

Generic Elective (Hon) Economics

II Semester

Paper: Introductory Macroeconomics

Dear Students, We has covered Unit-2: Money in the previous classes. Now we will have to discuss last topic of the syllabus Unit-3: Inflation as I already suggested reading in the class of N. Gregory Mankiw Chapter-5 and Oliver Blanchard Chapter-23 readings.

Unit-3: Inflation

Inflation and its costs, hyperinflation

Inflation

Inflation is a situation where the continue increase in prices, leading to fall in purchasing power of money. In an inflationary situation, too much money chases too few goods. Inflation is a self perpetuating and irreversible upward movement of price caused by an excess of demand over capacity to supply.

Moreover, Deflation is a situation of decrease in the overall level of pries. Disinflation is a situation of reduction in the rate at which prices are rising.

Inflation and Interest Rates

As we first discussed in chapter 1, interest rates are among the most important macroeconomic variables. Here we discuss the relationship between inflation and interest rates.

Two Interest Rates: Real and Nominal

As explained in this section, there are two types of interest rates—nominal and real interest rates.

The interest rate that the bank pays is called the nominal interest rate, and increase in your purchasing power is called the real interest rate. If i denotes the nominal interest rate, r the real interest rate, and π the rate of inflation, then the relationship among these three variables can be written as

$$r = i - \pi$$

The real interest rate is the difference between the nominal interest rate and the rate of inflation.

The Fisher Effect

Fisher relationship shows the tendency of inflation and nominal interest rate to move together. Rearranging terms in our equation for the real interest rate, we can show that the nominal interest rate is the sum of the real interest rate and the inflation rate.

$$i = r + \pi$$

The equation written in this way is called the **Fisher equation**, after economist **Irving Fisher (1867-1947)**. It shows that the nominal interest rate can change for two reasons: because the real interest rate changes or because the inflation rate changes.

Once we separate the nominal interest rate into these two parts, we can use equation to develop a theory that explains the nominal interest rate.

In the case of quantity theory of money shows that the rate of money growth determines the rate of inflation.

In Fisher equation then tells us to add at the real interest rate and the inflation rate together to determine the nominal interest rate.

However, the quantity theory and the Fisher equation together tell us how money growth affects the nominal interest rate. *According to quantity theory, an increase in the rate of money growth of 1 percent causes a 1 percent increase in the rate of inflation. According to the Fisher equation, a 1 percent increase in the rate of inflation in turn causes a 1 percent increase in the nominal interest rate.*

Thus, the one-for-one relation between the inflation and nominal interest rate is called the **Fisher effect**.

Two Real Interest rates: Ex Ante and Ex Post

So far we have discussed distinguish between real and nominal interest rate. But when a borrower and lender agree on a nominal interest rate, they do not know what the inflation rate over the term of loan will be.

Therefore, we must distinguish between two concepts of the real interest rate:

(a) Ex-ante real interest rate: It is that real interest rate which the borrowers and lenders expect when the loan is made.

(b) Ex-post real interest rate: It is that real interest rate which actually takes place.

Although borrowers and lenders cannot predict future inflation with certainty, they do have some expectation about what the inflation rate will be.

Let π denote actual future inflation and $E\pi$ the expectation of future inflation. The ex ante real interest rate is $i - E\pi$, and the ex post real interest rate is $i - \pi$. The two real interest rates differ when actual inflation π differs from expected inflation $E\pi$.

Thus, the nominal interest rate cannot adjust to actual inflation, because actual inflation is not known when the nominal interest rate is set. The nominal interest rate can adjust only to expected inflation. The Fisher effect is more precisely written as

$$i = r + E\pi$$

The ex ante real interest rate r is determined by equilibrium in the market for goods and services, as described by the model in the chapter-4. The nominal interest rate I moves one-for-one with changes expected inflation $E\pi$.

Seigniorage: The Revenue From Printing Money

So far, we have seen how growth in the money supply causes inflation. With inflation as a consequence, what would ever induce a central bank to increase the money supply substantially?

Let's start with **Seigniorage** is the difference between the value of currency/money and the cost of producing it. It is essentially the profit earned by the government by printing currency. And also the revenue raised by the printing of money is called seigniorage. All governments spend money. Three ways in which a government can finance its spending are:

- 1) Through taxes
- 2) Borrow from public
- 3) Print Money

When the government prints money to finance expenditure, it increases the money supply. The increase in the money supply, in turn, causes inflation. Printing money to raise revenue is like imposing an *inflation tax*.

$$\text{Seignorage} = \Delta M / P \quad \text{---(1)}$$

Where

ΔM = Change in nominal money stock from the end of last month to the end of this month or nominal money creation during the month.

P = Price level

$\Delta M / P$ = Money creation divided by the price level.

Equation (1) can be rewritten as, by multiplying and dividing by M , as:

$$\Delta M / P = \Delta M / M \cdot M / P \quad \text{---(2)}$$

[**Seignorage**] = [**Rate of nominal money growth rate**] x [**Real money balance**]

Equation (2) gives the relationship between seignorage, nominal money growth and real money balance and can be read as, larger the real money balance held in the country, more will be the amount of seignorage corresponding to a given rate of nominal money growth.

Substitute (1) in (2), we get :

$$\text{Seignorage} = \Delta M / M \cdot M / P \quad \text{---} \quad (3)$$

Divide equation (3) by real income Y (at monthly rate), we get:

$$\text{Seignorage} / Y = \Delta M / M [M / P / Y] \dots *$$

The above equation * tells that as nominal money growth ($\Delta M / M$) rises, inflation rises. As inflation rises, opportunity cost of holding money rises. Consequently, people will lower their real money balances (M / P).

Inflation and Real Money Balances

The amount of real money balance (M / P) that people wants to hold depends on three factors. In equation from it is obtained as:

$$M / P = Y L(i) \quad \text{---} \quad (4) \quad \text{Quantity Theory of Money}$$

And
$$i = r + E \pi \quad \text{---} \quad \text{Fisher effect}$$

Substituting (Fisher effect) in (equation- 4), we get

$$M / P = Y L(r + E \pi) \quad \text{---} \quad (5)$$

The equation-5 reveals that , the real money balance depends on :

- (i) Income(Y)
- (ii) Real interest rat (r)
- (iii) Expected inflation (Eπ)

During hyperinflation, it is assumed that both Y and r are constant.

$$M / P = Y L(r + E \pi) \quad \text{---} \quad (6)$$

Equation (6) gives the relationship between real money balance and expected inflation. An increase in expected inflation lead people to reduce their real money balances. People resort to barter system. Also, people use foreign currencies as stores of value.

Combining equation (3) and (6), we get:

$$\text{Seignorage} = (\Delta M / M) [Y L(r+E\pi)] \text{---(7)}$$

The above equation-7 shows that **when large budget deficit is financed through seignorage, it leads to high and increasing inflation.**

Effect of Constant Nominal Money Growth on Seignorage

If the rate of nominal money growth be constant forever, then its effect on seignorage can be seen as follows:

Effect of constant nominal money growth forever is that both actual inflation (π) and expected inflation ($E\pi$) must be equal to nominal money growth ($\Delta M / M$)

That is,

$$E\pi = \pi = \Delta M / M \text{---(8)}$$

Substituting (8) in (7), we get :

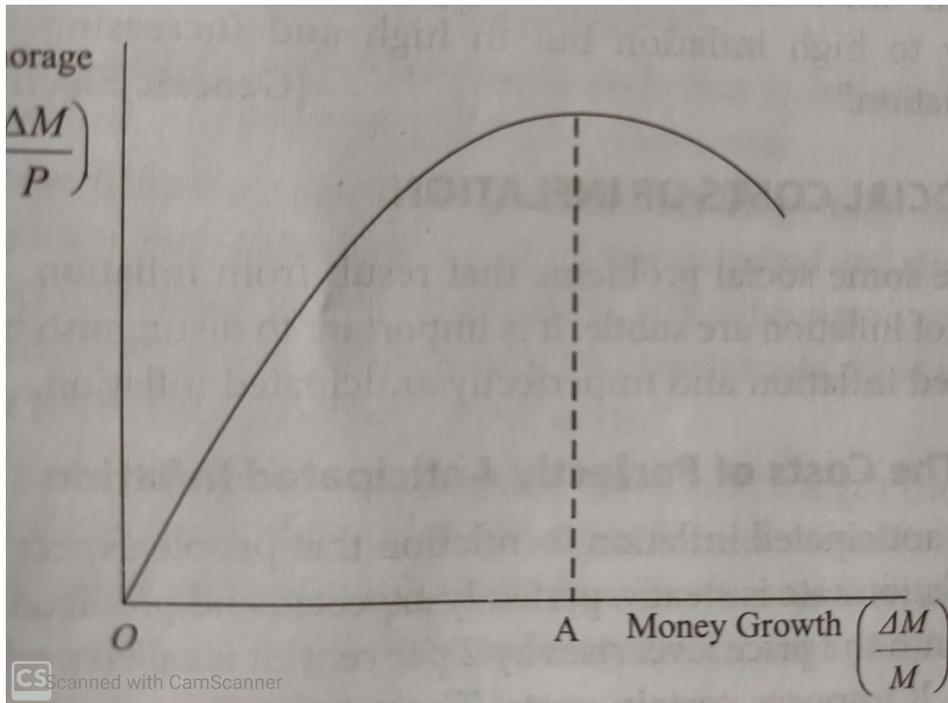
$$\text{Seignorage} = (\Delta M / M) [Y L(r+\Delta M / M)] \text{---(9)}$$

The above equation shows that $\Delta M / M$ has two opposite effects on seignorage:

(i) The first term $\Delta M / M$ in equation shows that as nominal money growth rises, seignorage also rises (given real money balances).

(ii) The second term $\Delta M / M$ shows that an increase in nominal money growth raises inflation and reduces real money balance or seignorage.

The relationship between seignorage and nominal money growth is shown in figure-1



In the above figure, seignorage is initially an increasing function then a decreasing function of nominal money growth, giving it a hump shape.

From origin till point **A** = As nominal money growth increases, seignorage also increases.

Beyond Point **A** = Beyond Point **A**, as nominal money growth increases, seignorage decreases.

Inflation tax is product of rate of inflation (π) and real money balance (M / P)

$$\text{Inflation tax} = \pi \cdot M / P \quad \text{-----} \quad (10)$$

Substitute equation (8) in (10), we get:

$$\begin{aligned}
&= (\Delta M / M) (M / P) \\
&= (\Delta M / \cancel{M}) (\cancel{M} / P) \\
&= \Delta M / P \\
&= \text{Seignorage}
\end{aligned}$$

Hence, as inflation rate becomes very high it leads to larger budget deficit. One reason is lags in tax collection. This effect is called **Tanzi-Olivera effect**. The effect shows that high inflation reduces real government revenue, which further worsens the budget deficit situation. As budget deficit worsens, more seignorage is needed.

The Social Costs of Inflation

Our discussion of the causes and effects of inflation does not tell us much about the social problems that result from inflation. We turn to those problems now.

The Costs of Perfectly Anticipated Inflation / The Costs of Expected Inflation

Consider first the case of expected inflation. Perfectly anticipated inflation is inflation that people expect. In other words, when inflation rate is steady, perfectly expected and predictable, (suppose that every month the price level rose by 1 percent. What would be the social costs of such a steady and predictable 12 percent annual inflation? It is called perfectly anticipated inflation. It imposes certain costs. These are:

1. **Shoelather Cost:** The cost to the individual of holding money is the interest foregone by not holding an interest-bearing asset. When inflation rate rises, nominal interest rate rises and the interest lost by holding money rises. Thus, the cost of holding money rises. In other words, demand for money balances

fall. People must make more frequent trips to the bank to withdraw smaller cheques. It involves shoe leather cost of inflation, because walking to the bank more often causes one's shoes to wear out more quickly.

- 2. Menu Cost:** With high inflation, firms are expected to change their announced prices. It requires changing cash registers, catalogues etc. These costs are called menu costs, because the higher the rate of inflation, the more often firms have to print new menus.
- 3. The cost of Relative Price Variability:** Firms facing menu costs do not change prices frequently. A higher rate of inflation implies greater variability in relative prices. This variability in relative price imposes a cost—that is, it leads to microeconomic inefficiencies in the allocation of resources.
- 4. Tax Distortions:** Most of the tax provisions do not take into account the effects of inflation. Inflation can change individuals' tax liability since tax code measures nominal income rather than the real capital gain. Thus, inflation distorts how taxes are levied.
- 5. Confusion and Inconvenience of Making Inflation Corrections:** Money is the yardstick with which we measure economic transactions. With inflation, this yardstick is changing. For example, when the value of dollar is continuously changing, then dollar is a less useful measure. Thus, inflation imposes a cost in terms of inconvenience of making inflation corrections.

The Costs of Unexpected Inflation

Unexpected inflation has an effect that is more pernicious than any of the costs of steady. More detailed, Unexpected or imperfectly anticipated inflation is inflation that people do not expect. It imposes certain costs. These are:

- 1. Adverse Effect on Efficient Decision Making:** With inflation, some are gainers and others are losers. Unanticipated inflation introduces an extra

element of risk. Such extra risk eliminates some attractive exchanges among both business and consumers. This is a cost which arises because of unexpected inflation.

2. **Arbitrary Wealth Redistribution:** Inflation changes the real value of assets fixed in nominal term. With unexpected inflation, realised real interest rates are lower than nominal interest rates. It hurts individuals on fixed pensions. It can wipe out the purchasing power of a lifetime saving.

Most loan agreements specify a nominal interest rate which is based on the rate of inflation prevailing at that time. If inflation is on the higher side than expected, then debtors win and the creditors lose as debtors repay the loan with less purchasing power. This shows how inflation redistributes wealth between debtors and creditors.

HYPERINFLATION

Hyperinflation or High inflation is often defined as price rise that exceeds 50 percent per month or 1000 per cent per annum. Here we consider the costs and causes of such extreme inflation.

(i) Hyperinflation results when there is a **budget rises**. It is generally due to major **social or economic unrest, civil war or a revolution or a large adverse economic shock**.

(ii) The size of the deficit is so large that the **government is unable to borrow from public or from abroad**. Government finances deficit through money creation. The central bank prints money. Government issues bonds and asks the central bank to buy them. The central bank buys these bonds by printing

more money Government uses this money to finance its deficit. The process is called **debt monetization**. It leads to hyperinflation.

Some adverse affects of Hyperinflation are :

1. The transaction system works less and less efficiently.
2. Price signals become less and less efficient.
3. Changes in the inflation rate become larger.

The Costs of Hyperinflation

Although economists debate whether the costs of moderate inflation are large or small, no one doubts that hyperinflation extracts a high toll on society. Hyperinflation makes the country run less efficiently. *The costs of hyperinflation are same as the social cost of inflation*, but in hyperinflation these cost are more severe and intolerable because money loses its role as a store of value, unit of account and medium of exchange. Barter becomes more common and more unofficial currencies like cigarettes start replacing official currency. The costs of inflation becomes severe in hyperinflation. It can be seen from the following .

1. Shoeleather
2. Menu costs
3. High variation in the relative prices
4. Tx system
5. Customers face inconvenience. As I already discussed previous section.

Causes of Hyperinflation

The main cause of hyperinflation is always massive growth in the supply of money. The government prints more money to finance huge budget deficits which are generating large national debts.

Conclusion: The classical Dichotomy

Over the course of this and the previous chapter, we have studied the meaning of money and the impact of the money supply on inflation and various other variable.

The separation of real and nominal variables is called the classical dichotomy.

According to classical economic theory, money is neutral , that is money supply has no relevance for real variables. In other words, money supply does not change real variables. In classical theory, determination of real variable is done without any mention of money supply. It is called monetary neutrality. Money market equilibrium determines the price level and all other nominal variables.

(Note : As per as the university of delhi syllabus, we had covered some of the units in the classroom and rest of the units have been covered through online classes as well as e-content in our college website. In addition to that, you will have to look at Economic Survey 2019-20, Please see the below link., <https://www.indiabudget.gov.in/economicsurvey/>

Partha Ray(2013): Monetary Policy Oxford India Short Introduction

Please see the below link..<https://www.thehindu.com/opinion/lead/the-perils-of-rbis-fixation-on-inflation/article30578704.ece>

Pulapre Balakrishnan: "the perils of RBI's fixation on inflation" Please see the below link., <https://www.thehindu.com/opinion/lead/Flawed-premise-misplaced-prescription/article14508120.ece>

Readings:

1. *N.Gregory Mankiw (2013). Macroeconomics(8th edition): Section 4.1(pp.79-85) and section 5.1 (pp.100-106).*
2. *Oliver Blanchard (2006) Macroeconomics (6th edition); Chapter:4.*
3. *Economic Survey 2017-18 Volume 2, chapter 4*
4. *Partha Ray (2013) Monetary Policy Oxford India Short Introduction. Chapter 1. What is Monetary Policy? pp. 31-45.*
5. *Partha Sen: “Ujit Patel Committee Report-Flawed Premise, Misplaced Prescription,” The Hindu (July 26, 2016) [Supplementary reading].*

**All the best **

Course Teacher
Dr.D.Appala Naidu