Lecture 7
Stabilizing the Economy: Monetary Policy (Part I)

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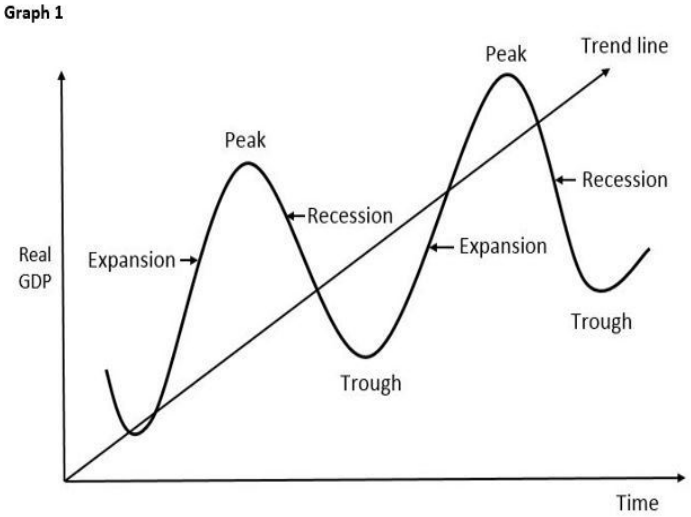
RECAP



- Economy experiences short-term fluctuations
- Use of macroeconomic policies to counter recession and inflation
- **Fiscal** policy
  - G, T
- **Monetary** policy

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Monetary policy

- Monetary policy is about MONEY
- Quantity of money in the economy affects interest rate, and interest rate affects GDP and inflation
- How does money affect interest rate?
  - Money market
    - Supply of money
    - Demand for money
- How does central bank control money supply?
- How does interest rate affect GDP and inflation?

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Lecture Outline (Part 1)

- What is money?
  - How to measure quantity of money?
- Money supply
  - Jointly determined by actions of:
    - Commercial banks
    - Depositors
    - Central bank
      - How does central bank control money supply?
- Money supply and inflation in the long run

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money?

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This is not **money**

7

This is **money**

8

This is **money**

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This is **money**

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What is **money?**

- Money is any asset that can serve the following functions:

1. **Medium of exchange**
   - An asset used in making purchases
2. **Unit of account**
   - A standard unit that provides a consistent way of quoting prices
3. **Store of value**
   - An asset that serves as a means of holding wealth

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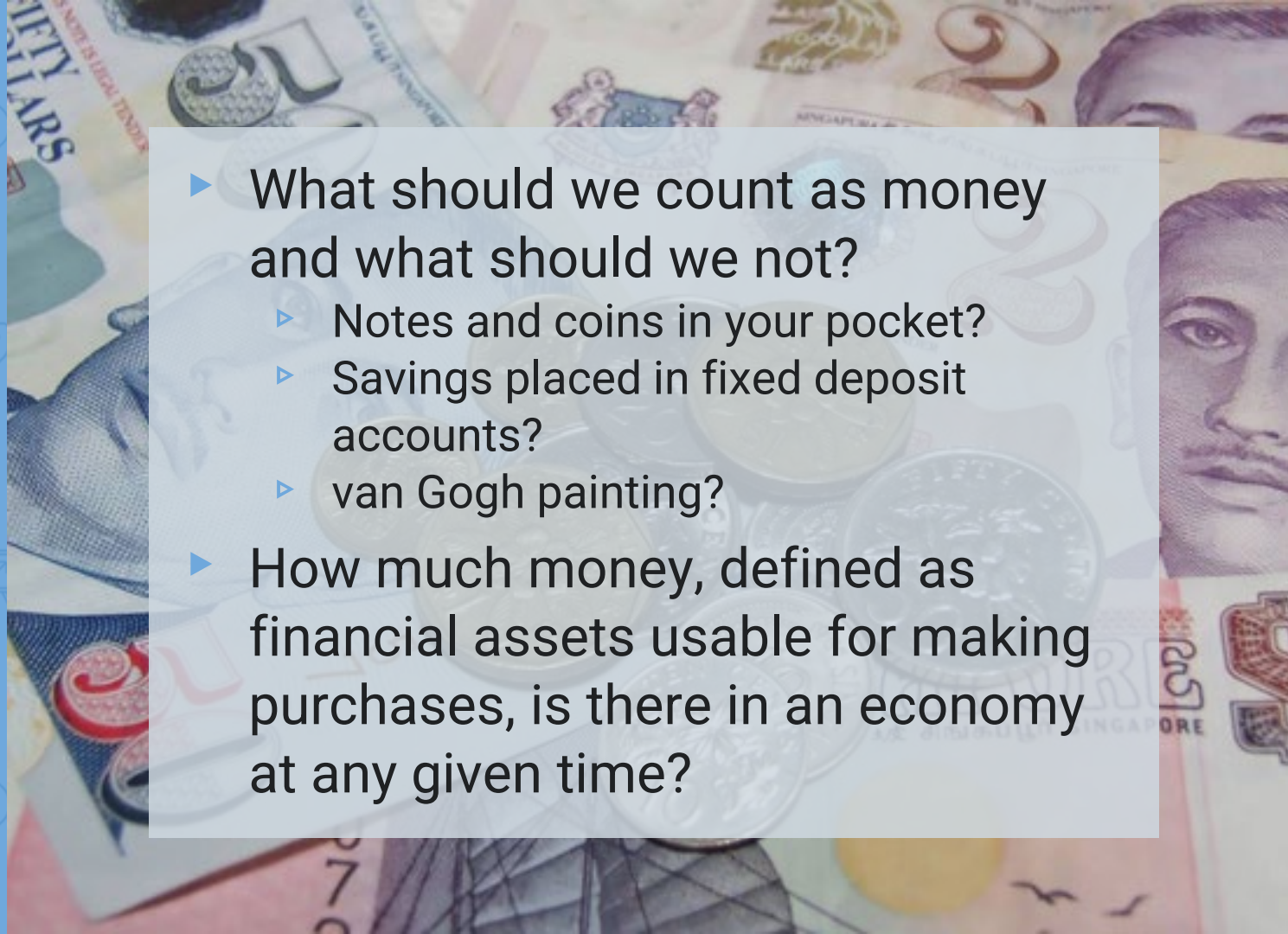
Measuring Money Supply



- What should we count as money and what should we not?
  - Notes and coins in your pocket?
  - Savings placed in fixed deposit accounts?
  - van Gogh painting?
- How much money, defined as financial assets usable for making purchases, is there in an economy at any given time?

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Measuring Money Supply

- **M1**
  - Narrow definition of money supply
  - A country's basic money supply that's used as a medium of exchange
  - Includes:
    - Currency in active circulation
    - Demand deposits (i.e. current account)

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Measuring Money Supply

- **M2**
  - Broader definition of money supply
  - **M2 = M1 + quasi-money**
  - **Quasi monies**: assets usable in making payments but at greater cost or inconvenience than currency or cheques
    - Savings deposits
    - Time deposits (fixed deposits)
    - Money market mutual funds
  - Main advantage of using M2 instead of M1 is that M2 is more stable

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Measuring Money Supply in Singapore, Dec 2021

M1			**286,176.3**
	Currency in Active Circulation	57,274.2	
	Demand Deposits	228,902.1	
M2			**733,241.7**
	M1	286,176.3	
	Fixed Deposits	176,350.9	
	S$ NCDS	57.5	
	Savings and Other Deposits	270,657.0	

Source: MAS, Monthly Statistical Bulletin

15 In Short

Money supply = currency in circulation + deposit balances held by public in commercial banks

MS = C + D

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Commercial Banks and Creation of Money

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Money Supply

- **MS = C + D**
- Money supply depends in part on the behaviour of commercial banks and depositors
- How does the the lending behaviour of commercial banks affect money supply?

Money Supply, An Example

- Macroland begins with no banking system
- Government issues $1 million
- Banks are created to store cash
- Payments are made by withdrawing cash or writing cheques

Consolidated Bank Balance Sheet – Part 1

- All dollars are deposited
- **Balance sheet** of all commercial banks taken together:

Assets		Liabilities	
Currency	$1,000,000	Deposits	$1,000,000

- A firm's **assets** are what it owns
  - Assets of a bank are loans it has made and cash on hand (also called reserves)
- A firm's **liabilities** are what it owes
  - A bank's most important liabilities are its deposits
- The balance sheet of a bank must always balance

Consolidated Bank Balance Sheet – Part 1

Assets		Liabilities	
Currency	$1,000,000	Deposits	$1,000,000

- Currency held in the bank's vault is the **bank reserves**
  - Used to meet depositors' withdrawals and payments
  - Macroland's banks have 100% reserves
    - **100% reserve banking** is when banks' reserves equal 100% of their deposits
- Bank reserves is not part of money supply
  - Held in bank's vault; not in active circulation
- MS = C + D = $1,000,000
  - C = 0

Bank Loans

- Bankers realize that inflows and outflows from vaults leave some dollars unused
  - Say, only 10% of deposits are needed for transactions
  - 90% can be lent to borrowers to earn interest
- Bankers thus decide to keep reserves equal to $100,000, or 10% of deposits, and lend out the other $900,000 to farmers

Consolidated Bank Balance Sheet – Part 2

- Consolidated bank balance sheet after first round of loans:

Assets		Liabilities	
Currency	$100,000	Deposits	$1,000,000
Loans	$900,000		

- The **reserve-deposit ratio**, **rdr**, is bank reserves divided by total deposits
  - 10% in the above example
- **Fractional reserve banking system** holds less bank reserves than deposits
  - The reserve-deposit ratio is less than 100%

Consolidated Bank Balance Sheet – Part 3

- Farmers borrow $900,000 to buy supplies
  - Farmers spend the $900,000 which are then deposited in the banks
- Consolidated bank balance sheet after the dollars are redeposited:

Assets		Liabilities	
Currency	$1,000,000	Deposits	$1,900,000
Loans	$900,000		

- MS = C + D = $1,900,000
  - C = 0
  - Loan of $900,000 increased the money supply by $900,000

Excess Reserves

Assets		Liabilities	
Currency	$1,000,000	Deposits	$1,900,000
Loans	$900,000		

- Note that after the dollars were redeposited, banks' reserve went back up to $1,000,000
- rdr = 52.6%
- Desired rdr = 10%
- Banks are holding **excess reserves**

Consolidated Bank Balance Sheet – Part 4

- With deposits of $1,900,000 and a desired rdr of 10%, banks want only $190,000 in reserves
- Currently holding $1,000,000; excess reserves
- Loan $810,000
- Loan are spent and re-deposited

Assets		Liabilities	
Currency	$1,000,000	Deposits	$2,710,000
Loans			

190,000 + 810,000

900,000 + 810,000

1,900,000 + 810,000

- Excess res ated and re

Consolidated Bank Balance Sheet – The End

- Expansion of loans and deposits stops when reserves are 10% of deposits
  - $1,000,000 available as reserves
  - Deposits stabilize at $10,000,000

Assets		Liabilities	
Currency	$1,000,000	Deposits	$10,000,000
Loans	$9,000,000		

- MS = C + D = $10,000,000
  - Begin with only $1,000,000 in cash
  - “Creation of money” by commercial banks

An Easier Way to Find Money Supply

- With 10% reserves, each dollar supports $10 in deposits
- Deposits in the banking system satisfy this relationship:

$$\frac{\text{Bank reserves}}{\text{Bank deposits}} = \text{Desired rdr}$$

$$\text{Bank deposits} = \frac{\text{Bank reserves}}{\text{Desired rdr}}$$

- In Macroland, since all currency is deposited, C = 0,

MS = D = $1 mil / 0.1 = $10 mil

Money Multiplier

- An increase in $1 mil of bank reserves leads to an increase of $10 mil in money supply
- **Money multiplier, mm**

  $= \frac{1}{\text{desired rdr}} = \frac{1}{0.1} = 10$

- $\frac{\text{Bank deposits}}{\text{Bank reserves}} = \text{mm}$
- Bank deposits = Bank reserves x mm
- Δ deposits (and Δ MS)

  = Δ bank reserves x mm

Money Supply with Currency and Deposits

- In our earlier example, all currency are deposited
  - Not realistic; we hold cash in our pockets
- Say, Macroland residents hold $0.5 mil as currency, deposit $0.5 mil in banks
- Desired rdr = 10%
- Bank deposits = $0.5 mil / 0.10 = $5 mil
- MS = $0.5 mil (C) + $5 mil (D) = $5.5 mil
- Money supply decreases when people hold more cash

Money Supply during Festive Seasons

- During festive seasons, people increases their currency holdings (for shopping or gifting)
  - E.g. people withdraw $100,000 from banks; public now has $600,000 cash
- Bank deposits decrease $100,000 to $400,000; banks now have $400,000 in reserves
- MS = C + D = 0.6 mil + ($0.4 mil/0.1) = $4.6 mil
- When public withdraws cash from banks, overall money supply decreases
- Central bank will have to intervene to offset the impact

Central Bank and how it Controls Money Supply

Central Bank

- A **central bank** is a government institution that is responsible for the monetary policy and the oversight and regulation of financial markets
  - US's central bank is the Federal Reserve (Fed)
  - Singapore's central bank is the Monetary Authority of Singapore (MAS)
- In the U.S., Fed determines the size of the nation's money supply
- In Singapore, MAS determines S$ exchange rate

Central Banks

- Responsibilities of central bank:
  - Managing monetary policy
  - Ensuring smooth operation of financial markets
    - Supervising and regulating banks
    - Loaning banks funds when needed

Fed and Money Supply

- The Fed controls money supply *indirectly* through
  1. open-market operations
  2. discount window lending
  3. reserve requirement

Open-market Operation

- To increase money supply, the Fed engages in **open-market purchase** of government bonds
  - The Fed pays bond holders with new money
  - People who sell the bonds to the Fed deposit the proceeds in banks
  - Bank reserves increase
  - Kick start the process of lending and redeposit of funds
  - Money supply increases

Open-market Operation

- To reduce money supply, the Fed engages in **open-market sale** of government bonds
  - People who purchase the bonds from the Fed make payment with funds in their checking/saving accounts
  - The Fed retires these reserves from circulation
  - Bank reserves decrease
  - Kick start the process of decrease in lending and decrease in redeposit of funds
  - Money supply decreases

Fed and Money Supply, A Numerical Example

- Macroland has $0.5 mil in currency and bank reserves of $0.5 mil
  - rdr = 0.1
  - Money supply = $0.5 mil + ($0.5 mil/0.1) = $5.5 mil
  - Central bank pays $50,000 for a bond held by the public
  - Assume that all $50,000 are deposited
  - Money supply = $0.5 mil + ($0.55 mil/0.1) = $6 mil
  - $50,000 increase in reserves leads to a $500,000 increase in the money supply

Discount Window Lending

- Fed offers lending facility to banks, called **discount window lending**
  - If a bank needs reserves, it can borrow from the Fed at the discount rate
    - The discount rate is the rate the Fed charges banks to borrow reserves
- Lending increases reserves and ultimately increases the money supply
- Changes in the discount rate signal tightening or loosening of the money supply

Reserve Requirement

- The Fed can also change the reserve requirement for banks
  - The **reserve requirement** is the minimum values of the ratio of bank deposits that must be held in reserves
  - The reserve requirement is rarely changed

Stabilizing Financial Markets

- **Banking panics** occurred when customers believe one or more banks might be bankrupt
  - Depositors rush to withdraw funds
  - Everyone tries to withdraw before the bank runs out of money
  - Banks have inadequate reserves to meet demand
  - Banks close

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Bank Run

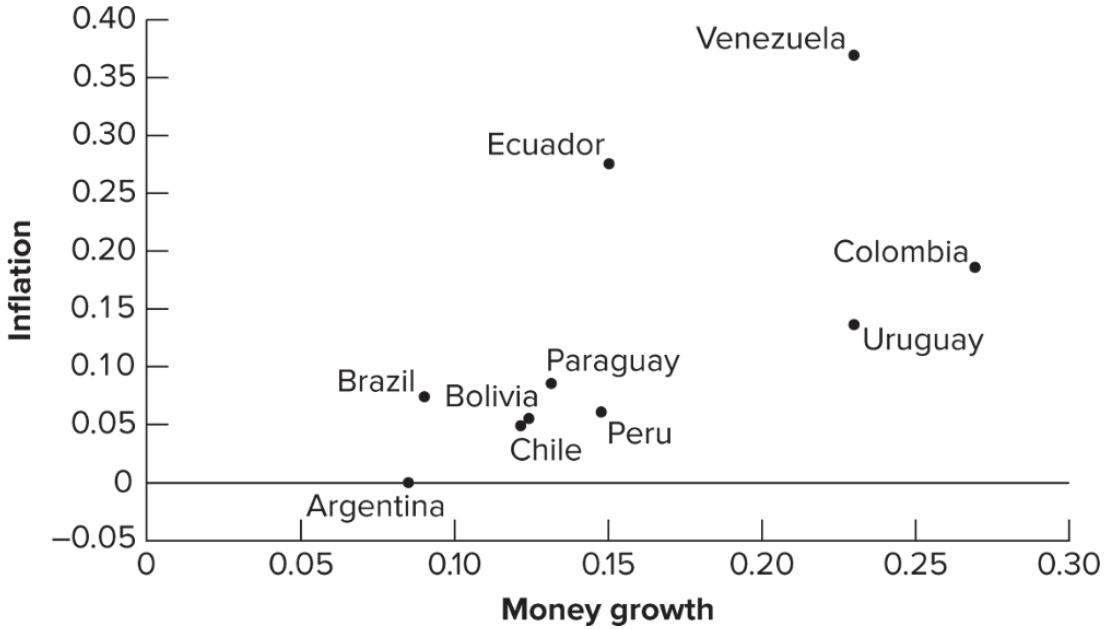
Stabilizing Financial Markets

- Central bank prevents bank panics by
  - Supervising and regulating banks
  - Loaning banks funds if needed
  - Deposit insurance

Money and Inflation in the Long Run

Velocity of Money (V)

- In the long run, the amount of money circulating and the level of prices are closely linked
  - Sustained high inflation rates occur with a comparably high growth rate of the money supply



- **Velocity** is a measure of the speed at which money circulates, i.e. the speed at which money changes hands in transactions involving final goods and services

$$\text{Velocity} = \frac{\text{Nominal GDP}}{\text{Money stock}}$$

  - Nominal GDP is the price level (P) times real GDP (Y)
  - M is the money stock

$$V = \frac{P \times Y}{M}$$

Velocity

- Velocity is determined by a number of factors including technology such as ATMs and debit cards
- These technologies allow people to conduct business while carrying less cash
- Less cash is needed + plenty of money changing hands → higher velocity

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Money and Inflation in the Long Run

- The **quantity equation** states that money times velocity equals nominal GDP

$$M \times V = P \times Y$$

  - Restatement of the velocity definition
  - Shows the relationship between money and price level
  - Assume velocity (V) & real GDP (Y) are constant
  - The quantity equation becomes

$$M \times \bar{V} = P \times \bar{Y}$$

  - An increase in the money supply by a given percentage would increase the price level by the same percentage

THANKS!

Any questions?

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