

Money and Inflation

Intermediate Macroeconomic Theory Macroeconomic Analysis

University of North Texas

- 1 What is Money?
- 2 The Quantity Theory of Money
- 3 Inflation and Interest Rates
- 4 The Social Costs of Inflation
- 5 Hyperinflation

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What is Money?

- Definition: the stock of assets that can be readily used to make transaction
- The functions of money
- The types of money
- How the quantity of money is measured
- How the quantity of money is controlled

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What is Money?

- Definition: the stock of assets that can be readily used to make transaction
- The functions of money
 - 1 **Store of value:** a way to transfer purchasing power from the present to the future
 - 2 **Unit of account:** the terms in which prices are quoted and debts are recorded
 - 3 **Medium of exchange:** what we use to buy goods and services
- The types of money
- How the quantity of money is measured
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- Definition: the stock of assets that can be readily used to make transaction
- The functions of money
- The types of money
 - ① **Fiat money**: money that has no intrinsic value (dollar bills)
 - ② **Commodity money**: money that has intrinsic value (gold)
- How the quantity of money is measured
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- How the quantity of money is measured
 - $M1 = \text{Currency} + \text{demand deposits} + \text{travelers' checks}$
- How the quantity of money is controlled

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- How the quantity of money is measured
- How the quantity of money is controlled
 - Delegated to a partially independent institution
 - Federal Reserve (Fed), Federal Open Market Committee (FOMC)
 - Open market operation: the purchase and sale of government bonds

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The Quantity Theory of Money

Quantity Equation

- **Quantity Theory of Money (QTM):** how the quantity of money affects the economy
- Quantity equation: the link between transactions and money
 $\Rightarrow MV = PY$
- What determines the quantity of real money balance (M/P) people wish to hold

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Quantity Equation

- **Quantity Theory of Money (QTM):** how the quantity of money affects the economy
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$$\Rightarrow MV = PT$$

- 1 M : the quantity of money
- 2 V : the transaction velocity of money (measures the rate at which money circulates in the economy)
- 3 P : the price of a typical transaction (the number of dollars exchanged)
- 4 T : total number of transactions during some period of time → difficult to measure

$$\Rightarrow MV = PY$$

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- 1 M : the quantity of money
 - 2 V : Income velocity of money
 - 3 P : GDP deflator
 - 4 Y : Total output of the economy (real GDP)
- What determines the quantity of real money balance (M/P) people wish to hold

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- What determines the quantity of real money balance (M/P) people wish to hold
 - $M/P = kY$
 $\rightarrow M \cdot 1/k = PY$
 $\rightarrow \text{If } V = 1/k, MV = PY$
 - When people want to hold a lot of money for each dollar of income, money changes hands infrequently

The Quantity Theory of Money

- Assuming constant velocity, $M\bar{V} = PY$
 - The quantity of money determines the dollar value of the economy's output
 - A change in the quantity of money must cause a proportionate change in nominal GDP (PY)
 - The price level (P) is proportional to the money supply (M)
 - $\% \Delta M + \% \Delta V = \% \Delta P = \% \Delta Y \rightarrow \% \Delta M = \% \Delta P(\pi)$

$\Rightarrow$ "Inflation is always and everywhere a monetary phenomenon"
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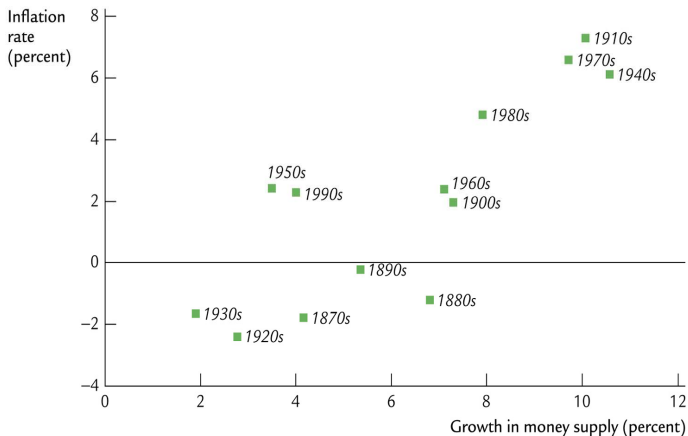
Money and Inflation

- Money supply growth and Inflation

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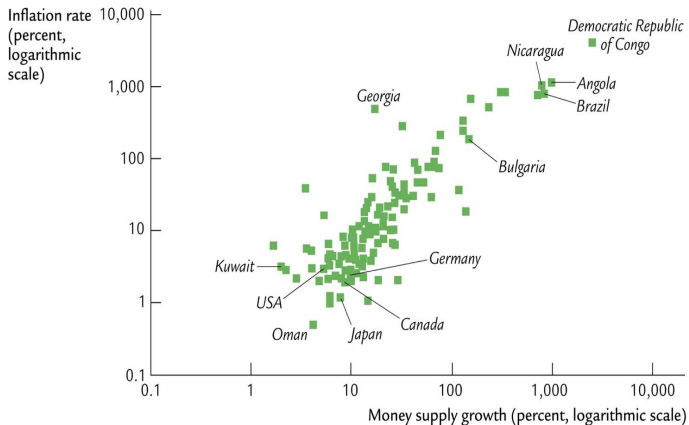
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Inflation and Interest Rates

- Nominal interest rate versus Real interest rate
- Fisher equation: $i = r + \pi^e$
 - ⇒ Nominal interest rate can change
- The Fisher effect: one-for-one relationship between the inflation rate and nominal interest rate

Inflation and Interest Rates

- Nominal interest rate versus Real interest rate

- 1 Nominal interest rate (i): the rate of interest that investors pay to borrow money
- 2 Real interest rate (r): the nominal interest rate corrected for the effects of inflation

$$\Rightarrow r = i - \pi$$

- Fisher equation: $i = r + \pi^e$

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 - 2 (Expected) inflation rate changes
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- The Fisher effect: one-for-one relationship between the inflation rate and nominal interest rate
 - 1% increase in $\% \Delta M$
 - 1% increase in π (by QTM)
 - 1% increase in i (by Fisher effect)

Inflation and Interest Rates

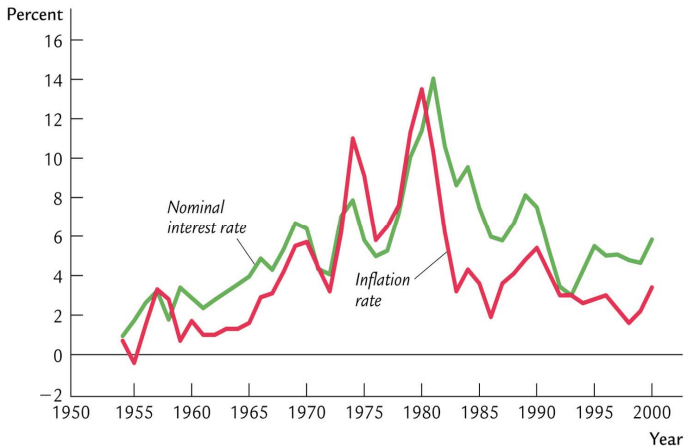
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Inflation and Interest Rates

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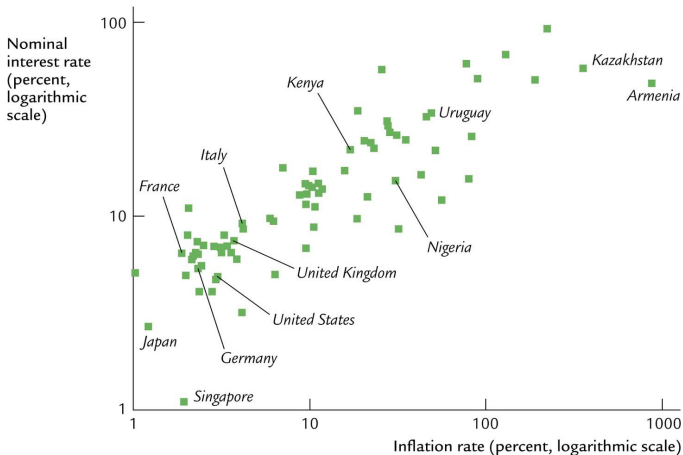
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Inflation and Interest Rates

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Inflation and Interest Rates

Nominal Interest Rate and the Demand for Money

- The nominal interest rate is the opportunity cost of holding money
- The quantity of money demanded depends on both
 - ① The level of income
 - ② The nominal interest rate

$$\Rightarrow \left(\frac{M}{P}\right)^D = L(i, Y) = L(r + \pi^e, Y)$$

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The Social Costs of Inflation

The Costs of Expected Inflation

- The costs of **expected** inflation:

- 1 Shoeleather cost
- 2 Menu costs
- 3 Relative price distortions
- 4 Unfair tax treatment
- 5 General inconvenience

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1 Shoeleather cost

- The costs and inconveniences of reducing money balances to avoid the inflation tax
- $\uparrow \pi \Rightarrow \uparrow i \Rightarrow \downarrow M/P$
- So, same monthly spending but lower average money holdings means more frequent trips to the bank to withdraw smaller amounts of cash

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- 2 Menu costs

- Examples: print new menus, print & mail new catalogs
 - The higher is inflation, the more frequently firms must change their prices and incur these costs

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- 3 Relative price distortions

- Suppose a firm issues new catalog each January. As P rises throughout the year, the firm's relative price will fall
 - Different firms change their prices at different times, leading to relative price distortions
 - Cause microeconomic inefficiencies in the allocation of resources

- 4 Unfair tax treatment

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- Some taxes are not adjusted to account for inflation, such as *capital gains tax*

- 1/1/2001: you bought \$10,000 worth of Starbucks stock

- 12/31/2001: you sold the stock for \$11,000, so your nominal capital gain was \$1000 (10%)

- Suppose $\pi = 10\%$ in 2001. Your **real** capital gain is \$0

- But the government requires you to pay taxes on your \$1000 nominal gain!!

- 5 General inconvenience

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The Costs of Expected Inflation

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 - Inflation makes it harder to compare nominal values from different time periods
 - This complicates long-range financial planning

The Social Costs of Inflation

Additional Cost of Unexpected Inflation

- Additional cost of **unexpected** inflation:
 - 1 Arbitrary redistributions of purchasing power
 - 2 Increased uncertainty

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Additional Cost of Unexpected Inflation

- Additional cost of **unexpected** inflation:

- ① Arbitrary redistributions of purchasing power

- Many long-term contracts are not indexed, but based on π^e
 - If $\pi \neq \pi^e$, then some gain at others' expense
 - If $\pi > \pi^e$, then purchasing power is transferred from lenders to borrowers
 - If $\pi < \pi^e$, then purchasing power is transferred from borrowers to lenders

- ② Increased uncertainty

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Additional Cost of Unexpected Inflation

- Additional cost of **unexpected** inflation:
 - 1 Arbitrary redistributions of purchasing power
 - 2 Increased uncertainty
 - When inflation is high, it's more variable and unpredictable
 - π turns out different from π^e more often, and the differences tend to be larger
 - This creates higher uncertainty, which makes risk averse people worse off

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Hyperinflation

- **Hyperinflation:** Inflation that exceeds 50% per month (more than 100-fold increase in price level over a year)
- The cause of hyperinflation: excessive growth in the supply of money

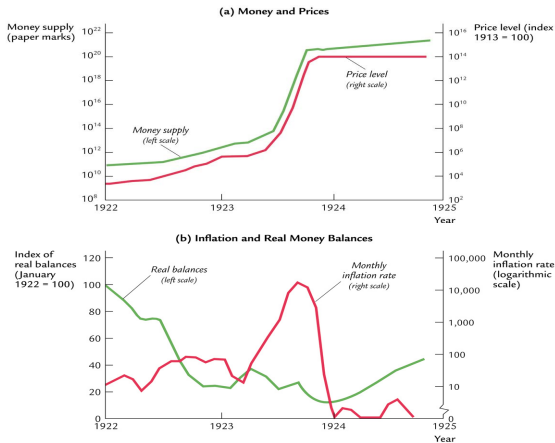
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- The cause of hyperinflation: **excessive growth in the supply of money**

(1) Hyperinflation in interwar Germany



Hyperinflation

- The cause of hyperinflation: **excessive growth in the supply of money**

(2) Recent episodes of hyperinflation

