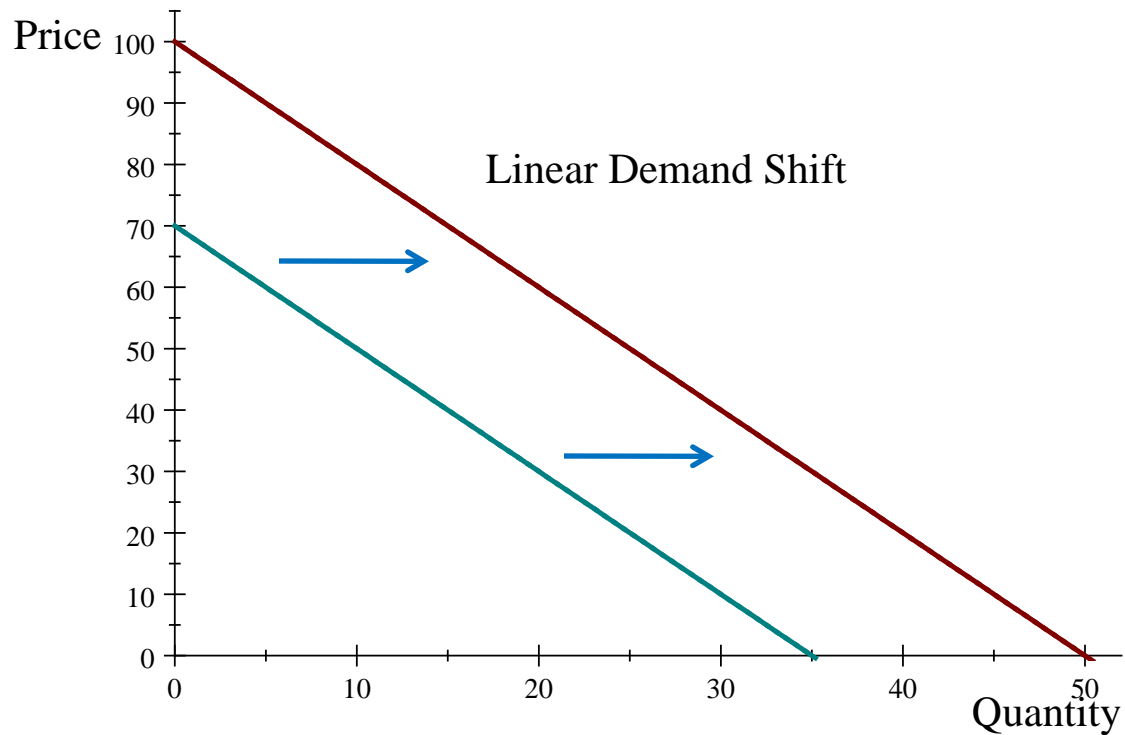
Shifts in Demand for Bonds-7

Increase in Liquidity of the asset:
Shift to the Right.
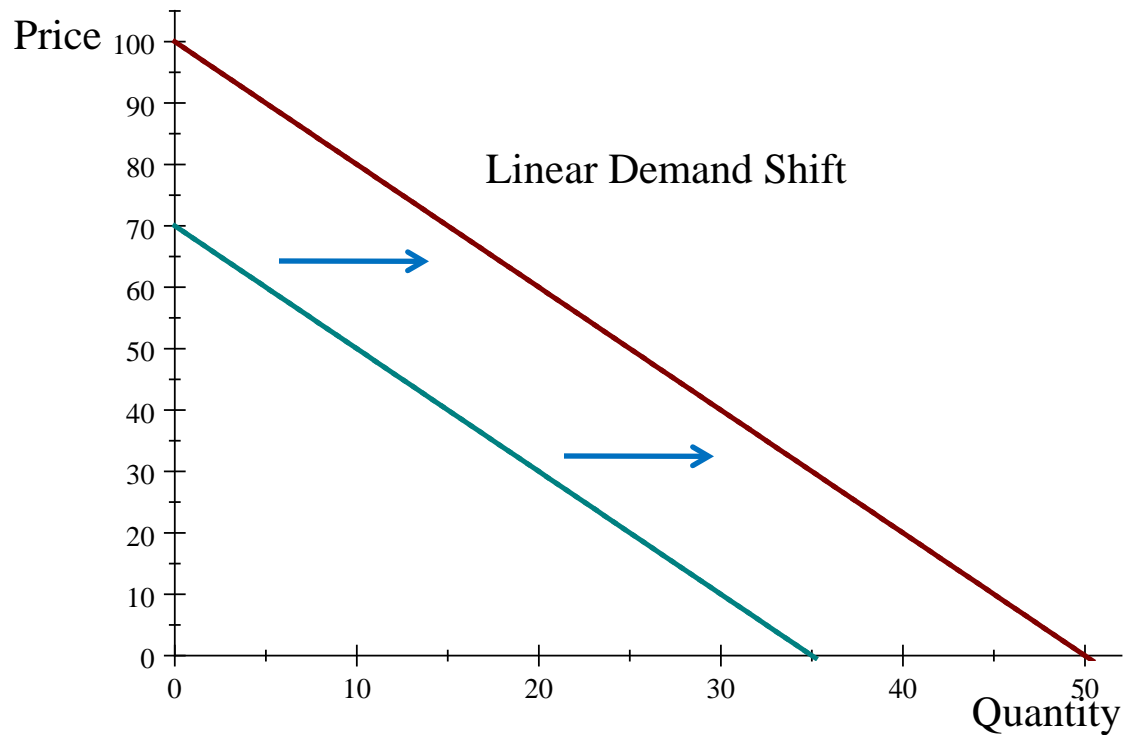
Price of Bond and Interest Rates-1

❖ Suppose demand for a Discount Bond is described by the equation below:

- $P^d = 1000\text{-}2B^d$

- If for Discount Bond with Face-Value of $1000, market price is $950 then quantity demand for the bond is $B^d = 100$

❖ The corresponding interest rate (=expected return, it is a Discount Bond):

- i = RET = (F-P)/P

- i=($1000 - $950)/$950 = 0.053 = 5.3%

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Price of Bond and Interest Rates-2

- If price of this bond *__is set to $900 __* then:

(i)   Expected Return (interest rate) changes:

$i = RET = (F-P)/P$

$i = (\$1000 - \$900)/\$900 = 0.111 = 11.1\%$

(i)   Quantity Demanded for this bond rises.

Price and Quantity Demanded of Bonds

Price Falls ⇨ Expected Return rise
⇨ Quantity demanded rise
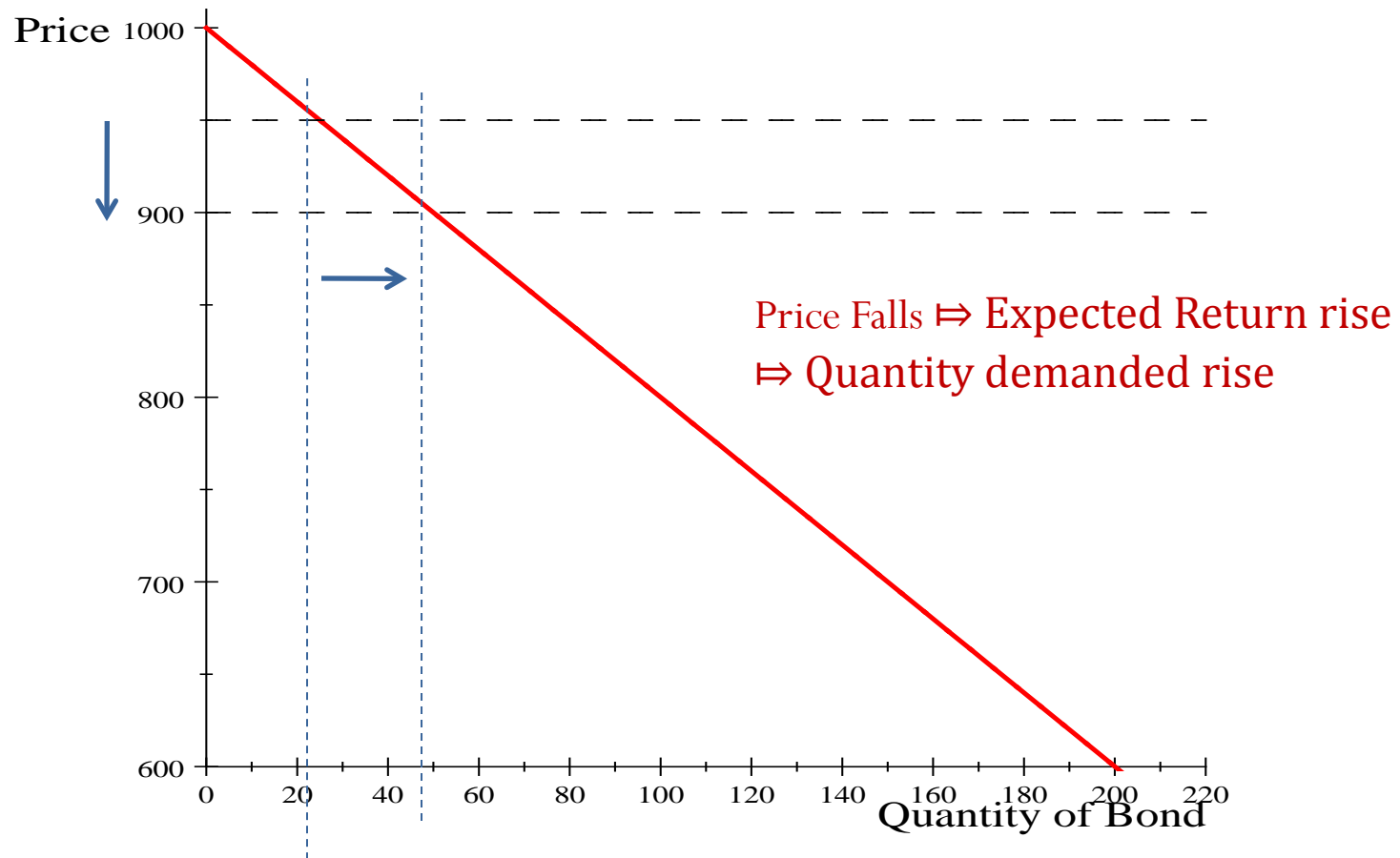
Supply is...

- A Function specifying quantity supplied for every given price; as well as a number of other variables for a given period of time.

- Law of supply postulates that this relationship is positive.

- *What are the variables that impact quantity supplied for a given good besides its own price?*

Supply Curve-1

Linear Supply Curve

Price / Quantity axes

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Supply Curve-1

Price

Linear Supply Curve

Minimum Willingness
to Accept (**WTA**)

Quantity

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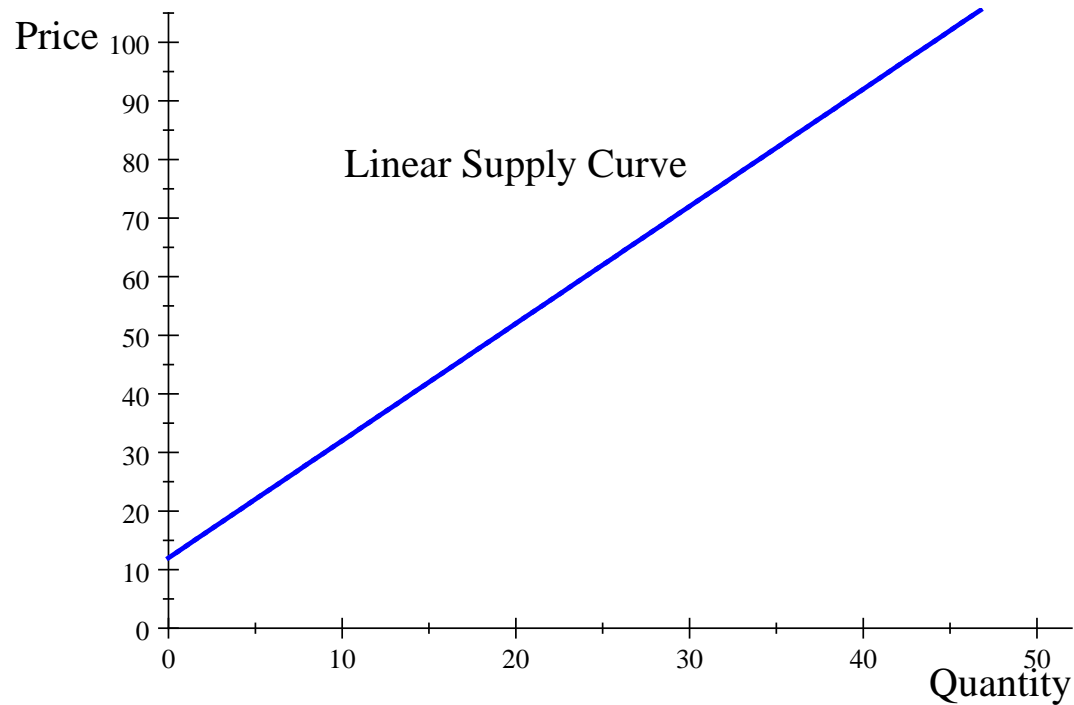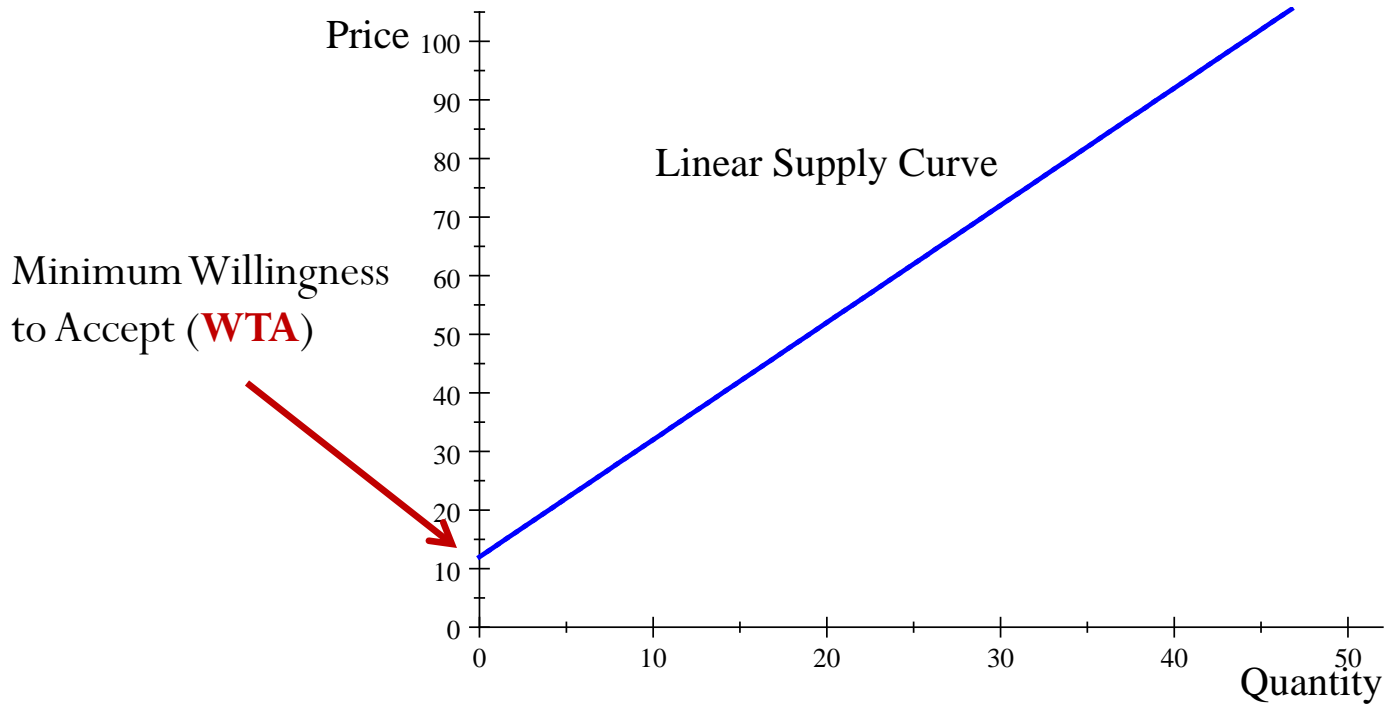
Supply and Demand for Bonds-1

❖ **Bond Demand:**

- At lower prices (higher interest rates), ceteris paribus, the quantity demanded of bonds is higher—an inverse relationship.

❖ **Bond Supply:**

- At lower prices (higher interest rates), ceteris paribus, the quantity supplied of bonds is lower—a positive relationship.

Supply and Demand for Bonds-2
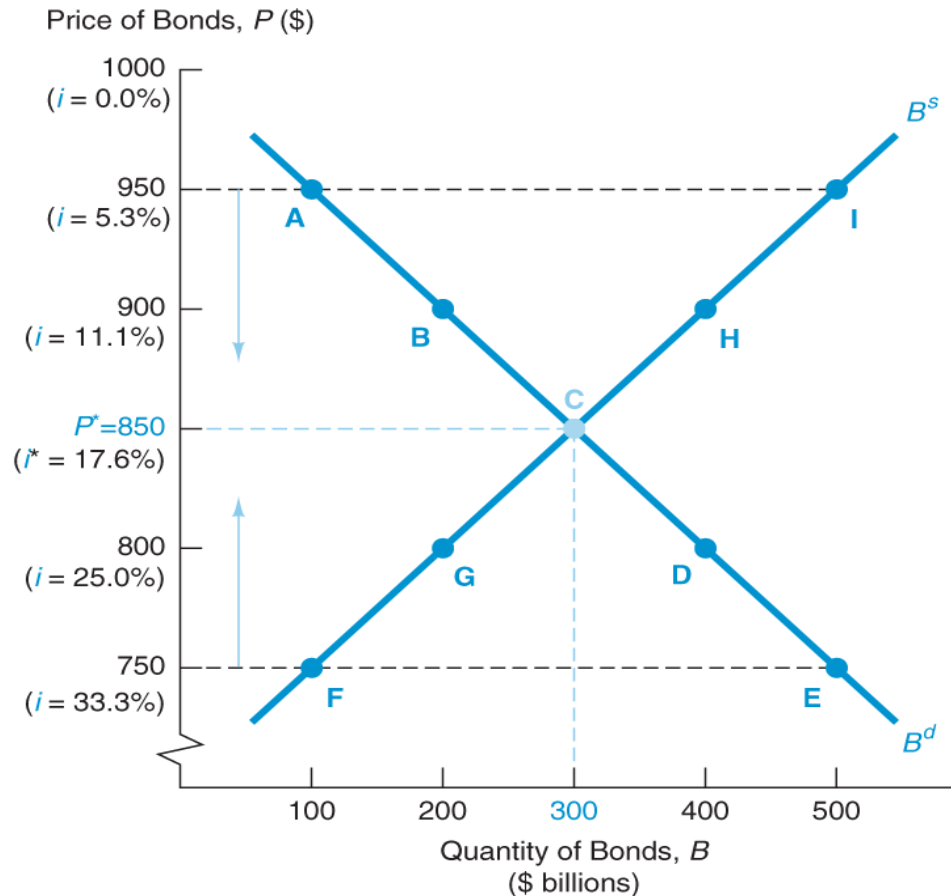
FIGURE 5-1 Supply and Demand for Bonds

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Supply and Demand for Bonds-2
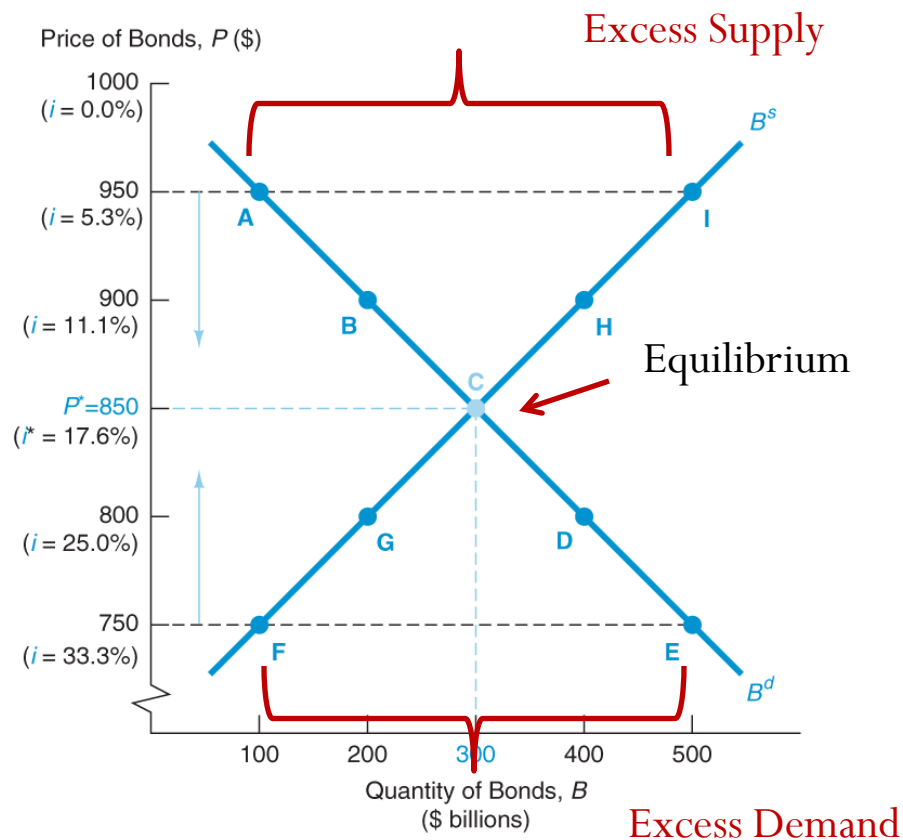
FIGURE 5-1 Supply and Demand for Bonds

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Adjustment Mechanism

- If for any reason Quantity demanded is larger than Quantity supplied $\Longrightarrow$ Excess Demand

- Excess Demand $\Longrightarrow$ Upward pressure on Price $\Longrightarrow$ Price starts increasing

- As price increase $\Longrightarrow$ Quantity demanded falls and quantity supplied rises until they are again equal (at a new pair of price and quantity).

- The adjustment for Excess supply is comparable.

Exercise : Supply and Demand for Bonds

- Supply and Demand for a Discount Bond with the face value of $500, withy maturity of a year, is given below:

$$Demand\ for\ Bonds: P^d = 900 - B^d$$
$$Supply\ for\ Bonds: \quad P^s = 200 + B^s$$

- Find the Market Equilibrium.

- Illustrate.

- Find its Rate of Return.

Exercise-2

ECON3307.2: Economics of Money and Banking
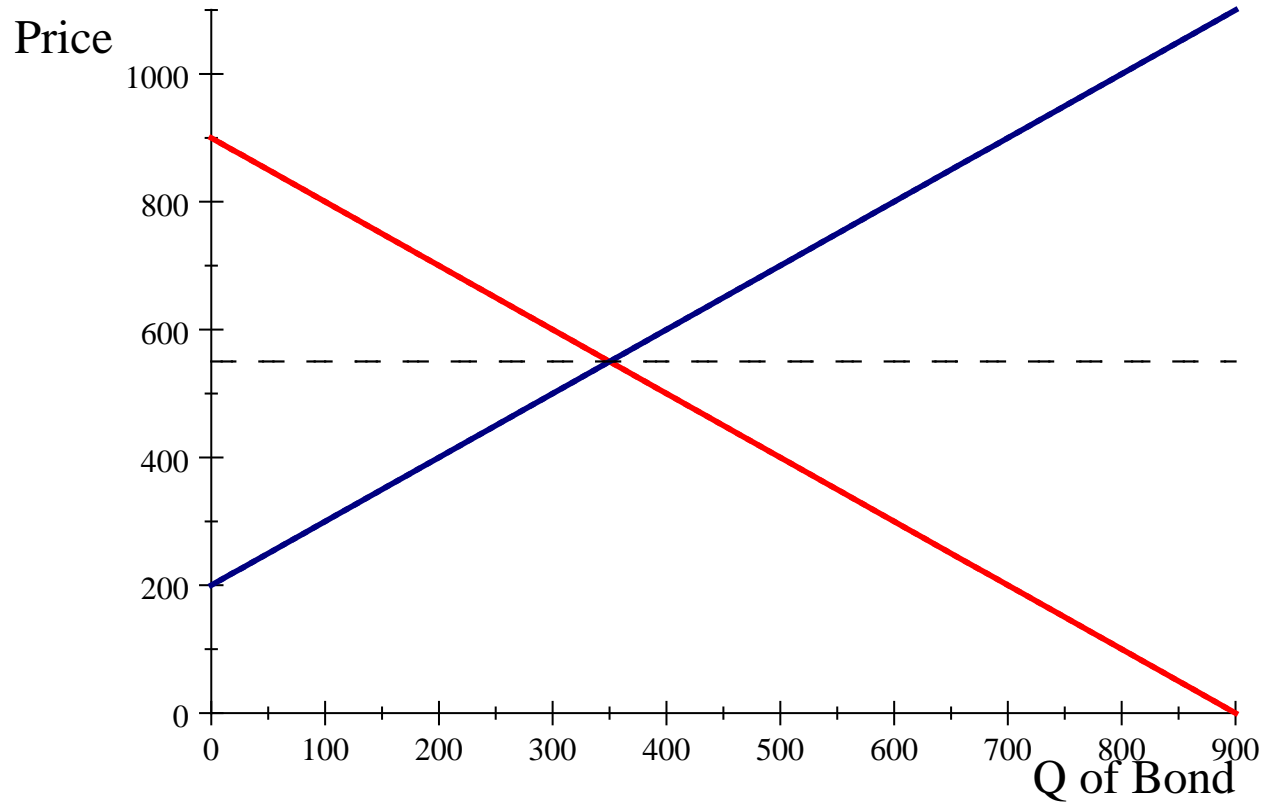
Exercise: Demand Shift

- The new government, just taking office, follows an expansionist fiscal policy. As a results of general tax reduction, the disposable income increased.

- It is estimated that the impact of this policy on Willingness to Pay for all discount bonds is an increase by 30%.

- Find the new Equilibrium.

- Illustrate.

- Find the new Rate of Return.

Exercise-2

ECON3307.2: Economics of Money and Banking
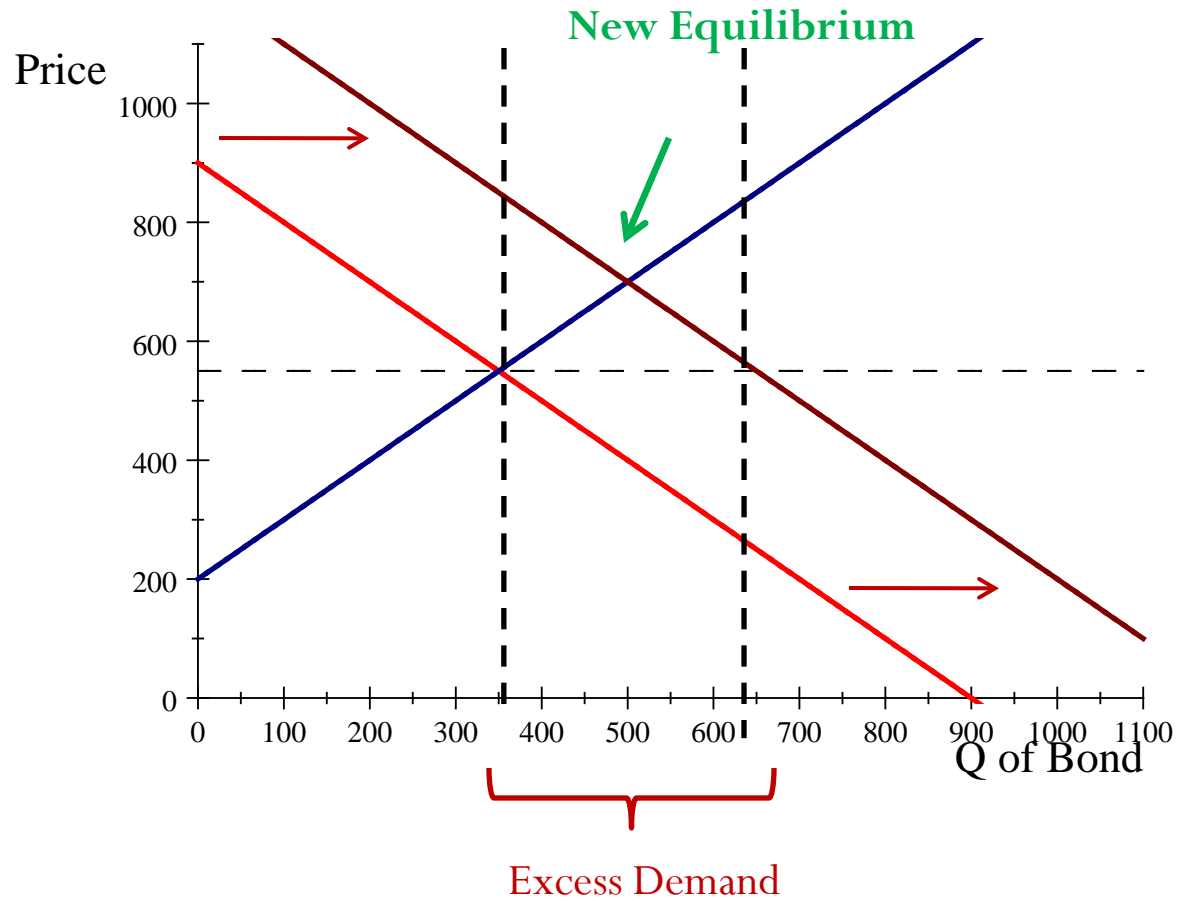
Exercise-3

❖ **Equilibrium: $P^d = P^s = P^*$; $B^d = B^s = B^*$**

$900 - B^* = 200 + B^* \Rightarrow B^* = 350$; $P^* = 200 + 350 = 550$

● **RET** $= (P-F)/P = (550-500)/550 \simeq 0.092 \simeq 9.2\%$

❖ After the change $\Rightarrow$ disposable income increase $\Rightarrow$ Demand shift right (max WTP up by 30%):

$P^d = 900 + 270 - B^d$

❖ *The rest in similar...*

What makes an asset risky?

What is Risk?

What is uncertainty?

Judging Gambles (set of uncertain payoffs)

- Expected Value is usually used to compare gambles (uncertain payoffs).

- **The expected value** of a random variable is the weighted average of all possible values that this random variable can take on. The weights used in computing this average correspond to the probabilities.

- If an individual prefers a certain amount lower than an uncertain amount with a higher expected value, the person is risk-averse. Human beings are generally risk-averse.

Calculating Expected Value

EV= 9/10*25+1/10*15= $24

10%

$15

$25

90%
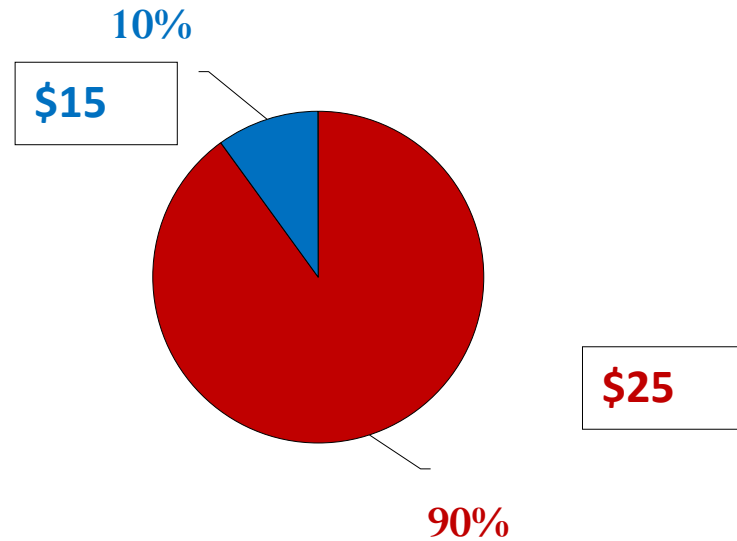
Experiment

- (i) Number of times WTA is smaller than EV

- (ii)Number of Type A and number of type B choices

- (iii) Number of **Ambiguous choices**

Supply of Bonds and Shifts

❖ Expected profitability of investment opportunities: in an expansion, the supply curve shifts to the right. *(Why?)*

❖ Expected inflation: an increase in expected inflation shifts the supply curve for bonds to the right. *(Why?)*

❖ Government activities: increased budget deficits (surpluses) shifts the supply curve to the right (left). *(Why?)*

Shift Factor: Expected Inflation

Sell **Money in Future** now, because Money in future seems less worthy…
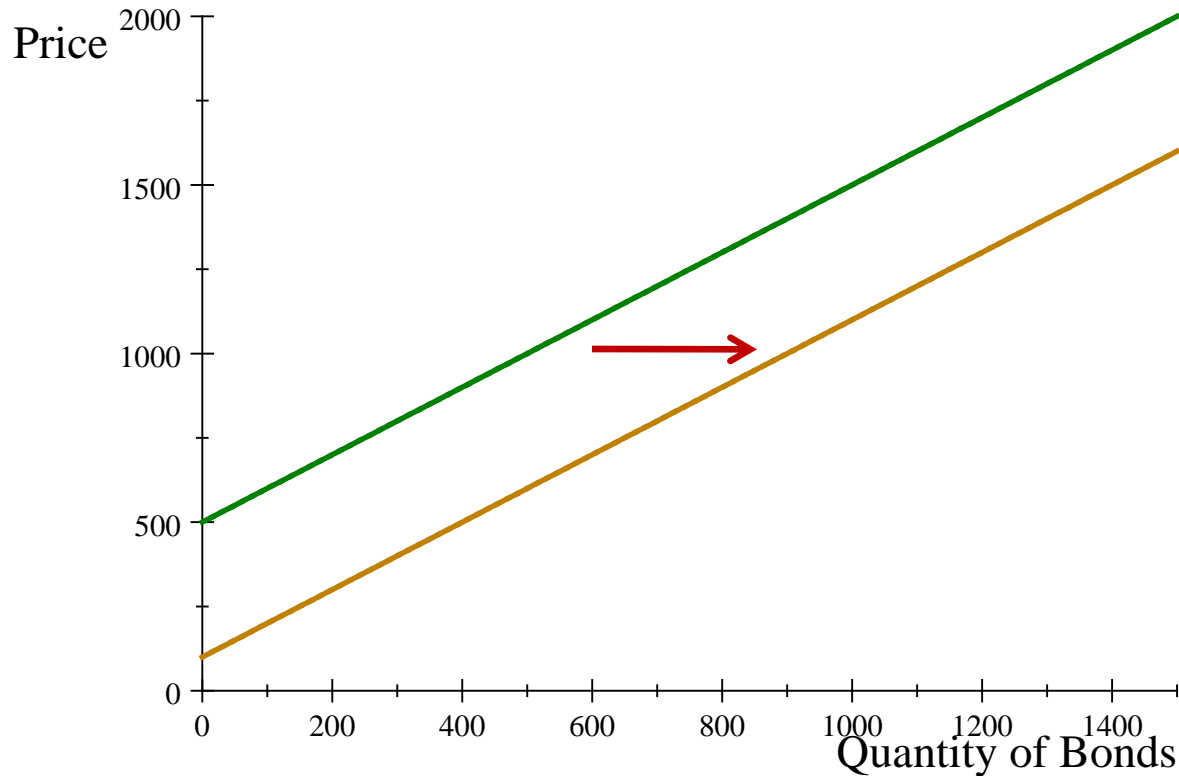
Bond Market and Expected Inflation-1

The Fisher Effect:

❖ Increases in expected inflation ⇨ **B^s shifts to right**

❖ Increases in expected inflation ⇨ **B^d shifts left**

❖ At the new equilibrium, bond prices fall.

Bond Market and Expected Inflation-2

FIGURE 5-4 Response to a Change in Expected Inflation

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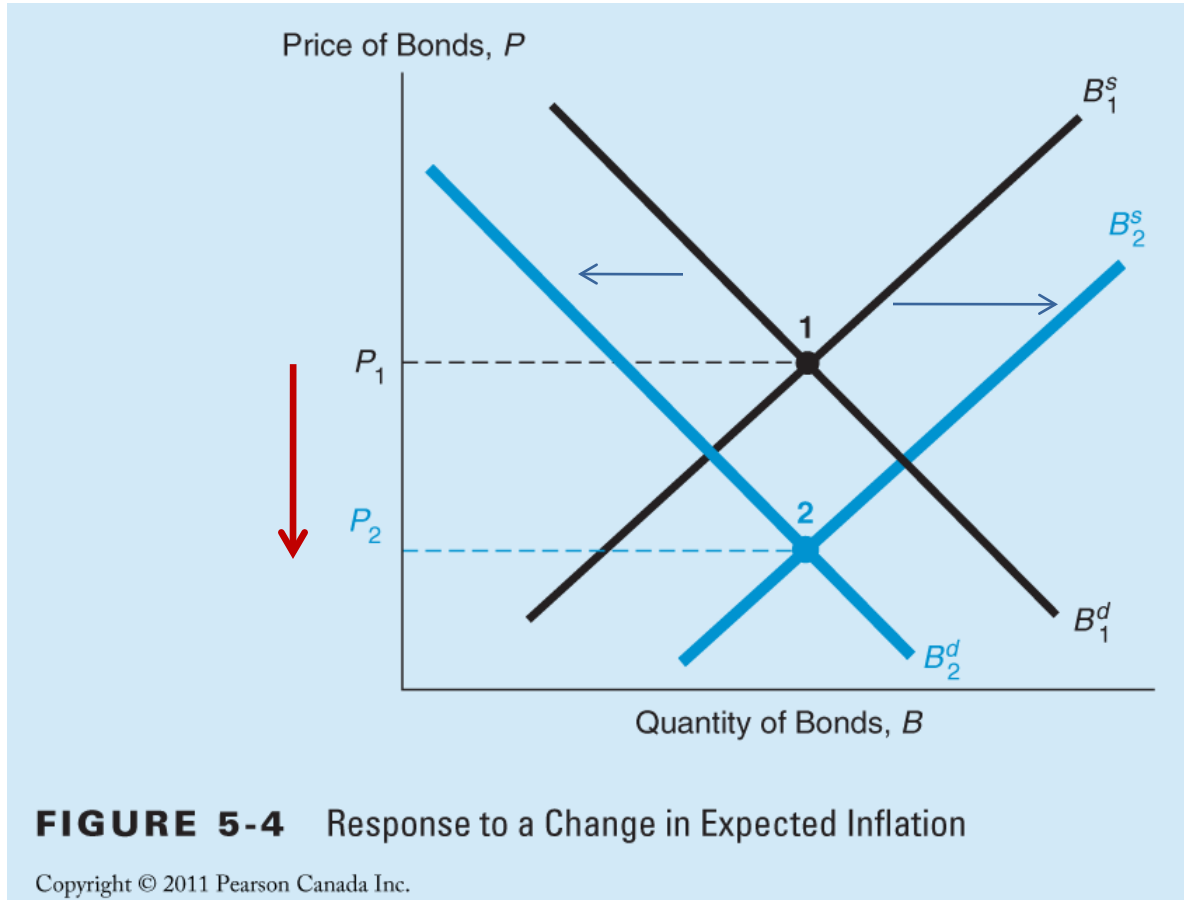
Bond-Market Model: Tip for understanding

- **Demand for Bonds**= Buying Money Located in Future,

- **Supply for Bonds**= Selling Money Located in Future

Expected Inflation and Interest Rates

Given the Previous Slide, What will happen to interest rates?

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Shift Factor: Profitability of Investment (Expansion)

ECON3307.2: Economics of Money and Banking
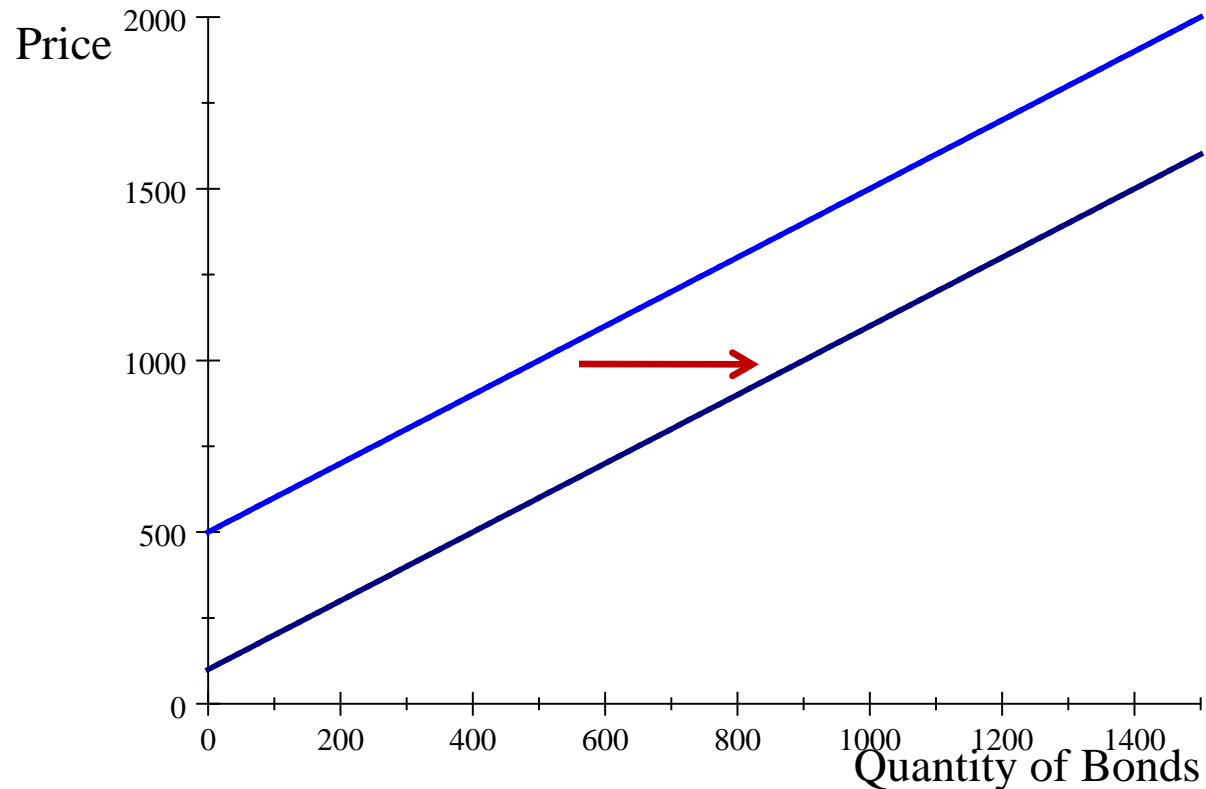
Expansion and Bond Market-1

During a business cycle expansion:

❖ Income and Wealth are increasing leading to an increase in bond demand: **higher savings**.

❖ The supply of bonds also increases as firms are more willing to borrow to invest: Expansion is usually correlated with **higher productivity**.

❖ This leads to a fall in the bonds price (provided that supply curve's shifts in more pronounced than the demand shift.

Expansion and Bond Market-2

Price of Bonds, P

FIGURE 5-6 Response to a Business Cycle Expansion

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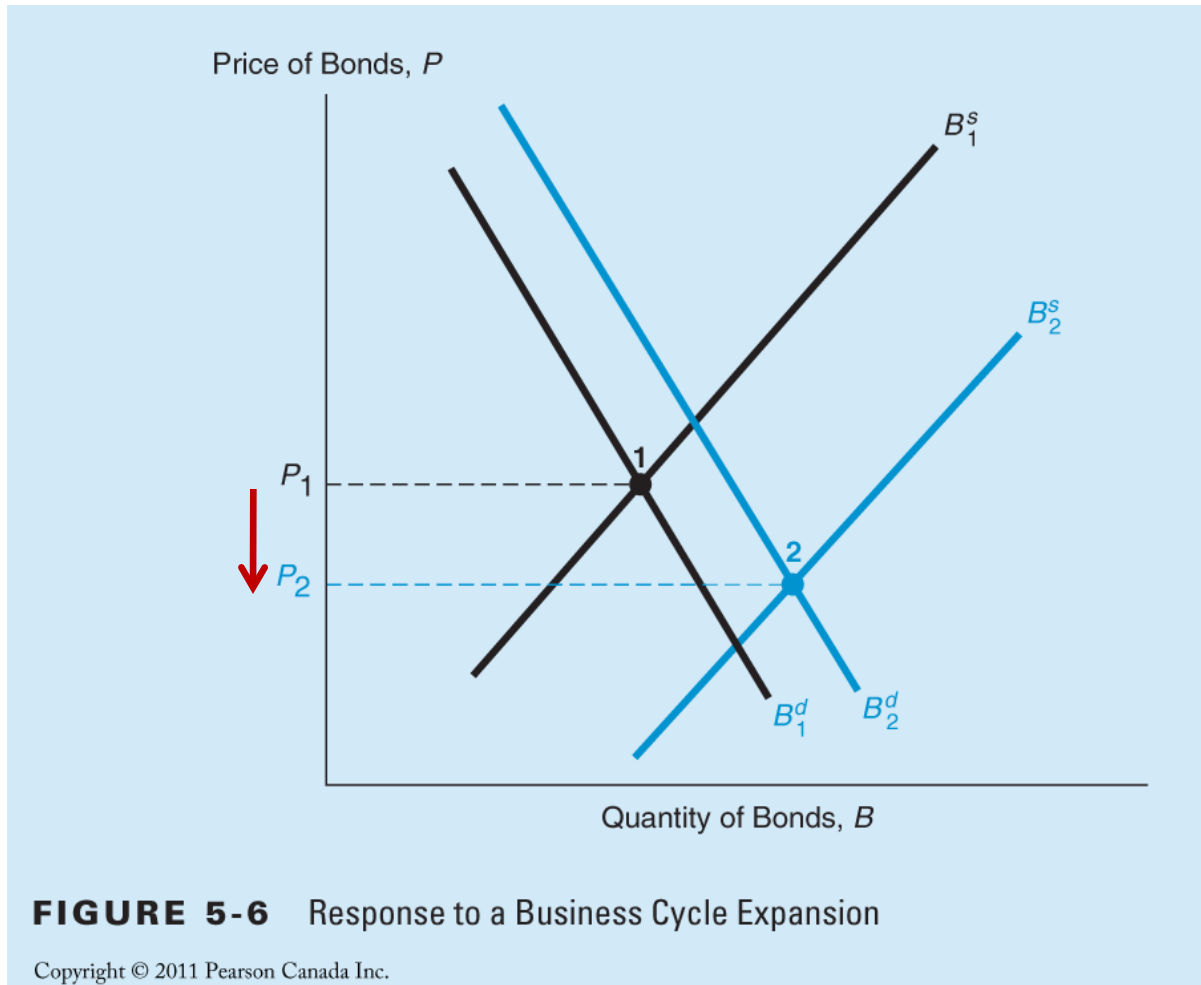
Expansion and Interest Rate-1

Given the Previous Slide, What will happen to interest rates?

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Expansion and Interest Rate-1

FIGURE 5-7 Business Cycles and Interest Rates (Three-Month Treasury Bills), 1962–2008

Shaded areas indicate periods of recession. The figure shows that interest rates rise during business cycle expansions and fall during contractions, which is what Figure 5-6 suggests would happen.

Source: Statistics Canada CANSIM II Series V122531.

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Bond Market and Lower saving Rate

What will you predict to happen in the Bond Market (and to interest rates) if saving rate falls?

Bond Market and Lower saving Rate-2

Price of Bonds, *P*

FIGURE 5-8   Response to a Lower Savings Rate

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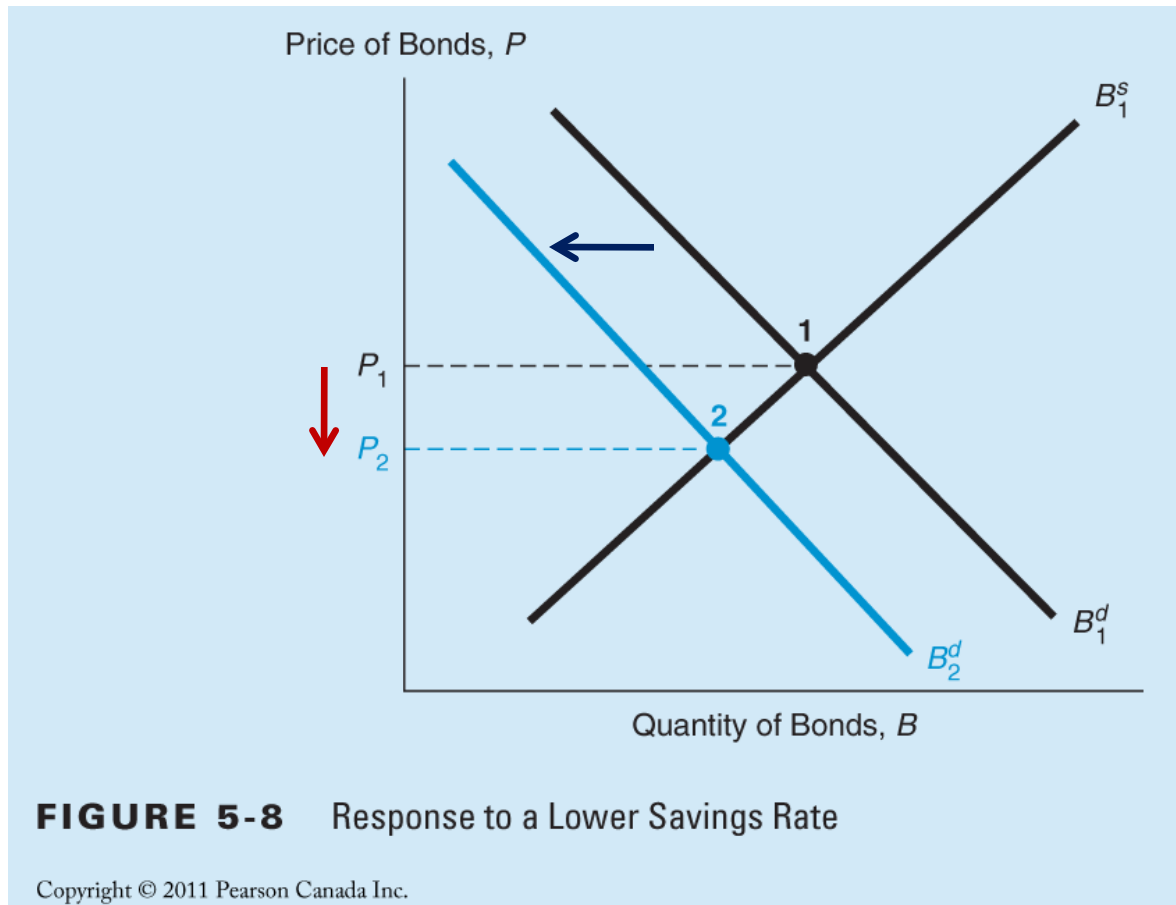
Bond-Market Model: Summary

	Profitability (Expansion)	**Expected Inflation**	Budget Deficit	**Fall in Risk/Rise in liquidity**
Demand **(B^d)**	**Shifts right**	**Shifts left**	-----	Shifts right
Supply **(B^s)**	**Shifts right**	**Shifts right**	Shifts right	----
Price	**Falls**	**Falls**	Falls	Rises
Interest rate	**Rises**	**Rises**	Rises	Falls

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A Model: Liquidity Preference Framework

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Liquidity Preference Framework–1

❖ Equilibrium interest rates are determined by the **supply and demand for money.**

❖ Two ways to hold wealth: money and bonds. Total wealth equals total amount of money and bonds.

$$B^s + M^s = B^d + M^d$$

❖ Rearrange terms:

$$B^s - B^d = M^d - M^s$$

If the bond market is in equilibrium ($B^s = B^d$) then the money market must also be in equilibrium ($M^d = M^s$): **Walras Law.**

Liquidity Preference Framework-2
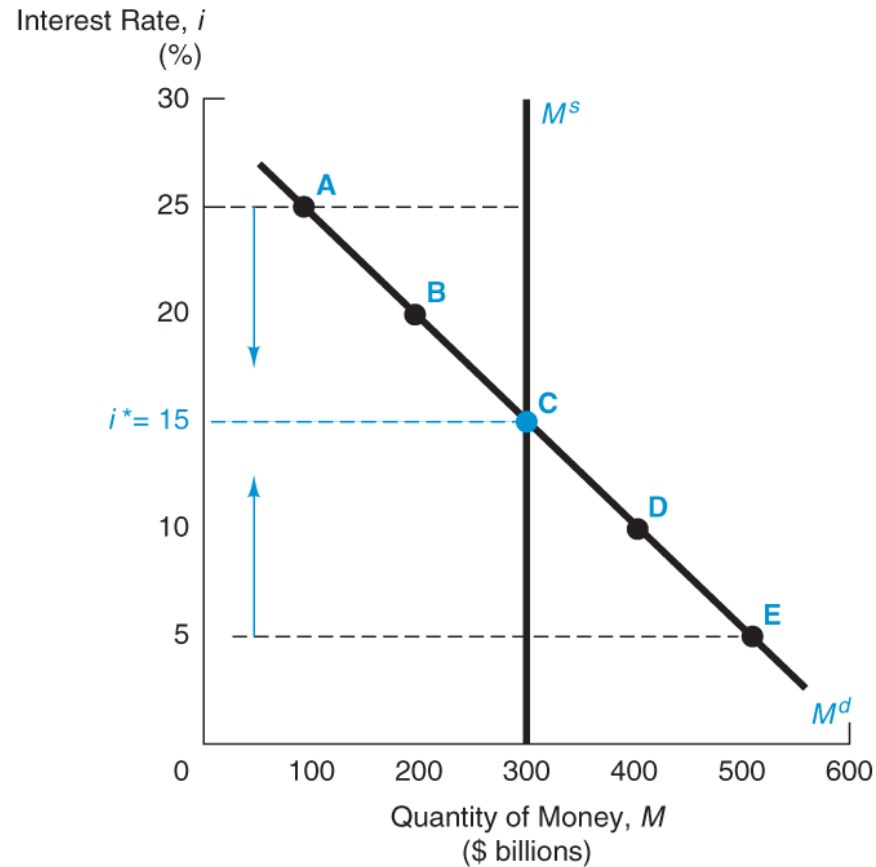
FIGURE 5-9 Equilibrium in the Market for Money

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Liquidity Preference Framework-2

Price of Money is assumed to be nominal interest rate.

Excess Supply

Excess Demand

FIGURE 5-9 Equilibrium in the Market for Money

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Liquidity Preference Framework-3

How does the Model Represented in the previous Slide makes sense?

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Shifts in Demand for Money-1

❖ **Income Effect:** a higher level of income causes the demand for money at each interest rate to increase and the demand curve to shift to the right.

❖ **Price-Level Effect**: a rise in the price level causes the demand for money at each interest rate to increase and the demand curve to shift to the right.

❖ Assume that the **supply of money** is controlled by **central banks**. An increase in the money supply engineered by the Bank of Canada will shift the supply curve for money to the right.

Shifts in Demand for Money-2

Propose a Scenario…

FIGURE 5-10 Response to a Change in Income or the Price Level

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Shifts in Money Supply

FIGURE 5-11   Response to a Change in the Money Supply

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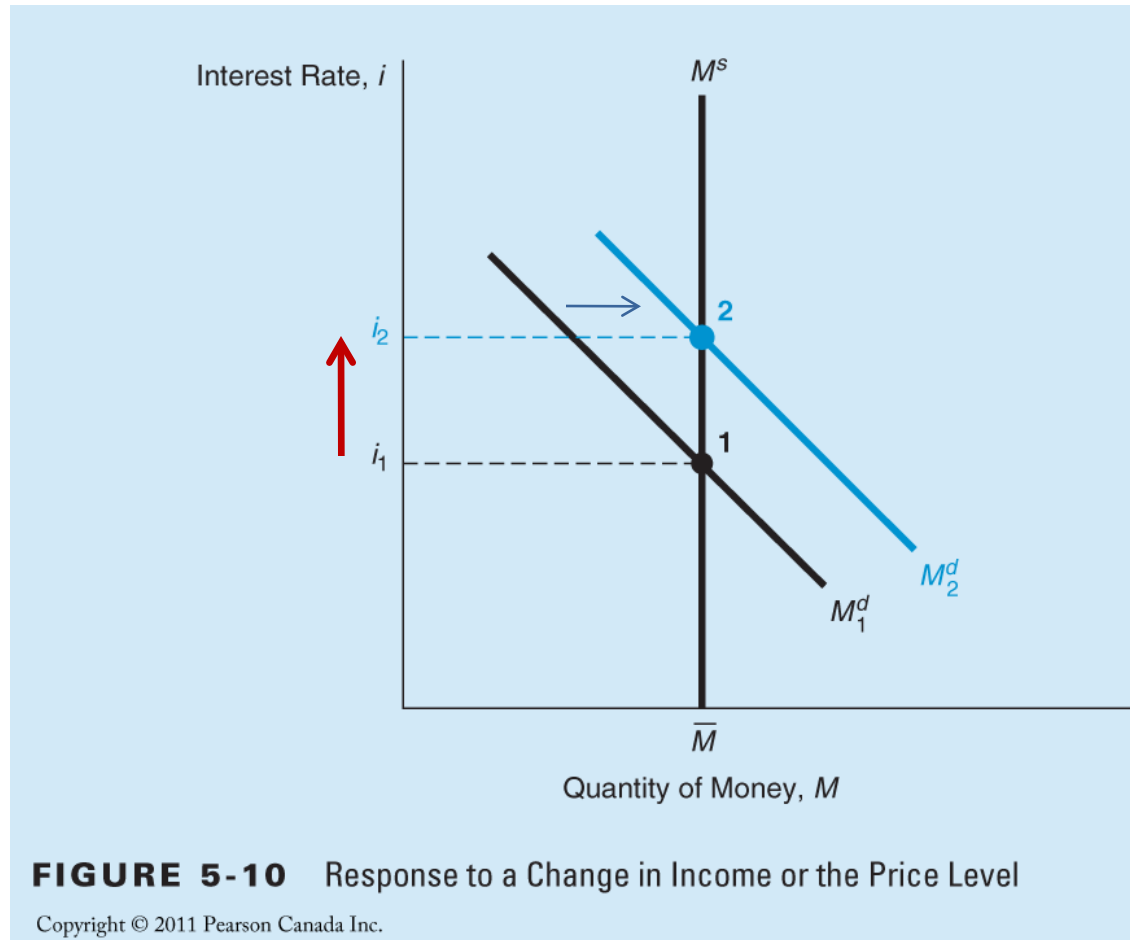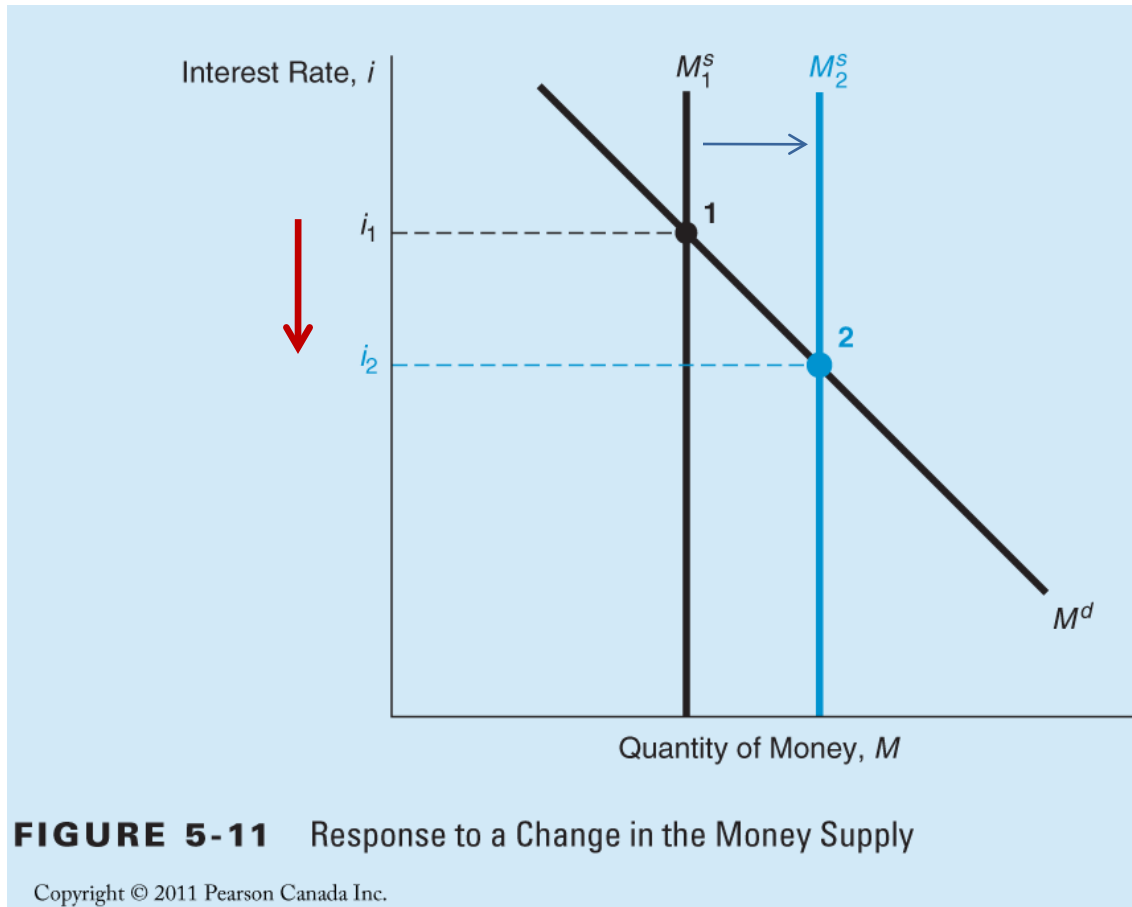
Money Market Summary

TABLE 5-4 Factors That Shift the Demand for and Supply of Money

Variable	Change in Variable	Change in Money Demand (M^d) or Supply (M^s) at Each Interest Rate	Change in Interest Rate	
Income	↑	M^d↑	↑	
Price level	↑	M^d↑	↑	
Money supply	↑	M^s↑	↓	
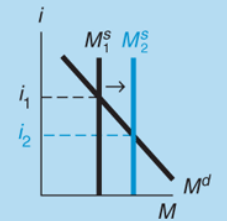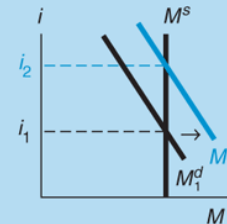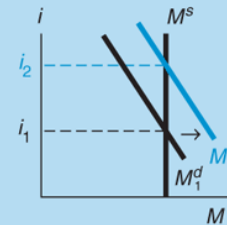
Note: Only increases (↑) in the variables are shown. The effect of decreases in the variables on the change in demand would be the opposite of those indicated in the remaining columns.

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Application to Monetary Policy

Money Supply Growth and Interest Rates-1

- Suppose Interest rates are too high impeding productive investments in an economy.

- Central banks/ governments can devise policies to bring the interest rate down.

- In Bond-Market Model, it can be done by restricting Supply of Bonds;

- In liquidity Preference Model, it can be done using Money Supply.

Money Supply and Interest Rates in Long-run

- **Immediate effect** of an increase in the money supply is a fall in the interest rate in response to a higher level of money supply

- **Price-Level effect** of an increase in the money supply is **a rise in interest rates** in response to the rise in the price level (through demand shift).

- The **expected-inflation** effect of an increase in the money supply is a rise in interest rates in response to the rise in the expected inflation rate (through demand shift).

Money Supply Growth and Interest Rates-2

Phase 1:

Liquidity Effect
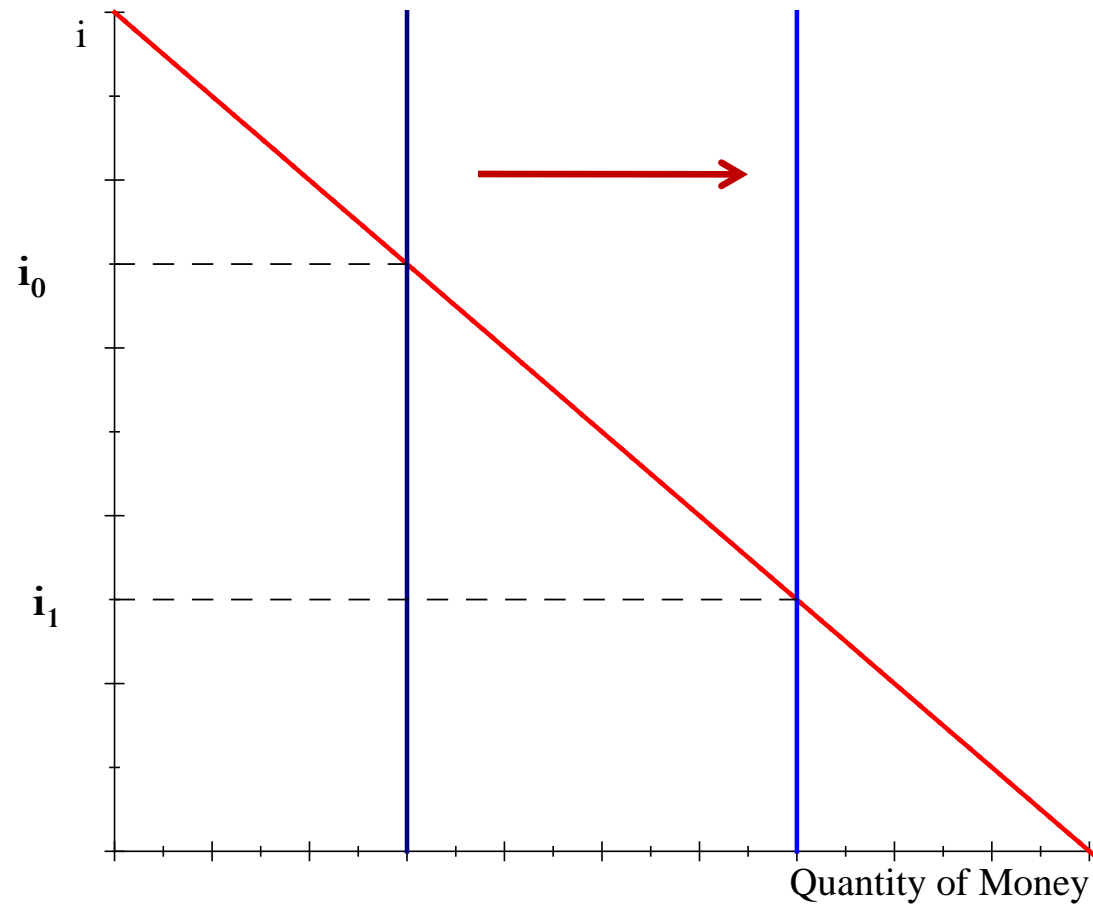
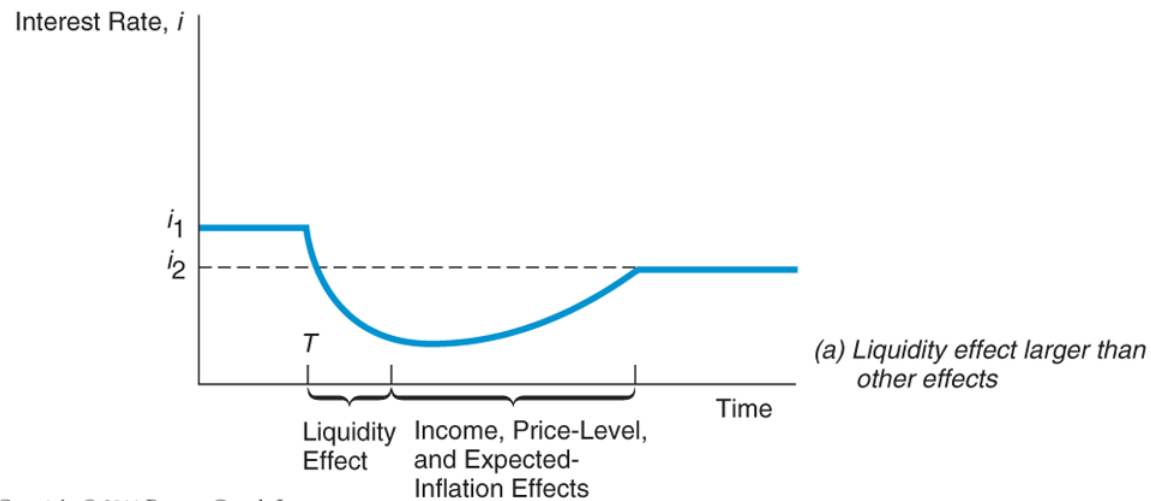# Money Supply Growth and Interest Rates-2

Phase 2:
Price Level Effect

ECON3307.2: Economics of Money and Banking
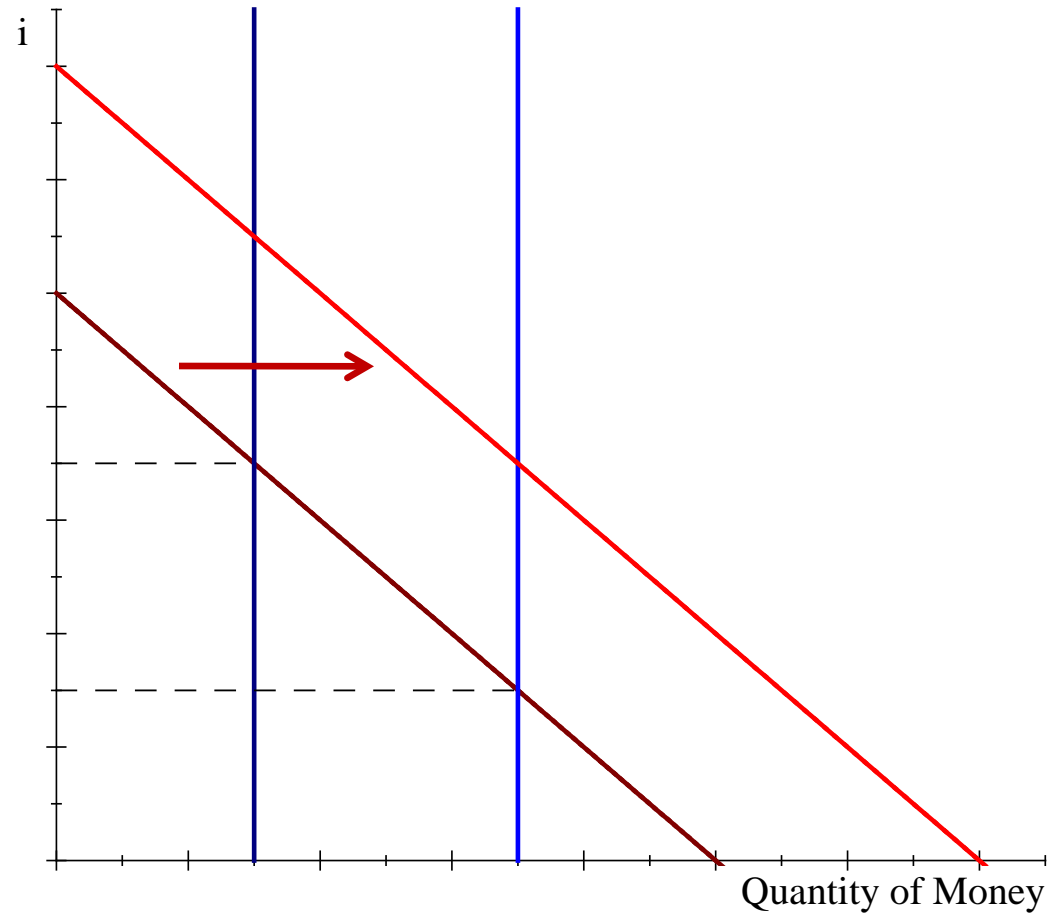
Money Supply Growth and Interest Rates-2

Phase 2-1:
Price Level Effect

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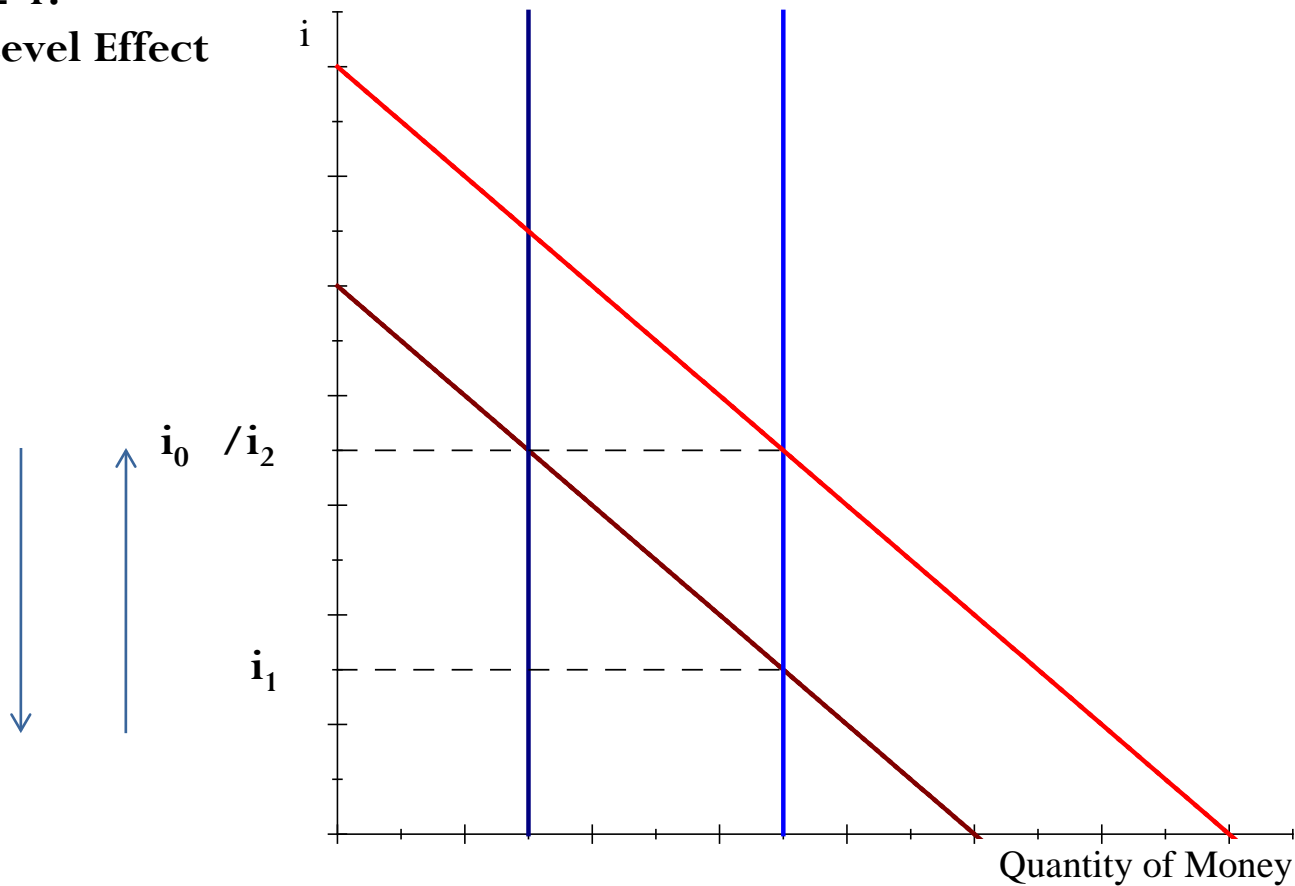
Money Supply Growth and Interest Rates-2

Phase 2-2:
Smaller Price Level Effect

Money Supply and Interest Rates-1

Interest Rate, i

i_1

i_2

T

Liquidity Effect

Income, Price-Level, and Expected-Inflation Effects

Time
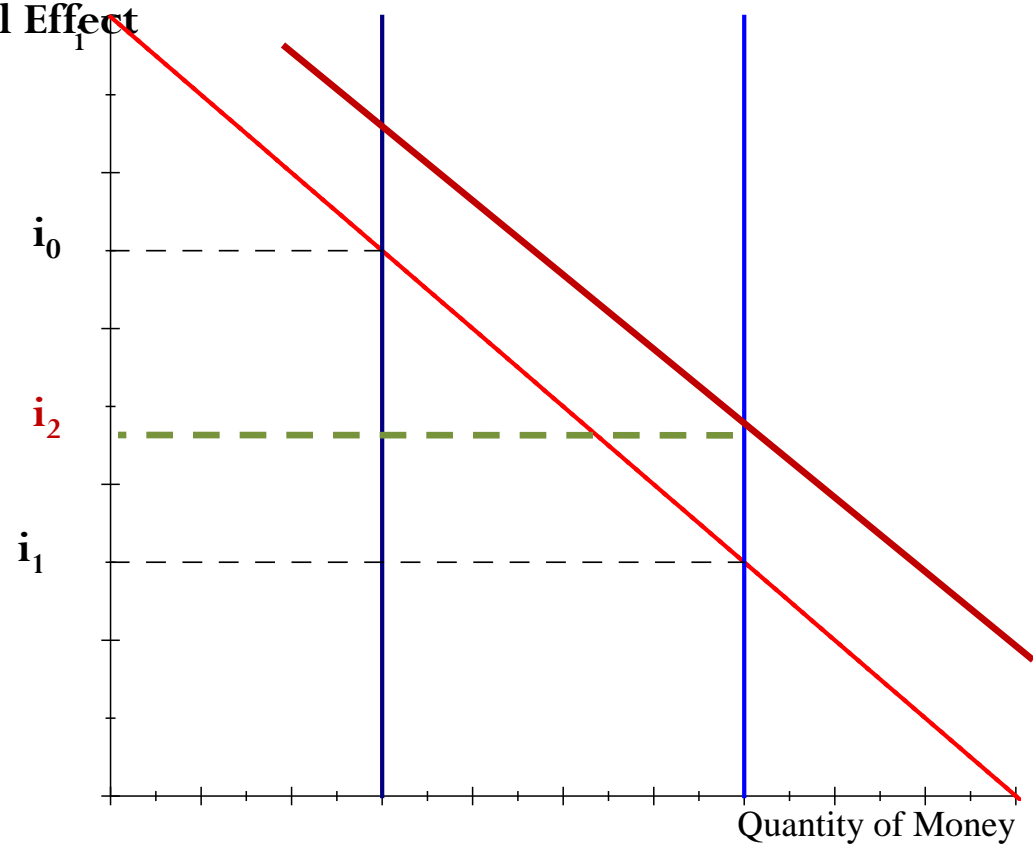
(a) Liquidity effect larger than other effects

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Money Supply Growth and Interest Rates-2

Phase 2-2:
Larger Price Level Effect

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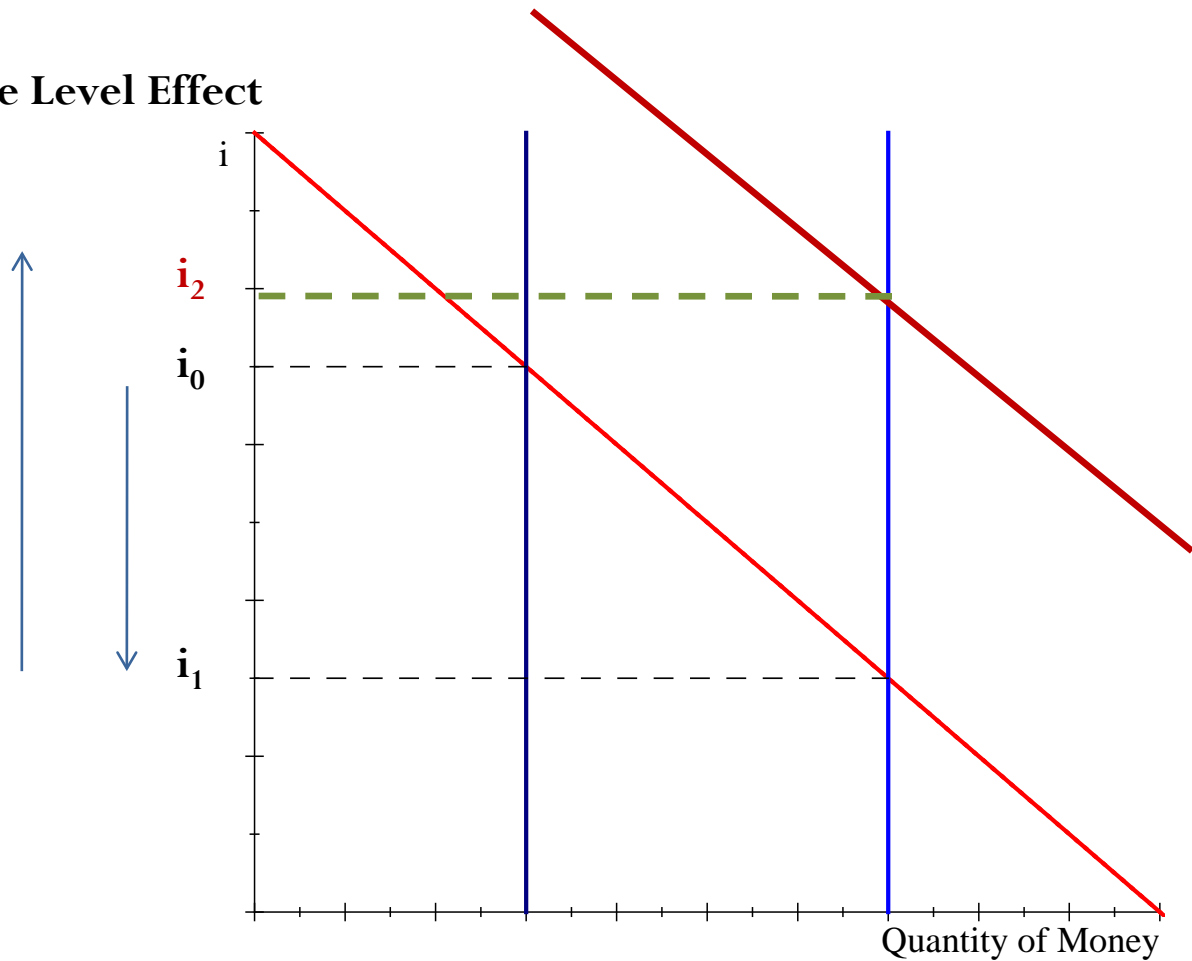
Money Supply and Interest Rates-2
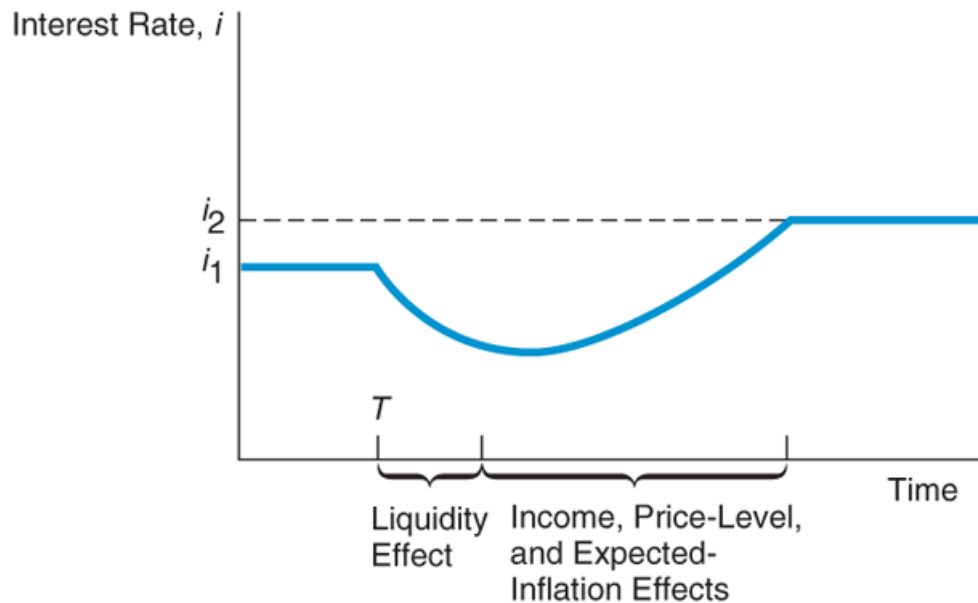
(b) Liquidity effect smaller than other effects and slow adjustment of expected inflation

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Money Supply Growth and Interest Rates-2

Phase 2-2:
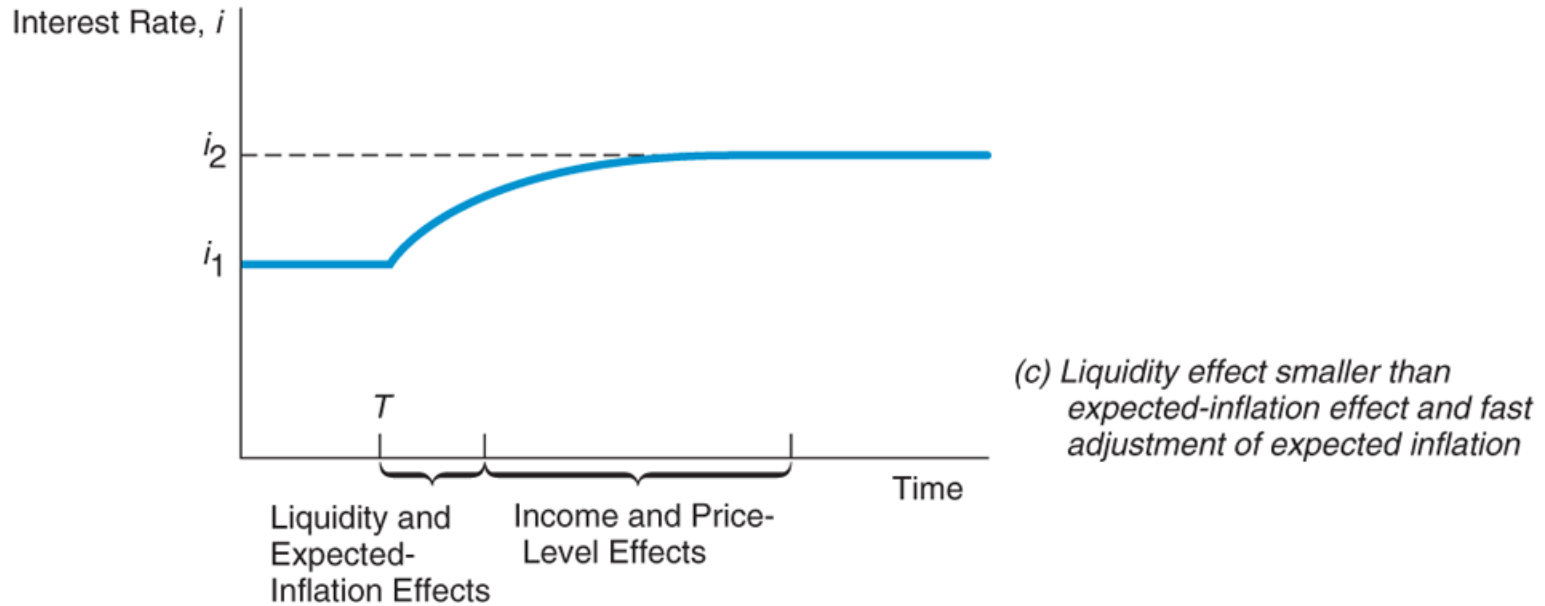**Larger Price Level Effect**
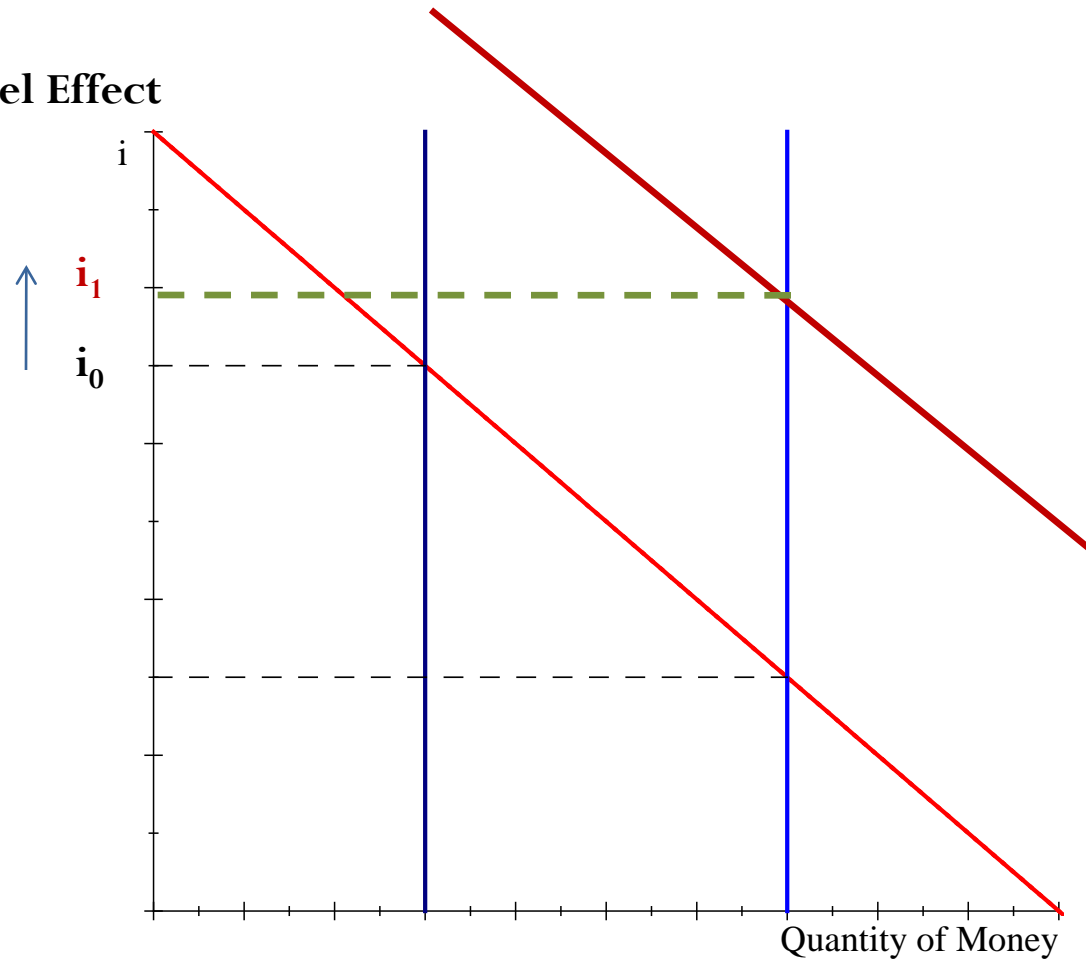
Money Supply and Interest Rates-2

FIGURE 5-12 Response over Time to an Increase in Money Supply Growth

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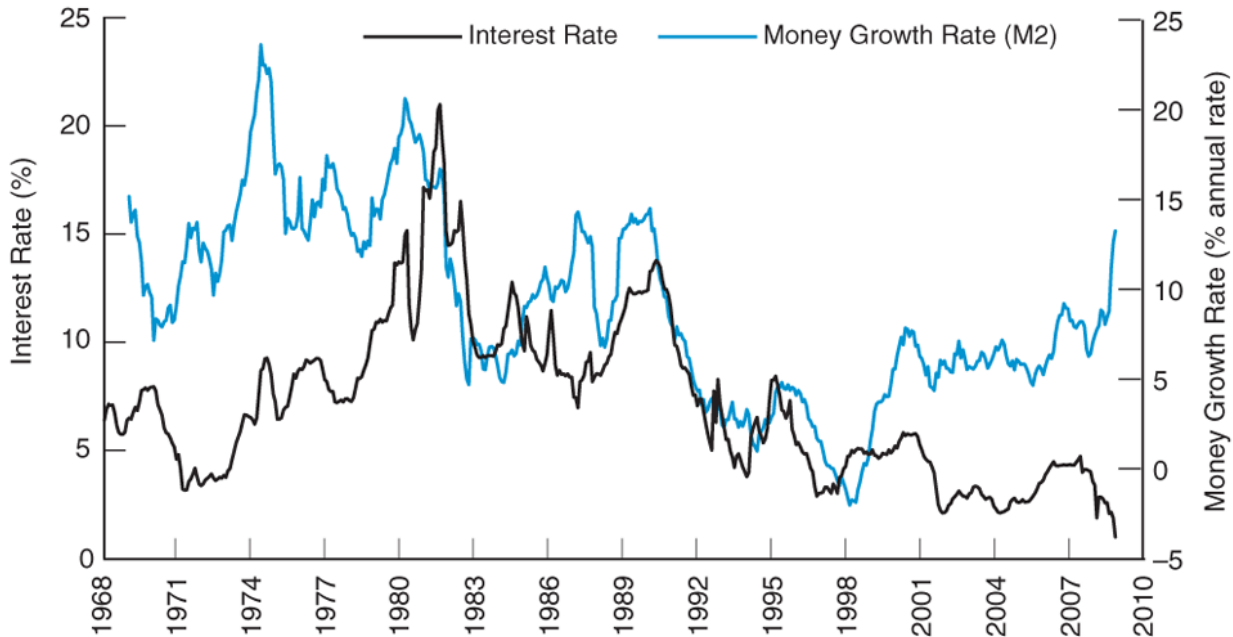
Money Growth and Interest Rates

FIGURE 5-13 Money Growth (M2, Annual Rate) and Interest Rates (Three-Month Treasury Bills), 1968–2008

Source: Statistics Canada CANSIM II Series V122531 and V41552796.

Money-Market Model: Summary

	Expected Inflation	Liquidity
Demand (M^d)	Shifts right	Shifts right (with a lag)
Supply (M^s)	-----	Shifts right
Interest rate	Rises	Falls/ Rises

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Robert Lucas, Jr. (1937) American economist, Nobel Prize in Economics in 1995

The Risk and Term Structure of Interest Rates

References and Goals

❖ **The Economics of Money, Banking and Financial Markets**

Fourth Canadian Edition by F. Mishkin and A. Serletis, 4th Canadian Edition.

❖**Chapter 6**:

The Risk and Term Structure of Interest Rates

Behavioral Finance

- The central issue in behavioral finance is explaining why market participants make systematic errors. Such errors affect prices and returns, creating market inefficiencies.

- It also investigates how other participants arbitrage such market inefficiencies.

Highly Recommended!

http://www.youtube.com/watch?v=LGK6Lt7jOSU
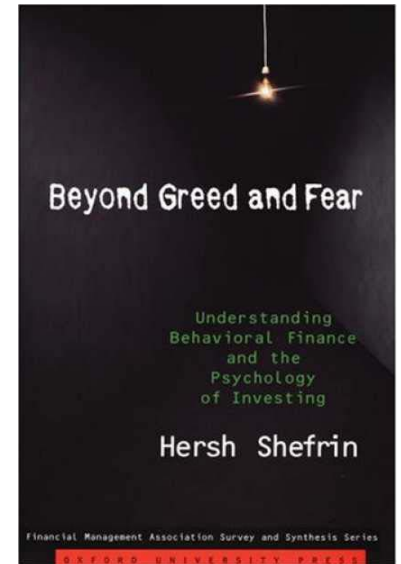
Risk and Term Structure of Interest Rates

❖**The risk structure** of interest rates looks at bonds with the same term to maturity and different interest rates.

❖**The term structure** of interest rates looks at the **relationship among interest rates on bonds with different terms to maturity**.

The risk structure of interest rates

❖ **Default risk:** occurs when the issuer of the bond is unable or unwilling to make interest payments or pay off the face value. Canadian government bonds are considered default free.

❖ **Risk premium**: the spread between the interest rates on bonds with default risk and bonds without default risk.

● There are also risks of fluctuations is the rate of return due to the changes in the market price of bonds.

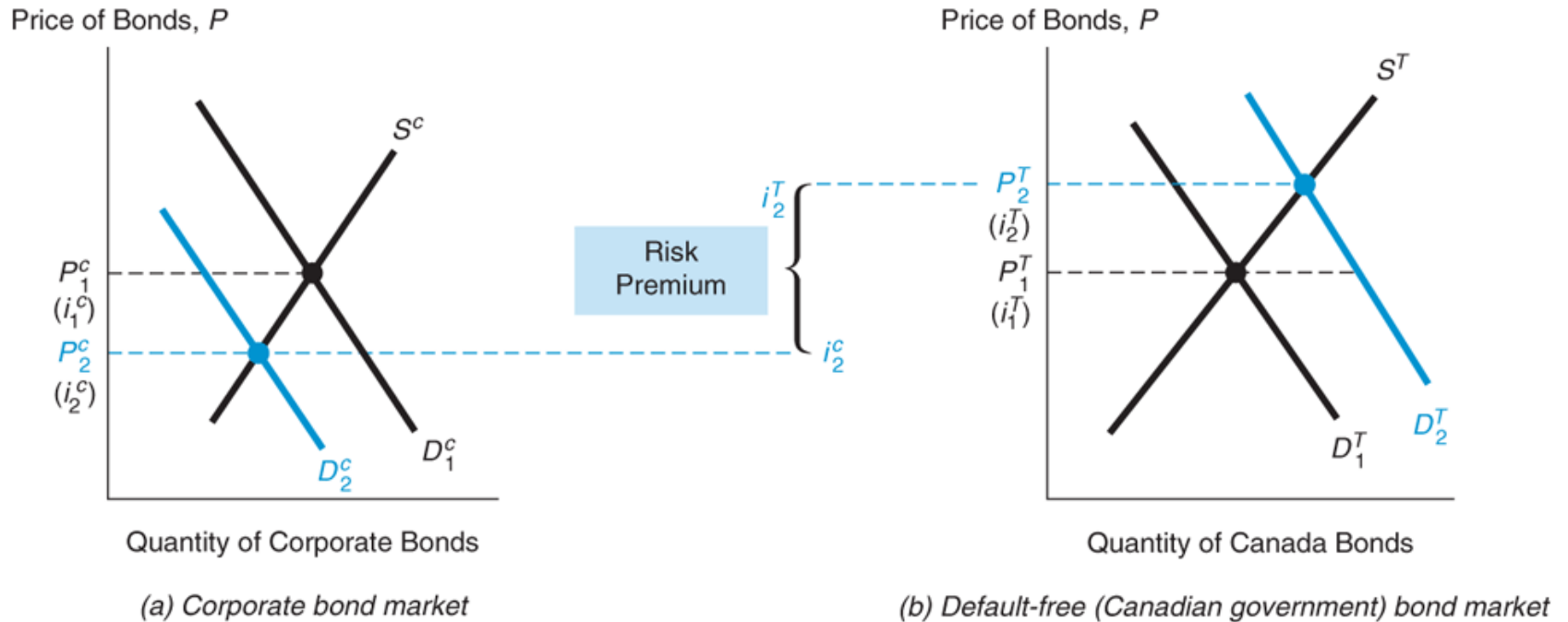# Response to an Increase in Default Risk on Corporate Bonds

Price of Bonds, P

S^c

P_1^c
(i_1^c)

P_2^c
(i_2^c)

i_2^T

Risk Premium

i_2^c

D_2^c

D_1^c

Quantity of Corporate Bonds

(a) Corporate bond market

Price of Bonds, P

S^T

P_2^T
(i_2^T)

P_1^T
(i_1^T)

D_1^T

D_2^T

Quantity of Canada Bonds

(b) Default-free (Canadian government) bond market

FIGURE 6-2 Response to an Increase in Default Risk on Corporate Bonds

6

Credit Ratings Agencies

Rating	Definitions
TABLE 6-1	Bond Ratings by Standard & Poor's and DBRS
Rating	**Definitions**
AAA	Highest quality
AA	Superior quality
A	Satisfactory quality
BBB	Adequate quality
BB	Speculative
B	Highly speculative
CCC, CC, C	Very highly speculative
D	In default

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Corporate-Canada Bond Spread 1978 - 2005

FIGURE 6-3   Corporates–Canadas Spread, 1978–2008

Source: Statistics Canada CANSIM II Series V122518 and V122544.

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Other Factors interacting with the Risk Structure

❖ **Liquidity:** how quickly and cheaply a bond can be converted to cash.

❖ **Income tax considerations:** in some countries certain government bonds are not taxable.

- In Canada coupon payments on fixed-income securities are taxed as ordinary income.

- In the U.S. interest payments on municipal bonds are exempt from federal income tax.

Term Structure of Interest Rates

- Bonds with identical risk, liquidity, and tax characteristics may have **different interest rates because the time remaining to maturity is different.**

- **Yield curve**: a plot of the yield on bonds with differing terms to maturity but the same risk, liquidity and tax considerations

    - Upward-sloping ⇨ long-term rates are above short-term rates

    - Flat ⇨ short- and long-term rates are the same

    - Inverted: long-term rates are below short-term rates

Empirical Facts To Be Explained by the Term Structure

1. Interest rates on bonds of different maturities **move together** over time.

2. When **short-term interest rates are low**, yield curves are more likely to have an **upward slope**; when short-term rates are increasing, yield curves are more likely to be inverted u-shaped.

3. Almost always the return is increasing with the length of the term-structure.

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Yield-Curve-1

❖ In Economics (and finance), the **yield curve** is the relation between the interest rate (or cost of borrowing) and the time to maturity of the debt for a given borrower in a given currency.

❖ For example, the U.S. dollar interest rates paid on U.S. Treasury securities for various maturities are plotted on a graph such as the one on the next slide, informally called "the yield curve." And the UK one on the slide after.

❖ More formal mathematical descriptions of this relation are often called the **term structure of interest rates**.

Yield-Curve-2

Yield curve as at 9th February 2005 for USD

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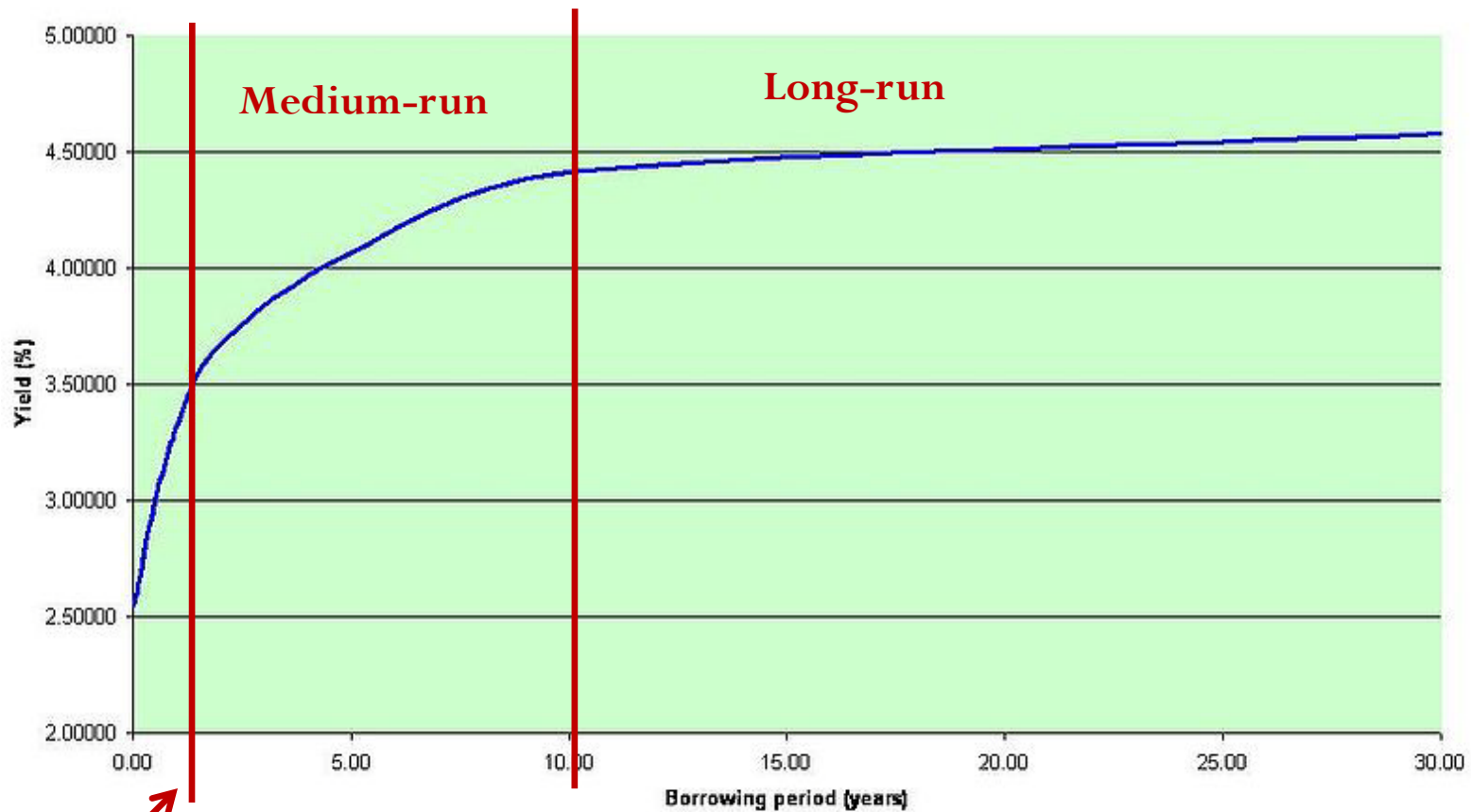
Yield-Curve-3

Yield curve as at 9th February 2005 for GBP

Medium-run   **Long-run**

Short-run

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Three Theories to Explain the Three Facts

1. **Expectations theory** explains the first two facts but not the third.

2. **Segmented markets** theory explains fact three but not the first two.

3. **Liquidity premium theory** combines the two theories to explain all three facts.

Expectations Theory: Assumptions-1

- The interest rate on a long-term bond will equal an average of the short-term interest rates that people expect to occur over the life of the long-term bond.

- Buyers of bonds do not prefer bonds of one maturity over another; they will not hold any quantity of a bond if its expected return is less than that of another bond with a different maturity.

- Bonds like these are said to be perfect substitutes.

Expectations Theory: Assumptions-2

- **No arbitrage:**

- as economic agents (investors) are **rational**

and

- **have no preferences over the maturity terms** of bonds as **markets are efficient**

then the return from $1 investment in any term-structure must be equal.

Expectations Theory—Example

- Let the current rate on one-year bond be 6%.

- You expect the interest rate on a one-year bond to be 8% next year.

- Then the expected return for buying two one-year bonds averages (6% + 8%)/2 = 7%.

- The interest rate on a two-year bond must be 7% for you to be willing to purchase it: **No arbitrage.**

Expectations Theory, in General-1

- For an investment of $1

- i_t = today's interest rate on a **one-period** bond

- i^e_{t+1} = interest rate on a one-period bond expected for next period

- i_{2t} = today's interest rate on the two-period bond

Expectations Theory, in General-2

Expected return over the two periods from investing $1 in the two-period bond and holding it for the two periods:

$$(1 + i_{2t})(1 + i_{2t}) - 1$$

$$= 1 + 2i_{2t} + (i_{2t})^2 - 1$$

$$= 2i_{2t} + (i_{2t})^2$$

Since $(i_{2t})^2$ is very small the expected return for holding the two - period for two perids is $2i_{2t}$

Expectations Theory, in General-3

If one-period bonds are bought with the $1 investment

$$(1+i_t)(1+i_{t+1}^e)-1$$

$$=1+i_t+i_{t+1}^e+i_t(i_{t+1}^e)-1$$

$$i_t+i_{t+1}^e+i_t(i_{t+1}^e)$$

$i_t(i_{t+1}^e)$ is extremely small

Simplifying we get

$$i_t+i_{t+1}^e$$

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Expectations Theory, in General-4

Both bond will be held only if the expected returns are equal.

$$2i_{2t} = i_t + i^e_{t+1}$$

$$i_{2t} = \frac{i_t + i^e_{t+1}}{2}$$

The two-period rate must equal the average of the two one-period rates. For bonds with longer maturities:

$$i_{nt} = \frac{i_t + i^e_{t+1} + i^e_{t+2} + \ldots + i^e_{t+(n-1)}}{n}$$

The n-period interest rate equals the average of the one-period interest rates expected to occur over the n-period life of the bond.

Expectations Theory: Implications

- Explains why interest rates on bonds with different **maturities move together over time** (fact 1). ✓

- Explains why yield curves tend to slope down when short-term rates **are (high and) increasing** (fact 2). ✓

- Cannot explain why yield curves usually slope upward; i.e. the return in the market ends up being higher for the longer term bonds: it contradicts the *No Arbitrage* assumption (fact 3). ✗

Expectations Theory: Fact 1

- Explains why interest rates on bonds with different maturities move together over time (fact 1).

- It means that if i_t goes up then i_{nt} has to go up as well.

- It is easy to see this below:

$$i_{nt} = \frac{i_t + i^e_{t+1} + i^e_{t+2} + \dots + i^e_{t+(n-1)}}{n}$$

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Term Structure of Interest Rates – Fact 1
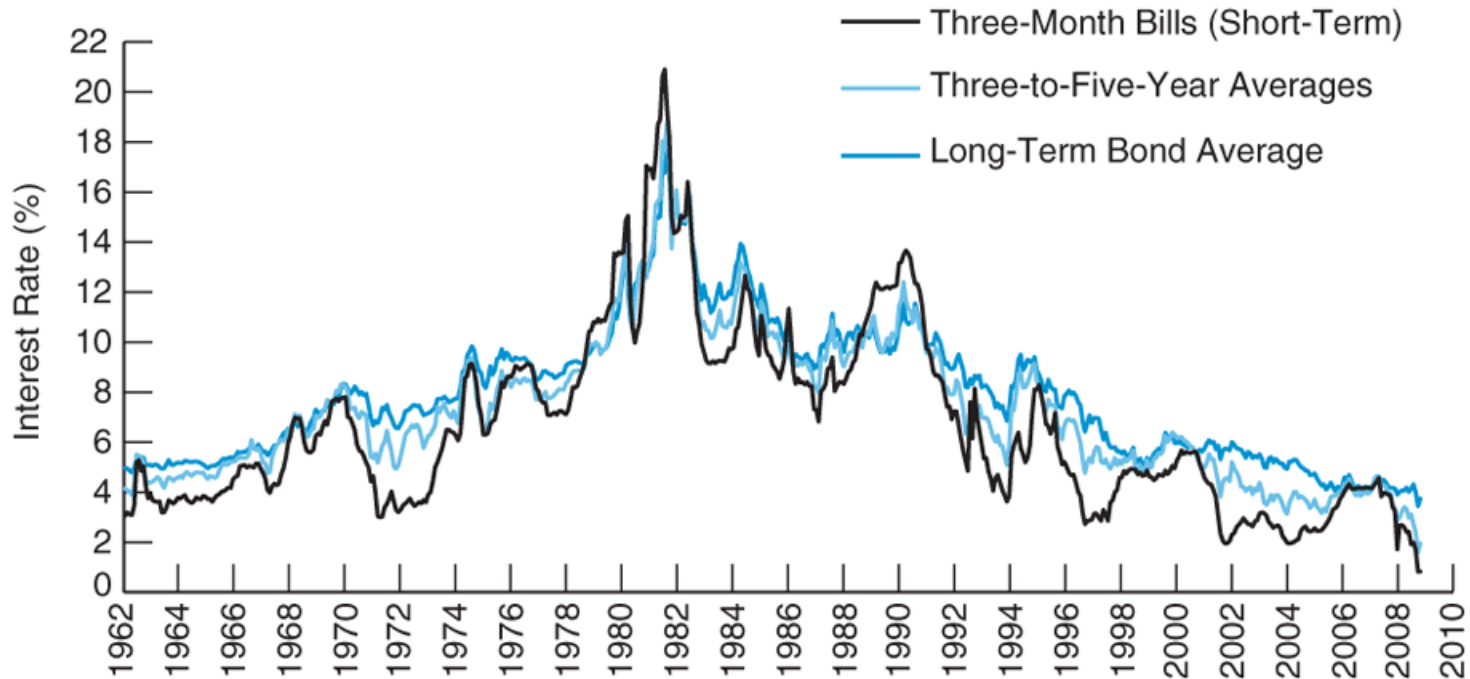
FIGURE 6-4 Movements over Time of Interest Rates on Government of Canada Bonds with Different Maturities, 1962–2008

Source: Statistics Canada CANSIM II Series V122531, V122485, and V122487.

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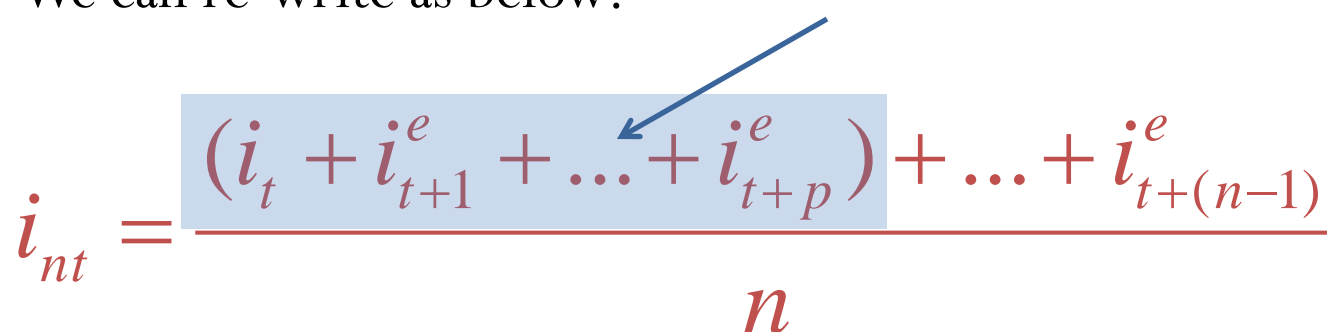
Expectations Theory: Fact 2

- Recall:

$$i_{nt} = \frac{i_t + i_{t+1}^e + i_{t+2}^e + \ldots + i_{t+(n-1)}^e}{n}$$

- We can re-write as below:

Short-run rates

$$i_{nt} = \frac{(i_t + i_{t+1}^e + \ldots + i_{t+p}^e) + \ldots + i_{t+(n-1)}^e}{n}$$

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Expectations Theory: Fact 2

- Explains why if short run interest rates are increasing then starting the medium-run bonds, the return starts falling.

- Suppose i_t till i_{t+p} are short-run interest rates an they are increasing:

- $i_t < i_{t+1} < ... < i_{t+p}$

- Afterwards, medium-run rates start which are the average of the previous ones.

$$i_{t+p+1} = \frac{i_t + i_{t+1} + \cdots + i_{t+p}}{p + 1}$$

Medium-run

Expectations Theory: Fact 2

- Then it is easy to see that:

$$i_{t+p+1} < i_{t+p}$$

- Because, medium-run rates are the average of the short-run returns (average returns on the previous terms).

Example

Test	Mark
1	50
2	60
3	70
4	80
Average	**65**

Increasing

Average is always below the last test's mark, provided that the marks are increasing.

About Assignment 2, Part A

- Orange County Bankruptcy of 1994 is the biggest public bankruptcies of the history of the US.

- Its culprit being wrong investment strategies, in the article by Hersh Shefrin, it is argued that it can be attributed to a number of behavioural biases that set theoretical predictions at odds with empirical facts.

- One of such basis relates to the *Failure of Expectation Hypothesis*.

About Assignment 2, Part A

Chapter **14**

Fixed Income Securities: The Full Measure of Behavioral Phenomena

- the theoretical issues that underlie the expectations hypothesis of the term structure of interest rates
- the evidence suggesting that the expectations hypothesis fails
- why underreaction to changes in inflation, stemming from anchoring and adjustment, interfere with the expectations hypothesis

About Assignment 2, Part A

- In your 1 page commentary in the assignment, you need to:

(i) Read, understand and summarise in the case as relates to Expectation Hypothesis and its failure.

(ii) Your comments on it: what do you think about Expectation Hypothesis and the reasons provided in the text for its failure.

Phillips Curve: Notes & Sample Questions

Instructor: Dr. Maryam Dilmaghani

The Short-run Phillips curve (inflation-unemployment trade-off) for Yutopia is given by the equation below:

$$\pi_t = Z_t - \alpha u_t$$

The Long-run Phillips curve is the blue vertical line. It means that the Inflation targeted and achieved by monetary policy will not affect the natural rate of unemployment in the long-run.
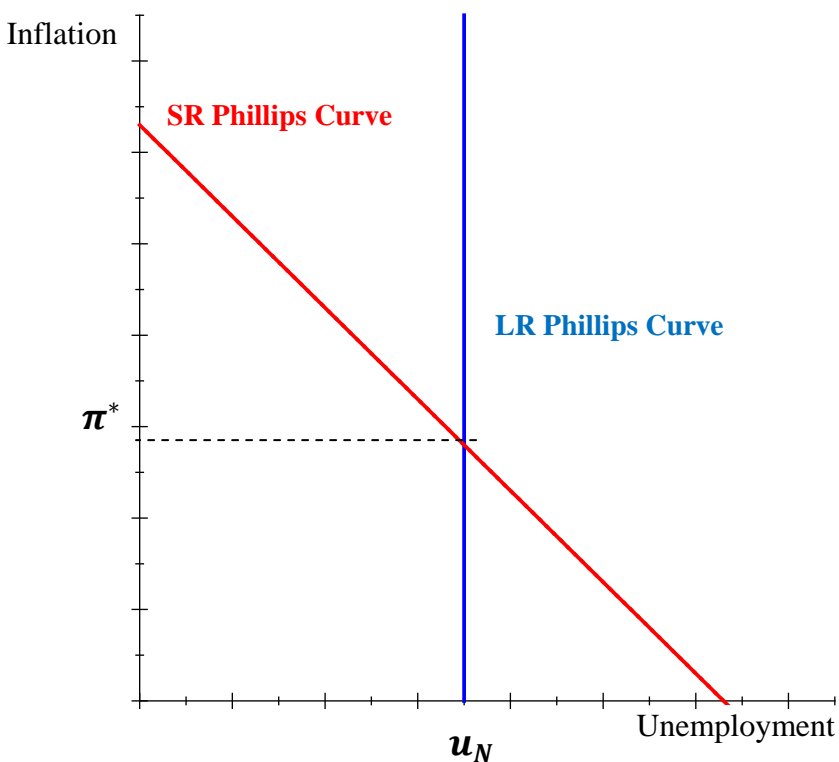
In the long run the inflation rate will be π^* and unemployment rate u_N: The intersection of SR and LR Phillips curve.

In the short-run, the inflation targeted by Monterey policy and the short-run Phillips curve will determined the unemployment rate. BUT, as soon as a monetary intervention is made, SR Phillips curve starts shifting, to the right (left) for expansion (contraction). It is shown in series of figures in the next pages.

Phillips Curve and Monetary Policy

1.   Monetary Expansion: To stimulate the economy
1.1.In the Short-run

$$M^S \uparrow : i \downarrow (i_{or}^T \downarrow) \Rightarrow \begin{cases} Loans \uparrow \Rightarrow C \uparrow: Excess \ Demand \Rightarrow Prices \uparrow \Rightarrow Inflation \uparrow \\ Loans \uparrow \Rightarrow Investment \uparrow \Rightarrow Jobs \uparrow \Rightarrow Unemployment \downarrow \end{cases}$$

1.2. In the Long-run

In the long-run however, usually the inflation will reduce real rate of return to investments and they gradually fall (realistically not at their pre-intervention level, somewhere in between).
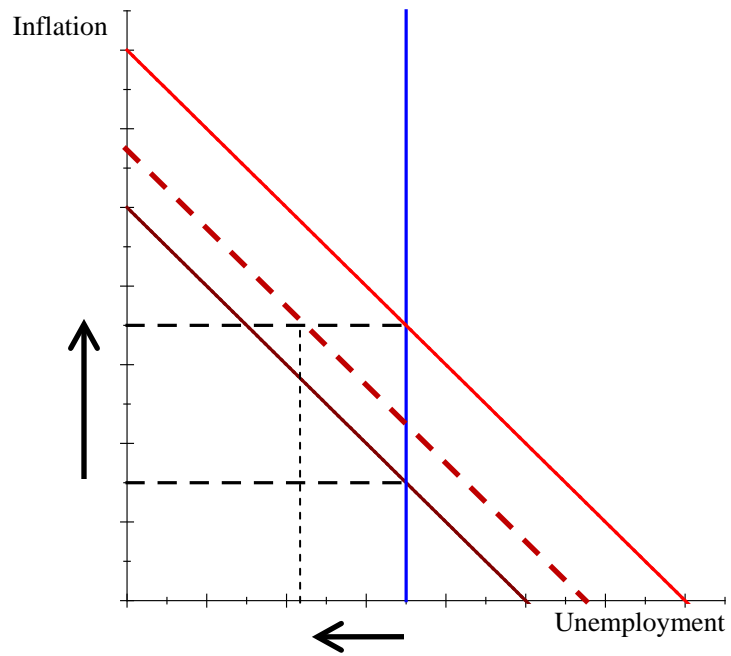
Mean while, the investment made through the monetary expansion increases both jobs and output and this partially neutralises Excess Demand hence inflation.

In sum, it is realistic that Monetary Policy has some impacts on Real Sectors. Not as much as monetarists believe and not at little as Real Business Cycles macroeconomists believe.
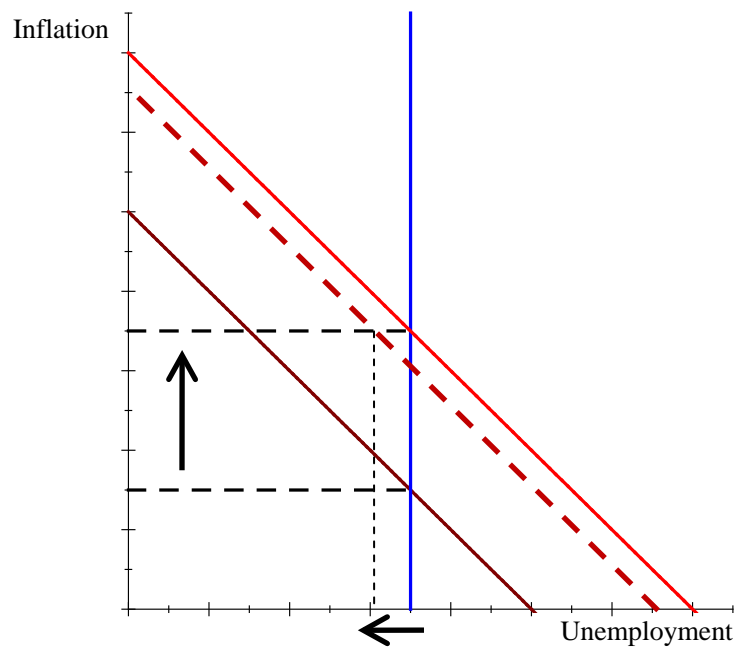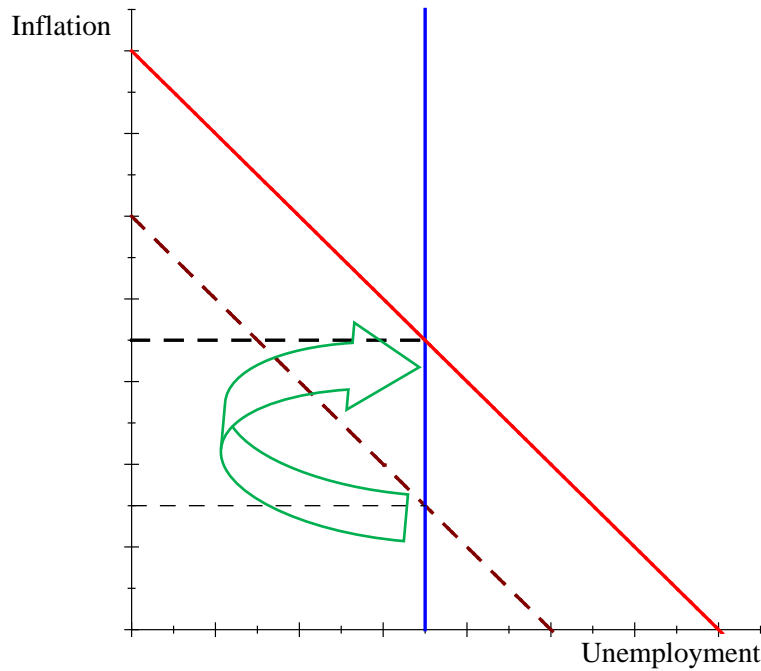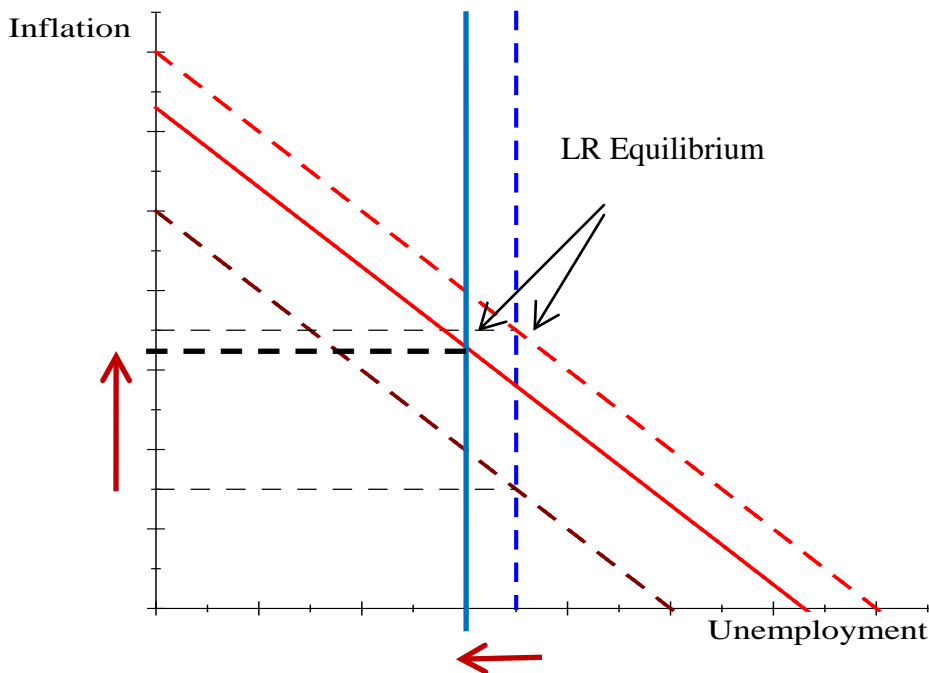
(1)
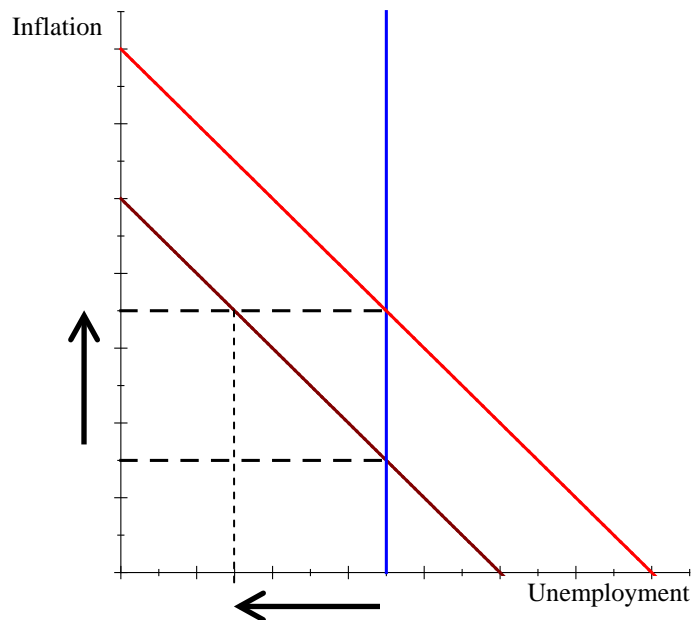
(2)

(3)

(4)

More Realist Long-run Impact of Monetary Expansion & Phillips Curve
Long-run Phillips curve shifts left (Solid blue) Short-run Phillips Curve does not shift all the way to the right. Hence with a higher level of Equilibrium Inflation, the natural level of unemployment will be lower.

Do the case of contraction as an exercise!