Money Growth and Inflation

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Inflation

Inflation is an increase in the overall level of prices.

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Inflation: Historical Aspects

- Over the past sixty years, prices have risen on average about 5 percent per year.
- **Deflation,** meaning decreasing average prices, occurred in the U.S. in the nineteenth century.
- **Hyperinflation** refers to high rates of inflation such as Germany experienced in the 1920s.

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Inflation: Historical Aspects

- In the 1970s prices rose by 7 percent per year.
- During the 1990s, prices rose at an average rate of 2 percent per year.

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The Classical Theory of Inflation

- The **quantity theory of money** is used to explain the long-run determinants of the price level and the inflation rate.
- Inflation is an economy-wide phenomenon that concerns the value of the economy's medium of exchange.
- When the overall price level rises, the value of money falls.

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Money Supply, Money Demand, and Monetary Equilibrium

- The **money supply** is a policy variable that is controlled by the Fed.
  - Through instruments such as open-market operations, the Fed directly controls the quantity of money supplied.

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Money Supply, Money Demand, and Monetary Equilibrium

Money demand has several determinants, including interest rates and the average level of prices in the economy.

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Money Supply, Money Demand, and Monetary Equilibrium

- People hold money because it is the medium of exchange.
  - The amount of money people choose to hold depends on the prices of goods and services.

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Money Supply, Money Demand, and Monetary Equilibrium

In the long run, the overall level of prices adjusts to the level at which the demand for money equals the supply.

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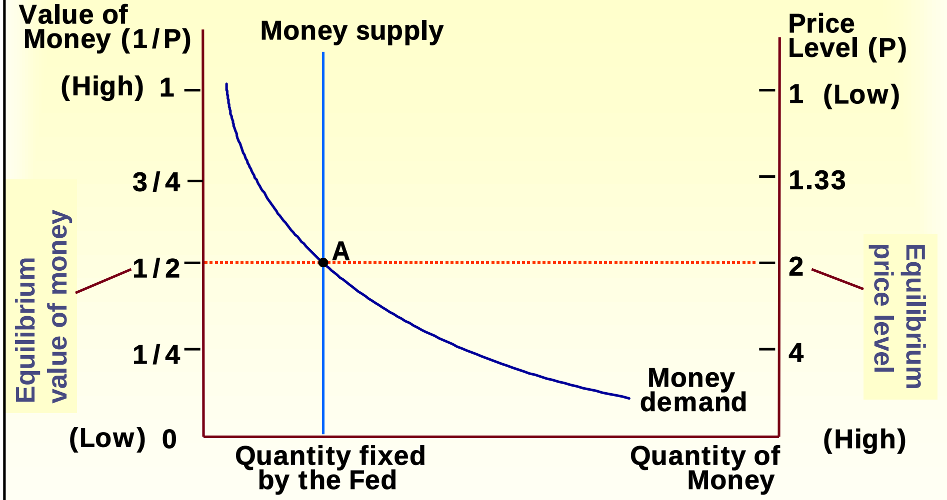
Money Supply, Money Demand, and the Equilibrium Price Level



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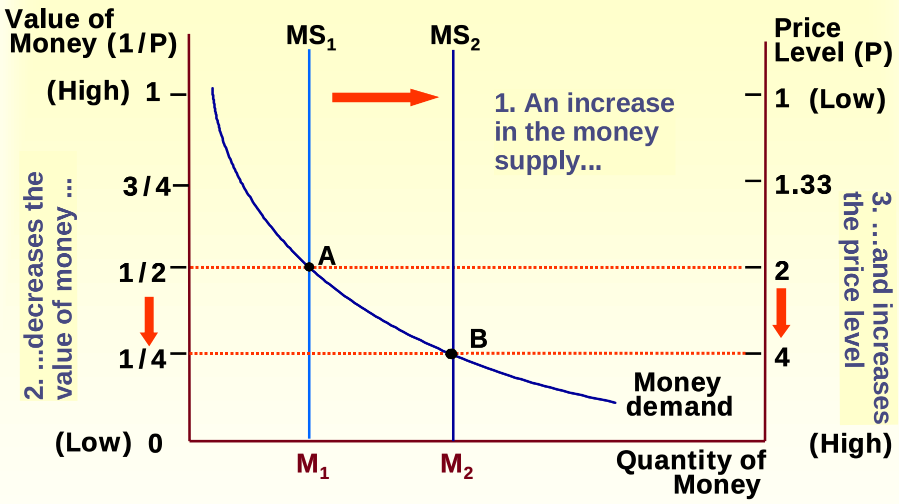
The Effects of Monetary Injection



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The Quantity Theory of Money

- How the price level is determined and why it might change over time is called the **quantity theory of money.**
  - The quantity of money available in the economy determines the value of money.
  - The primary cause of inflation is the growth in the quantity of money.

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The Classical Dichotomy and Monetary Neutrality

- **Nominal variables** are variables measured in monetary units.
- **Real variables** are variables measured in physical units.

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The Classical Dichotomy and Monetary Neutrality

- According to Hume and others, real economic variables do not change with changes in the money supply.
  - According to the classical dichotomy, different forces influence real and nominal variables.
- Changes in the money supply affect nominal variables but not real variables.

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The Classical Dichotomy and Monetary Neutrality

The irrelevance of monetary changes for real variables is called monetary neutrality.

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Velocity and the Quantity Equation

The velocity of money refers to the speed at which the typical dollar bill travels around the economy from wallet to wallet.

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Velocity and the Quantity Equation

$$V = (P \times Y)/M$$

Where: V = velocity
P = the price level
Y = the quantity of output
M = the quantity of money

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Velocity and the Quantity Equation

- Rewriting the equation gives the quantity equation:

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

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Velocity and the Quantity Equation

The **quantity equation** relates the quantity of money (M) to the nominal value of output (P x Y).

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Velocity and the Quantity Equation

- The quantity equation shows that an increase in the quantity of money in an economy must be reflected in one of three other variables:
  - the price level must rise,
  - the quantity of output must rise, or
  - the velocity of money must fall.

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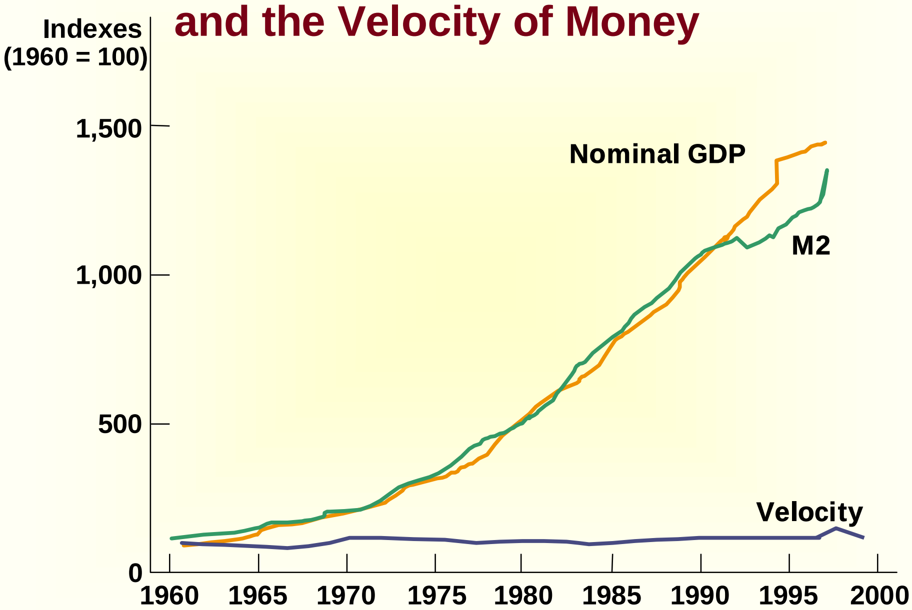
Nominal GDP, the Quantity of Money, and the Velocity of Money



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The Equilibrium Price Level, Inflation Rate, and the Quantity Theory of Money

- The velocity of money is relatively stable over time.
- When the Fed changes the quantity of money, it causes proportionate changes in the nominal value of output (P x Y).
- Because money is neutral, money does not affect output.

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The Equilibrium Price Level, Inflation Rate, and the Quantity Theory of Money

- When the Fed alters the money supply and induces parallel changes in the nominal value of output, these changes are also reflected in changes in the price level.
- When the Fed increases the money supply rapidly, the result is a high rate of inflation.

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Hyperinflation

- Hyperinflation is inflation that exceeds 50 percent per month.
- Hyperinflation occurs in some countries because the government prints too much money to pay for its spending.

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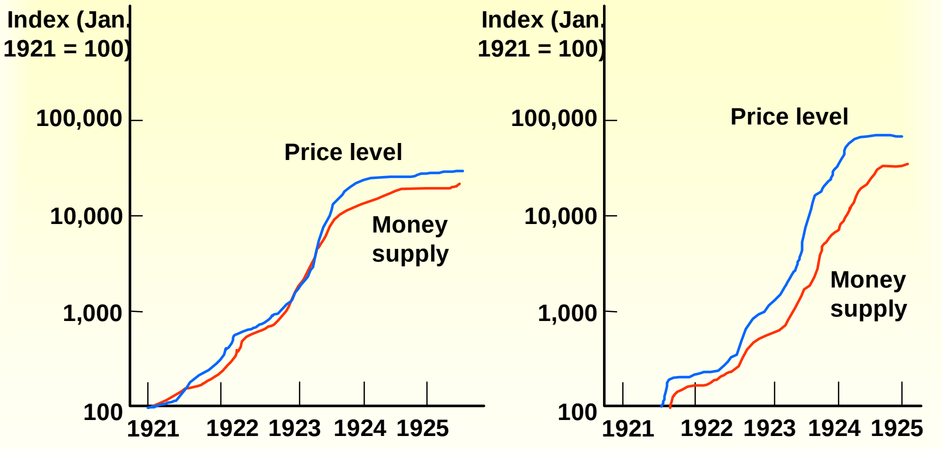
Money and Prices During Four Hyperinflations

(a) Austria (b) Hungary



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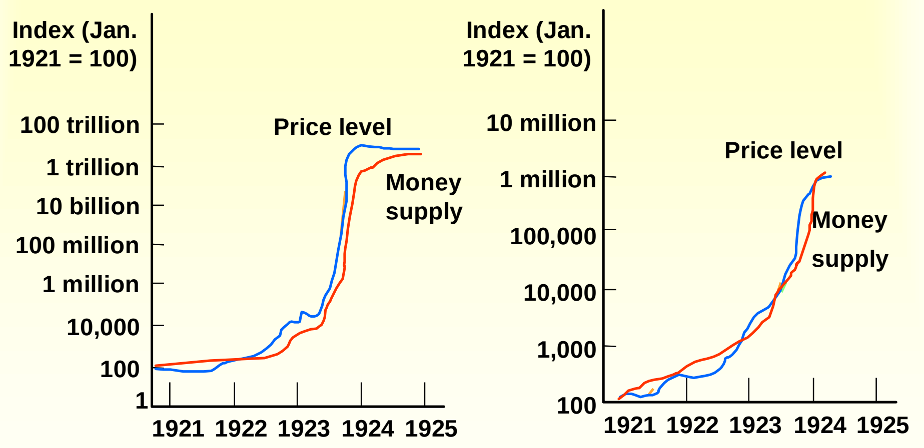
Money and Prices During Four Hyperinflations

c) Germany d) Poland



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Hyperinflation and the Inflation Tax

- When the government raises revenue by printing money, it is said to levy an **inflation tax.**
- An inflation tax is like a tax on everyone who holds money.
- The inflation ends when the government institutes fiscal reforms such as cuts in government spending.

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The Fisher Effect

- According to the **Fisher effect,** when the rate of inflation rises, the nominal interest rate rises by the same amount.
- The real interest rate stays the same.

Nominal interest rate =

Real interest rate + Inflation rate

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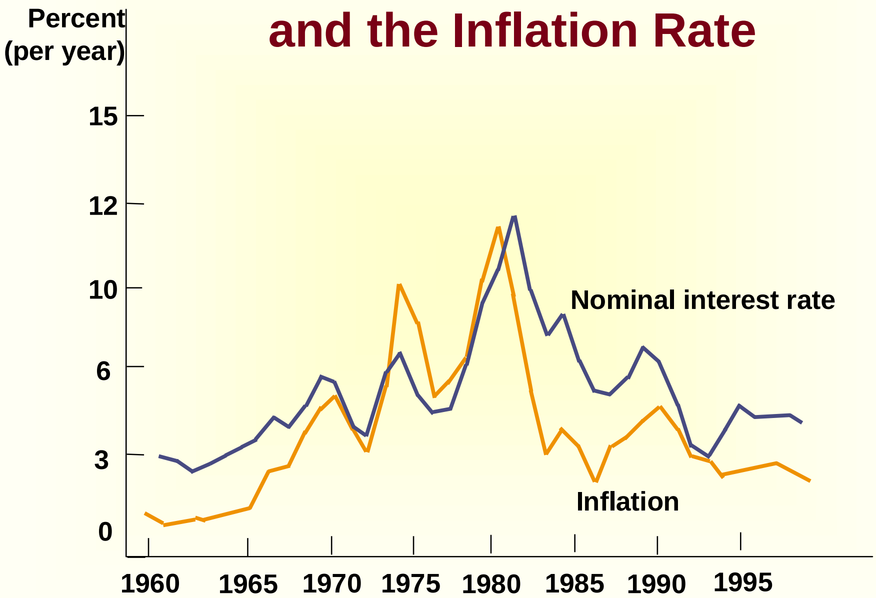
The Nominal Interest Rate and the Inflation Rate



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The Costs of Inflation: A Fall in Purchasing Power?

Inflation *does not* in itself reduce people's real purchasing power.

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The Costs of Inflation

- Shoeleather costs
- Menu costs
- Relative price variability
- Tax distortions
- Confusion and inconvenience
- Arbitrary redistribution of wealth

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Shoeleather Costs

- **Shoeleather costs** are the resources wasted when inflation encourages people to reduce their money holdings.
- Inflation reduces the real value of money, so people have an incentive to minimize their cash holdings.

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Shoeleather Costs

- Less cash requires more frequent trips to the bank to withdraw money from interest-bearing accounts.
- The actual cost of reducing your money holdings is the time and convenience you must sacrifice to keep less money on hand.
- Also, extra trips to the bank take time away from productive activities.

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Menu Costs

- **Menu costs** are the costs of adjusting prices.
- During inflationary times, it is necessary to update price lists and other posted prices.
- This is a resource-consuming process that takes away from other productive activities.

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Relative-Price Variability

- Inflation distorts relative prices.
- Consumer decisions are distorted, and markets are less able to allocate resources to their best use.

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Inflation-Induced Tax Distortion

- Inflation exaggerates the size of capital gains and increases the tax burden on this type of income.
- With progressive taxation, capital gains are taxed more heavily.

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Inflation-Induced Tax Distortion

- The income tax treats the nominal interest earned on savings as income, even though part of the nominal interest rate merely compensates for inflation.
- The after-tax real interest rate falls, making saving less attractive.

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How Inflation Raises the Tax Burden On Saving

	Economy 1 (price stability)	**Economy 2** (inflation)
Real interest rate	4%	4%
Inflation rate	0	8
Nominal interest rate (Real interest rate + inflation rate)	4	12
Reduced interest due to 25 percent tax (.25 x nominal interest rate)	1	3
After-tax nominal interest rate (.75 x nominal interest rate)	3	9
After-tax interest rate (after-tax nominal interest rate - inflation rate)	3	1

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Confusion and Inconvenience

- When the Fed increases the money supply and creates inflation, it erodes the real value of the unit of account.
- Inflation causes dollars at different times to have different real values.
- Therefore, with rising prices, it is more difficult to compare real revenues, costs, and profits over time.

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Arbitrary Redistribution of Wealth

- Unexpected inflation **redistributes wealth** among the population in a way that has nothing to do with either merit or need.
- These redistributions occur because many loans in the economy are specified in terms of the unit of account – money.

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Summary

- The overall level of prices in an economy adjusts to bring money supply and money demand into balance.
- When the central bank increases the supply of money, it causes the price level to rise.
- Persistent growth in the quantity of money supplied leads to continuing inflation.

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Summary

- The principle of money neutrality asserts that changes in the quantity of money influence nominal variables but not real variables.
- A government can pay for its spending simply by printing more money.
- This can result in an “inflation tax” and hyperinflation.

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Summary

- According to the Fisher effect, when the inflation rate rises, the nominal interest rate rises by the same amount, and the real interest rate stays the same.
- Many people think that inflation makes them poorer because it raises the cost of what they buy.
- This view is a fallacy because inflation also raises nominal incomes.

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Summary

- Economists have identified six costs of inflation:
  - Shoeleather costs
  - Menu costs
  - Increased variability of relative prices
  - Unintended tax liability changes
  - Confusion and inconvenience
  - Arbitrary redistributions of wealth

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Graphical Review

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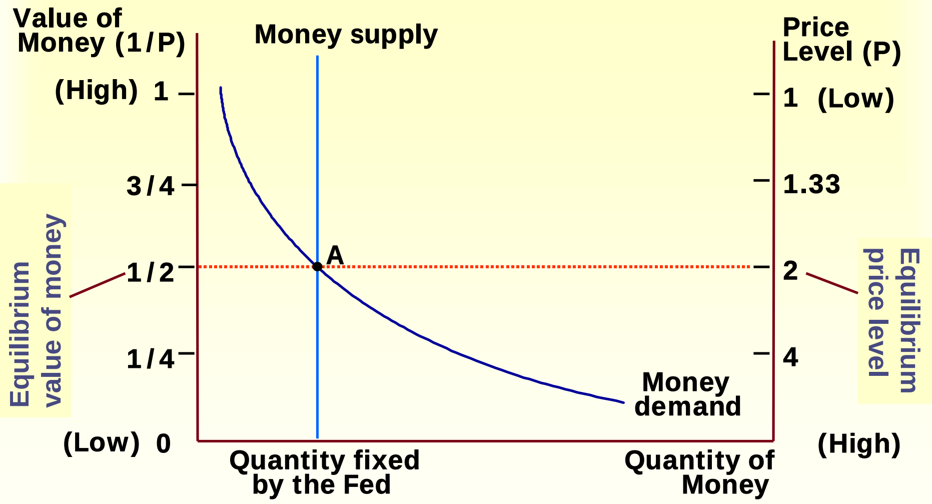

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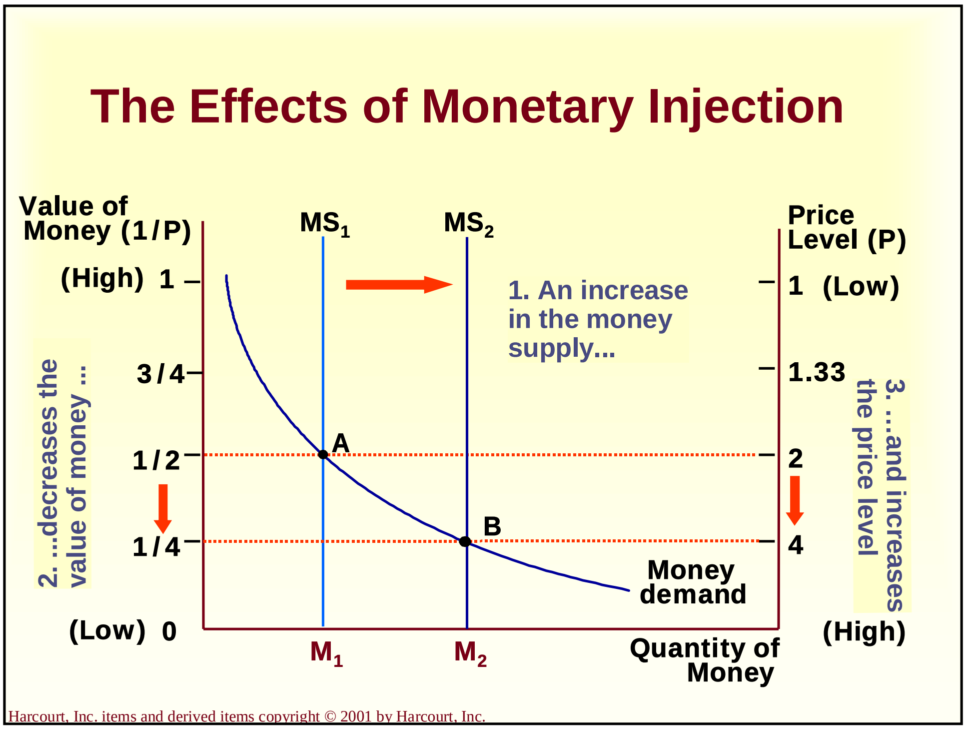
The Effects of Monetary Injection
Value of Money (1/P)
(High) 1
3/4
1/2
1/4
(Low) 0
MS1
MS2
1. An increase in the money supply...
2. ...decreases the value of money ...
3. ...and increases the price level
Price Level (P)
1 (Low)
1.33
2
4
(High)
A
B
Money demand
M1
M2
Quantity of Money
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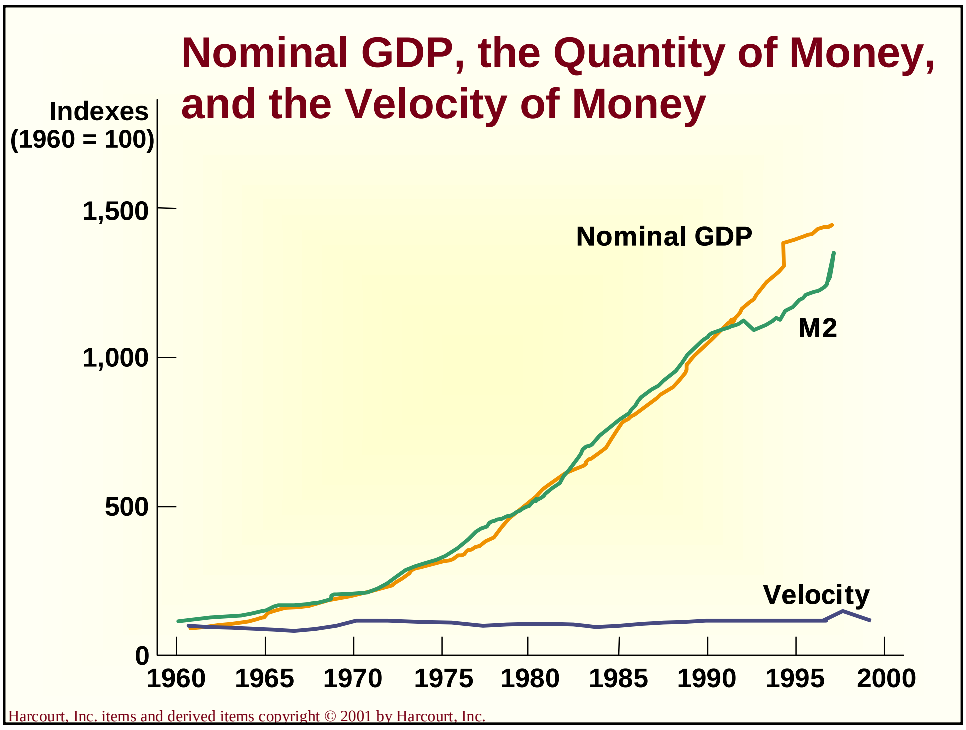
Nominal GDP, the Quantity of Money, and the Velocity of Money
Indexes (1960 = 100)
1,500
1,000
500
0
Nominal GDP
M2
Velocity
1960
1965
1970
1975
1980
1985
1990
1995
2000
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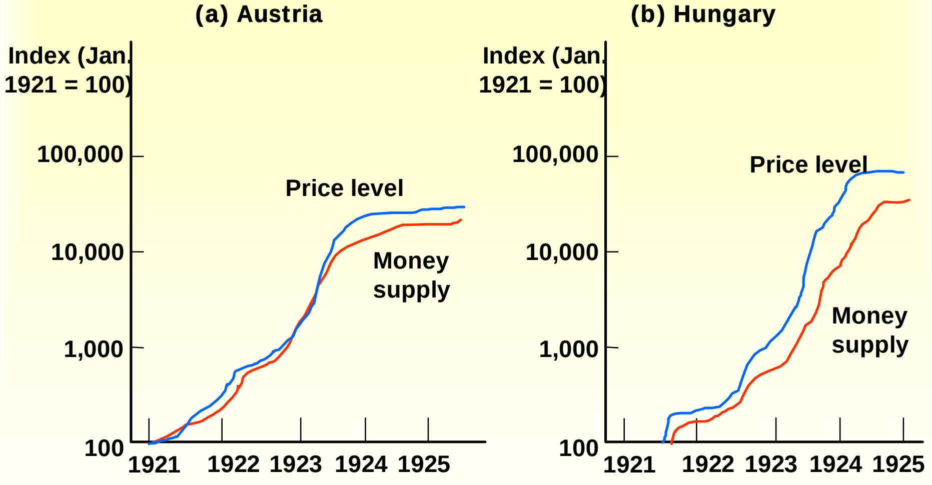
Money and Prices During Four Hyperinflations



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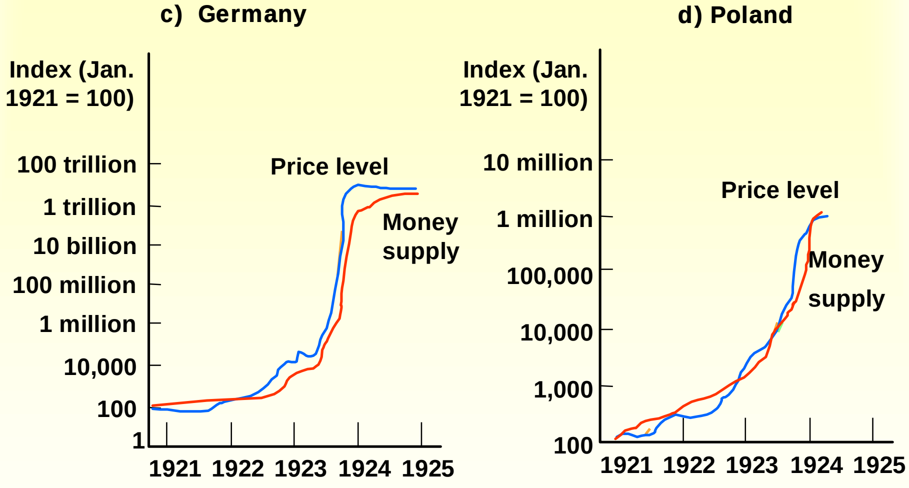
Money and Prices During Four Hyperinflations



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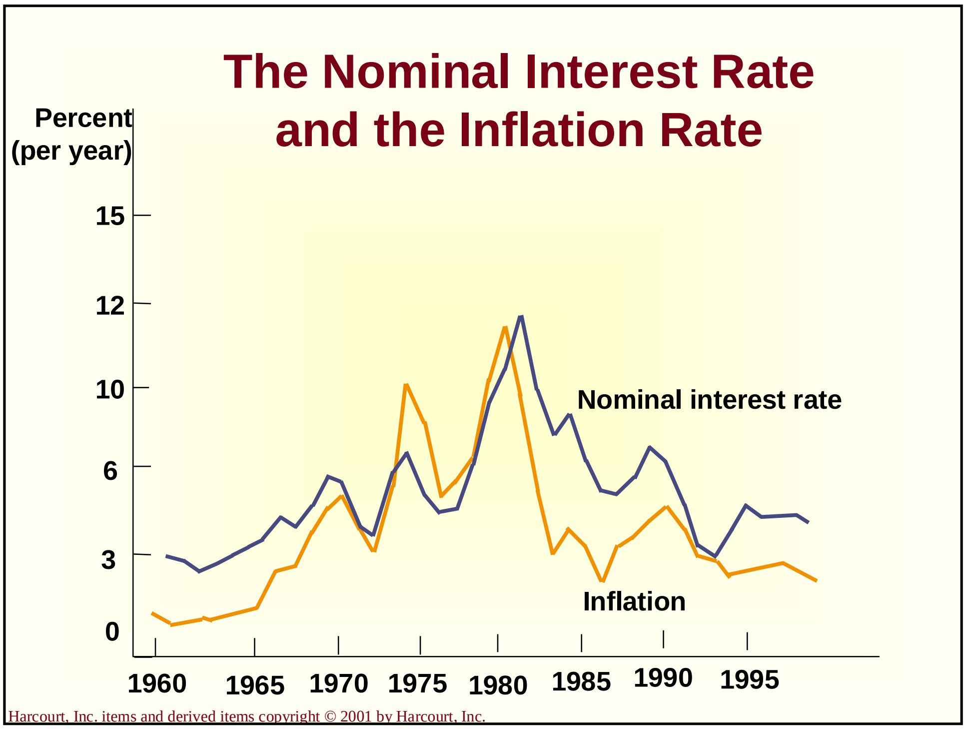
The Nominal Interest Rate
and the Inflation Rate
Percent
(per year)
15
12
10
6
3
0
Nominal interest rate
Inflation
1960
1965
1970
1975
1980
1985
1990
1995
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