Lecture 6
Inflation: causes and consequences on economic efficiency and welfare.

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Outline

1. Introduction

2. Costs and benefits of inflation

3. Hyperinflation

References: Mankiw (2009); professor’s notes.
1. Introduction

- Inflation: a sustained rise in the general level of prices.

- Accelerating Inflation: a rising inflation rate.

- Disinflation: a slowing inflation rate.

- Deflation: a sustained fall in the general level of prices.

- Hyperinflation
  - An inflation rate of 50% per month or more.
  - More than 1% per day.
  - 100-fold increase in prices per year.
  - 2 million-fold increase in prices over 3 years.
Why is inflation bad?

- What costs does inflation impose on society?
  
  - Common misperception: *inflation reduces real wages*
    - true only in the short run, when nominal wages are fixed by contracts;
    - in the long run, the real wage is determined by labor supply and the marginal product of labor, not the price level or inflation rate;
    - consider the data ...
The CPI and Average Hourly Earnings, 1965–2012

Hourly wage in May 2012 dollars

Real average hourly earnings in 2012 dollars, right scale

Nominal average hourly earnings, (1965 = 100)

CPI (1965 = 100)
Introduction

The classical view of inflation

▶ A change in the price level is merely a change in the units of measurement.

▶ *Then, why is inflation a social problem?*
Confronting the quantity theory with data

The quantity theory of money implies:

- Countries with higher money growth rates should have higher inflation rates.

- The long-run trend in a country's inflation rate should be similar to the long-run trend in the country's money growth rate.

Are the data consistent with these implications?
International data on inflation and money growth

Inflation rate (percent)

Money supply growth (percent)

-5 0 10 20 30 40

-10 0 10 20 30 40

China
Iraq
Turkey
Belarus
Zambia
U.S.
Mexico
Malta
Cyprus
Serbia
Russia
Suriname
U.S. inflation and money growth, 1960–2012

M2 growth rate

Inflation rate

% change from 12 mos. earlier

U.S. inflation and money growth, 1960–2012

M2 growth rate

Inflation rate

% change from 12 mos. earlier

U.S. inflation and money growth, 1960–2012

M2 growth rate

Inflation rate

% change from 12 mos. earlier
Inflation and money growth have the same long-run trends, as the quantity theory predicts.
U.S. inflation and nominal interest rates, 1960–2012

nominal interest rate

inflation rate
Inflation and nominal interest rates in 96 countries

Nominal interest rate (percent)

Inflation rate (percent)

Malawi
Georgia
Turkey
Ghana
Iraq
U.S.
Poland
Japan
Brazil
Kazakhstan
Mexico

Inflation and nominal interest rates in 96 countries
2. Costs and benefits of inflation

Implications of inflation are very different depending on whether inflation is anticipated or not.

- **Anticipated inflation**
  - Costs of anticipated inflation
    - Transaction costs (*shoe-leather cost*)
    - Tax distortions
    - Destroys value of tax collections over time
  - Benefits of anticipated inflation
    - Seigniorage

- **Unanticipated inflation**
  - Causes mistakes
  - Causes redistributions
The costs of expected inflation:

1. Shoe-leather cost

- def: the costs and inconveniences of reducing money balances to avoid the inflation tax.

- $\pi \Rightarrow i \Rightarrow \text{real money balances}$

- Remember: In long run, inflation does not affect real income or real spending.

- So, same monthly spending but lower average money holdings means more frequent trips to the bank to withdraw smaller amounts of cash.
2. Menu costs

- **def:** The costs of changing prices.

- **Examples:**
  - cost of printing new menus
  - cost of printing & mailing new catalogs

- The higher is inflation, the more frequently firms must change their prices and incur these costs.
3. Relative price distortions

- Firms facing menu costs change prices infrequently.

- Example:
  A firm issues new catalog each January. As the general price level rises throughout the year, the firm's relative price will fall.

- Different firms change their prices at different times, leading to relative price distortions ...
  ... causing microeconomic inefficiencies in the allocation of resources.
4. Unfair tax treatment

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

- Example:
  - Jan 1: you buy €10,000 worth of IBM stock
  - Dec 31: you sell the stock for €11,000, so your nominal capital gain is €1,000 (10%).
  - Suppose $\pi = 10\%$ during the year. Your real capital gain is €0.
  - But the govt requires you to pay taxes on your €1,000 nominal gain!!
5. General inconvenience

- Inflation makes it harder to compare nominal values from different time periods.

- This complicates long-range financial planning.
The costs of unexpected inflation:
Arbitrary redistribution of purchasing power

- Many long-term contracts not indexed, but based on $E\pi$.

- If $\pi$ turns out different from $E\pi$, then some gain at others’ expense.

- Example: borrowers & lenders
  - If $\pi > E\pi$, then $(i - \pi) < (i - E\pi)$ and purchasing power is transferred from lenders to borrowers.
  - If $\pi < E\pi$, then purchasing power is transferred from borrowers to lenders.

- Also: firms and workers (if paid with a lag); the retired; the government...
Additional cost of high inflation: Increased uncertainty

- When inflation is high, it’s more variable and unpredictable: $\pi$ turns out different from $E\pi$ more often, and the differences tend to be larger *(though not systematically positive or negative)*

- So, arbitrary redistributions of wealth more likely.

- This creates higher uncertainty, making risk-averse people worse off.
2. Costs and benefits of inflation

Benefits of inflation

- Nominal wages are rarely reduced, even when the equilibrium real wage falls. This hinders labor market clearing.

- Inflation allows the real wages to reach equilibrium levels without nominal wage cuts.

- Therefore, moderate inflation improves the functioning of labor markets.

- Seigniorage
3. Hyperinflation

- Common definition: $\pi \geq 50\%$ per month

- All the costs of moderate inflation described above become HUGE under hyperinflation.

- Money ceases to function as a store of value, and may not serve its other functions (unit of account, medium of exchange).

- People may conduct transactions with barter or a stable foreign currency.
What causes hyperinflation?

- Hyperinflation is caused by excessive money supply growth.
- When the central bank prints money, the price level rises.
- If it prints money rapidly enough, the result is hyperinflation.
### A few examples of hyperinflation

<table>
<thead>
<tr>
<th>country</th>
<th>period</th>
<th>CPI Inflation % per year</th>
<th>M2 Growth % per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>1983-85</td>
<td>338%</td>
<td>305%</td>
</tr>
<tr>
<td>Brazil</td>
<td>1987-94</td>
<td>1,256</td>
<td>1,451</td>
</tr>
<tr>
<td>Bolivia</td>
<td>1983-86</td>
<td>1,818</td>
<td>1,727</td>
</tr>
<tr>
<td>Ukraine</td>
<td>1992-94</td>
<td>2,089</td>
<td>1,029</td>
</tr>
<tr>
<td>Argentina</td>
<td>1988-90</td>
<td>2,671</td>
<td>1,583</td>
</tr>
<tr>
<td>Dem. Republic of Congo / Zaire</td>
<td>1990-96</td>
<td>3,039</td>
<td>2,373</td>
</tr>
<tr>
<td>Angola</td>
<td>1995-96</td>
<td>4,145</td>
<td>4,106</td>
</tr>
<tr>
<td>Peru</td>
<td>1988-90</td>
<td>5,050</td>
<td>3,517</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>2005-07</td>
<td>5,316</td>
<td>9,914</td>
</tr>
</tbody>
</table>
Why governments create hyperinflation

- When a government cannot raise taxes or sell bonds, it must finance spending increases by printing money.

- In theory, the solution to hyperinflation is simple: stop printing money.

- In the real world, this requires drastic and painful fiscal restraint.
3. Hyperinflation

The sensitivity of real money balances to the nominal interest rate complicates the problem of stopping a hyperinflation. If the quantity theory were completely true and the nominal interest rate did not affect money demand, then stopping a hyperinflation would be easy: The central bank would merely need to stop printing money. As soon as the quantity of money stabilized, the price level would stabilize.

But if money demand depends on the nominal interest rate, ending a hyperinflation is more complicated. The fall in inflation will lead to a fall in the cost of holding money and, therefore, an increase in real money balances. If the central bank merely stops printing money (that is, keeps $M$ constant), the increase in real balances ($M/P$) necessitates a fall in prices. Hence, the apparently simple task of ending a hyperinflation will, if the central bank is not careful, lead to the falling price level. In this case, the central bank will not have achieved its goal of price stability.

What monetary policy should the central bank pursue to achieve stable prices? That is, what path should the money supply follow to end the inflation without causing deflation? To answer this question, we work backward. We begin with the goal of price stabilization and find the path of the money supply that is consistent with that objective. Figure 1 shows the five steps to determining the path of the money supply.

1. The desired path of the price level is at the top of the figure. The price level is rising during the hyperinflation. Then, the new monetary policy goes into effect and prices stabilize.
2. Next is the rate of inflation $\pi$, which is the growth in the price level. It is high until the period of price stability, when it drops to zero.
3. The nominal interest rate $i$ adjusts one-for-one with the rate in inflation.
4. The fall of the nominal interest rate leads to a jump up in real balances $M/P$.
5. The path of the money supply $M$ then depends on the path of the price level $P$ and the path of real balances $M/P$.

Note: Each variable is drawn on its own scale.

![Figure 1](image-url)