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IMPERFECTLY FLEXIBLE PRICES - I

Unit Structure

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Imperfectly Flexible Prices (Sticky Price)
- 1.3 Price-Setting under Imperfect Competition
- 1.4 Menu Cost
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1.0 Objectives

- To know the Concept of Imperfectly Flexible Prices
- To know the reasons of imperfectly flexible prices
- To know how to price setting under imperfect competition
- To understand the concept of Menu cost

1.1 Introduction

Various economists have observed that fluctuations in the aggregate demand during short run causes deviations in the output and employment from the potential GDP. The classical and new classical economists advocated the view that it was because of wage-price flexibility that changes in the aggregate demand leads to an appropriate changes in the wages and prices, in such a manner that aggregate output and employment level remains unchanged. Contrary to this Keynes and his earlier followers assumed wages and prices to be rigid or sticky, because of this any fluctuation in the aggregate demand did not affect wages and prices in the short run but on the contrary this caused changes in the levels of output and employment.

The new classical economics is based on rational expectations and raised doubts on the validity of the assumption of price rigidity or stickiness of the traditional Keynesian model and pointed out that it was not based on the firm foundations of microeconomics which was based on the rational of profit maximizing principle.

The main element in the Keynesian model is that both the money wages as well as the prices are sticky or slow to adjust to the changes in the economic conditions. Now, here the question arises why are the prices sticky or slow to adjust to the changes in the economic conditions? With the help of microeconomic theory the new Keynesians tried to explain the short run price stickiness and thus putting it on firmer theoretical foundations. A number of models tried to explain the price stickiness which were based on the microeconomic principles and did make some improvement over the traditional Keynesian model but they too fell within framework of the earlier Keynesian model and are thus called New Keynesian Economics or Models.

A major difference between the New Keynesian economics and the traditional Keynesian model is that the New Keynesian economics is based on the imperfect competition whereas the traditional Keynesian model assumes perfect competition where the firm faces a horizontal demand curve. A horizontal demand curve in perfect competition showed that the firm can sell as much quantity it likes to sell at the prevailing price which is determined by the forces of demand and supply for that commodity. However, a downward sloping demand curve of an imperfectly competitive firm implies that any price cut by the firm will lead to some increase in its sales but rival firms will too follow the suit and are likely to cut their prices too, so it may not be a profitable idea to change or adjust prices. The new Keynesian models are based on the optimal behaviour of firms working rationally.

1.2 Imperfectly Flexible Prices (Sticky Price)

The major feature which distinguishes neoclassical macroeconomics from Keynesian macroeconomics is the assumed speed of price adjustment. The neoclassical models assume that the prices are perfectly flexible and instantaneously adjust to clear goods, labour and money markets. On the other hand Keynesian macroeconomics models assume that the prices are sticky or even fixed, and as a result at best, they adjust to clear markets only slowly or at worst they fail to clear markets at all, leaving either permanent excess demand (shortages) or excess supply (unemployment).

New Keynesian economists along with Prof. Mankiw went on to explain that under imperfect competition in the product market for example Oligopoly, Monopolistic Competition etc. When there is a decrease in the aggregate demand the firms try to keep their prices constant i.e. sticky. Firms face a downward sloping demand curve under imperfect competition. If there is a fall in the aggregate demands in the economy which can be due to a contraction in the money supply in the economy, then also the firms under imperfect competition would not reduce their prices in the process it may lose some of its clients or customers but not all of them. For example when there is a decrease in the aggregate demand which result in a decline in the demand for Tata automobiles, then the Tata Motors company can still continue to sell its cars at the previously high prices and may not lower the prices of the same, that is prices may remain sticky in the face of decrease in demand. Elaborating on this point Richard Froyen (*Macroeconomics, 6th edition, 1999, p. 62*) writes "Monopolistic competitors and oligopolies have some control over the price of their products. In fact, the incentive to lower prices may be fairly weak for those types of firms. If they hold to their initial price when demand falls, they will lose sales, but the sales they retain will still be at the relatively high initial price. Also, if all firms hold to the initial price, no individual firm will lose sale".

However, it may be noted here that even under imperfect competition market conditions, that when the demand for a product decreases, a firm gains or benefits from lowering the prices. As the firms under imperfectly competitive market face a downward sloping demand curve, a reduction in the price by the firm will increase the quantity demanded of the product, this is turn may lead to some gain in profits. This gives rise to a big question that why don't the firms lower their price when there is a decline in the aggregate demand?

1.2.1 Reasons for Imperfectly flexible prices or Sticky Prices

The two important reasons have been given for sticky prices by the new Keynesian economists. They are

- 1. The price paid by the firm or the cost borne by the firm for not adjusting prices is the potential loss of consumer's goodwill. The consumer's goodwill is also lost when the firm raises its prices. The customers don't mind or rather understand when the prices raised by the firms are mainly due to rising cost. However, customers don't like the change in the price made by the firm due to change in the demand for their product. It is mainly because of this reason that the firms prefer to keep the prices sticky.
- 2. The other aspect of perceived cost of price cutting during recession it that it may lead to higher price cuts by the rival companies and which may ultimately leads to a price war which harms every firm. These price cutting responses become more relevant in case of oligopolistic markets where the rival firms keep an eye on the pricing decisions of their rival firms.

The price stickiness will depend upon the cost of price adjustment, if the price adjustment costs are high enough, then the price stickiness will be there. This implies that the price will not adjust or response to changes in aggregate demand, or to the fluctuations in demand causing business cycles, whether it is recession or boom in the economy.

1.2.2 Imperfectly Flexible Price Model in Mathematical Form

Here, it is assumed that an economy has large number of firms, each having some monopoly power, like firms working under monopolistic competition and oligopoly have some monopoly power over its product. Here let Y_i represent the demand of each firm, P_i is the relative price of the product of a firm to the overall price level (P) and Y is the aggregate demand for the product. The demand function for each firm's product can be written as

$$Y_i = (P_i / P)^{-e} Y_{e>1}$$
(1)

The above equation (1) shows that the demand for the firm's product depends on its relative prices (Pi/P) price elasticity of demand (e) and the aggregate demand (Y).

In order to simplify the model Mankiw has assumed that the real aggregate demand (Y) is determined by the real money supply, that is, Y = M / P. Substituting M / P for Y in equation (1) we have

$$Y_i = (P_i / P)^{-e} . M / P$$
(2)

The equation (2) shows us that the demand situation which a firm faces depends on its relative price to the overall price (Pi / P) and real money supply (M / P) which determines aggregate demand. Besides this, the relative price of a firm also determines its relative position on the given aggregate demand for the product.

An imperfectly competitive firm fixes it price by adding a mark-up over its marginal cost. Thus,

$$P_{i} = \underline{e} \quad \underline{W}$$

$$e -1 \quad MP_{L} \qquad \dots \dots \dots \dots (3)$$

Where, W / MP_L is marginal cost and e / (e - 1) is the mark-up. A firm's profit which is represented by π can be obtained by multiplying the amount of output demanded and sold by the difference between price and the marginal cost.

Profit (π) = P_i - (W / MP_L) Y_i(4)

the nominal money supply, with price P_i remaining the same. In terms of equation (2) with the fall in M, demand for output of each firm, Y_1 will decline which will result in recession, price of each firm remaining unchanged.

The firms will have to reduce their prices in order to maintain output level when there is fall in the demand. When the firm facing a downward-sloping downward demand curve reduces its prices then it will lead to increase in sales and profits. However, according to Mankiw, price adjustment by a firm would yield only second order gain and even small menu costs exceed it. Therefore, the firm will not adjust i.e. cut prices. If the average price level does not get adjusted to the new reduced demand conditions for output, the recession will occur in the economy. With this reduced output (Y) of the firm, the profits as measured by equation (4) will fall.

When Mankiw compares menu cost of price adjustment, potential gain from price cutting will be very small, that is, of second order under the following two conditions:

- 1. The potential gain of making price adjustment is very small when the difference between the existing price and profit maximizing i.e. optimal price is small.
- 2. A firm dealing in a product having a low-price elasticity of demand, the increase in profit is less sensitive to adjusting price to the exactly new profit-maximizing level.

Here, it may be highlighted again that the firms don't adjust their prices when they are facing changes in the demand because when they are taking pricing decisions, they don't take into account the external demand benefits of adjusting prices. It is because of this, that the overall price level (P) and the relative prices of the firms remain unchanged. Thus, the fall in the aggregate demand leads to a reduction in the output i.e. recession.

Check Progress

- 1. What do you understand by imperfectly flexible prices?
- 2. What are the reasons of imperfectly flexible prices or sticky prices?
- 3. Explain imperfectly flexible price model in mathematical form.

References: Macro Economics by Dr. H. L. Ahuja

1.3 Price-Setting Under Imperfect Competition

Gregory Mankiw and some other Keynesian economists are of the opinion that not adjusting prices in the time of a fall in the aggregate demand would lead to recession. During recession, both output level and the employment level are quite low, large number of factories don't work or work below capacity. When a society fails to attain its potential GDP and full employment level which is socially desirable, it implies that the members of the society have failed to co-ordinate among themselves in some way or the other. This co-ordination problem is relevant and important in the explanation of stickiness of the prices of the firms which is set them anticipating the actions of rivals. While fixing the prices one firm anticipates what price the other firm will set, but still their decisions are based on uncertainty about what prices the other firms will charge.

Let us now see how the price stickiness leads to recession which is mainly due to the failure of co-ordination between the rivals when the aggregate demand decreases. We consider that in the economy there are two firms, firm A and firm B which implies that there is an oligopoly market. When there is decrease in the aggregate demand which let's say is due to fall in the money supply, now each firm will have to take a decision whether it should cut its price to achieve profit maximization, or should it keep its price at the existing high level. However, it is worth noting out here that firm's profit depends not only on its own price decision but also on the pricing decision of the other firms. We can explain this with the help of the following table which represents pay-off matrix of two firms of various combinations of pricing decisions of the two firms.

Table No. 1.1 Pay off Matrix

(In Crores)

Firm A	Firm B	
	Cut Price	Keeping Price high
Cut Price	Firm A's Profit: 50	Firm A's Profit: 10
	Firm B's Profit: 50	Firm B's Profit: 25
Keeping Price high	Firm A's Profit: 25	Firm A's Profit: 20
	Firm B's Profit: 10	Firm B's Profit: 20

It can be seen here that both the firms decide to keep the prices at the current high level where each of the firms will make a profit of Rs.20 cr. (see right hand side

bottom box) without anyone of them opting for price cutting. In such a situation because of price stickiness there will be a fall in the output as well as the employment level in the economy which will ultimately lead to recession. If on the other hand, if both the firms decide to cut their prices, then each firm will make a profit of Rs.50 cr. This will not only increase the profits of the two firms individually but will also lead to social optimum. This will happen because as the prices are reduced by both the firms it will lead to fall in the overall price level which will ultimately stimulate aggregate demand. So in such a case recession would not occur.

Further, if firm A cuts its price, while the firm B keeps its price at the existing high level, firm A's profits are Rs. 10 crores while firm B's profit are 25 crores. (See right-hand side upper box of the table). When firm B does not cut its price in recession firm A's profits are much lower, one because of lower output and secondly due to lower price. Similarly, if firm B cuts its price but firm A Keeps its price at the existing high level, firm A's profits are 25 crores and firm B's profits are Rs. 10 crores (see bottom box of left-side of payoff matrix of the table). None of the firms would prefer recession, but to avoid recession, both of them need act together. A decision taken by one firm will affect the earning opportunities available to the other firm. When the firm reduces its price, it is beneficial for others also this happens because of beneficial aggregate demand externality (due to higher profits) earned by it. As both the firms are ignoring this beneficial externality, this will lead them to recession as there is no co-ordination between them.

It is obvious, that each firm will expect the other firm to reduce its price, so both firms will reduce their prices which will be desirable not only from individual point of view but from the point of view of the society as well, as these reduction in prices by the firms will lead to reduction in the overall price level which will enable them to avoid recession in terms of both employment and output. On the other hand, if each firm expects that the other will keep its price at the present high level both will keep prices unchanged at the present relatively high level. This ultimately leads to recession, which is neither good for the individual firms nor for the society as a whole. Anyone of the two results can be true however; the new Keynesian economists think that the second inferior outcome, that is, no reduction or adjustment in prices which will lead to recession has more chances because of coordination failure. Thus, Gregory writes (*Gregory Mankiw, Macroeconomics, 6th edition, p.512.*), "If the two firms could coordinate, they would both cut their price and reach the preferred outcome." However, in the real life situation co-ordinated effort is difficult as the number of firms setting the prices is very large. From this

we can conclude that prices are sticky mainly because of people's expectations, although stickiness is not good for anyone.

1.4 Menu Costs

It has been argued by the New Keynesian economists that menu costs are the reason for price stickiness. Business cycles can result due to price stickiness, the suboptimal adjustment of prices in response to demand shocks. Gregory Mankiw in his article "Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly" in 1985 presented that sticky price can be both individually effective but ineffective when it comes to public. It has been pointed out by Mankiw that, even small menu costs can cause large welfare losses.

One of the main reasons according to Mankiw and other Keynesian economists that the firms do not want to alter their prices when there is change in the demand for their products is that they have to incur costs for making adjustment in prices when demand for their products changes is that they have to incur costs for making adjustment in prices. To change prices, a firm has to print a new catalogue and send it to its customers, distribute new price list among its sale staff. Such costs of making price adjustments are called Menu Cost. This term came into existence from the practice of restaurants. When restaurants alter their prices, they will have to print new menus and incur cost on it.

According to New Keynesian economists and Mankiw the firm will only change its price when the advantages or gains by changing the prices over weigh the costs. However, there were some economists who were doubtful about this point of view kept forward by the new Keynesian economists. The new Keynesian economists have pointed out that menu costs are quite trivial and therefore they cannot explain stickiness of price in the face of decrease in aggregate demand. They questioned how recession which occurred due to price-stickiness and proved very costly for the entire economy was explained by small menu costs. But Mankiw (*N. Gregory, Macroeconomics, Worth Publishers 6th edition, 2003, p.510*) has argued that "small does not mean inconsequential, even though menu costs are small, they can have large effects on the economy as a whole".

A static model of a monopoly firm's pricing decision was used by Mankiw, which sets its price in advance and changes it ex post, by paying a small menu cost. A monopoly firm faces an inverse demand function and a constant cost function.

$$C = kqN$$

Where,

C = Total nominal cost of production

q = Quantity produced

k = Constant

$$P = f(q)N$$

Where,

P = Nominal price

Nominal scale variable is represented by N, which represents the exogenous level of aggregate demand. It can be believed to be an overall price level. C and P both increase proportionally to N that is the level of nominal demand.

Now, let C = C/N and P = P/N which turns the firm's problem independent of the aggregate demand.

$$C = kq$$
$$P = f(q)$$

The figure below represents the producer's surplus (profit earned by the firm) which is equal to the rectangle between point K and Pm. While on the other hand, the excess utility enjoyed by the consumer over the price paid represents the consumer's surplus, which is represented by the triangle above. The sum of both consumers' surplus and producers' surplus represents the total surplus.

The firm needs to set its price one period ahead based on expectations about future aggregate demand, being this price P_mN^e. If expectations are correct ex- post, the observed price p_0 is p_m . Otherwise; the observed price is P_m (N^e/N).



Figure No. 1.1

1.4.1 First scenario

The first case Mankiw examines is when aggregate demand N is lower than expected, and therefore p_0 is higher than P_m , as shown in the figure below. The producer surplus is lowered by B-A (since profits as seen before were equal to rectangle B plus the rectangle to its left), which is positive because P_m is by definition the profit-maximising price. Social welfare (or total surplus) is reduced by B + C, and therefore the reduction in welfare due to the contraction in aggregate demand is larger than the loss in the surplus of the firm.





Now, let's suppose that the firm is capable of changing its price ex-post, at a menu cost of z. The firm can then reduce its price from P_0 to P_m and obtain additional profits of B - A, which the firm will do if B - A > z. However, from the point of view of a social planner, the firm should lower its price if and only if B + C > z. Let's see Mankiw's propositions on different outcomes:

- **Proposition 1.** If the firm reduces its price after a contraction in demand then doing so is social optimal (if it reduces the price, is because B - A > z and therefore B + C > z + A + C > z)
- **Proposition 2.** If even after a contraction in demand if the firm does not reduce its price to P_m then B + C > z > B + A, even though it is socially

optimal (the ineffectiveness results which is because printing new menu results in an external benefit of C + A)

• **Proposition 3.** As the aggregate demand contract then there is reduction in social welfare unambiguously, this is shown by the sum of the producer's and consumer's surplus. If the price is reduced by the producer, then the contraction only has the menu cost z. If the firm does not cut its price, then the contraction has the cost of B + C (probably much larger than z).

1.4.2 Second scenario

The second case Mankiw analyses is an expansion in aggregate demand (N > N^e), and therefore $P_0 < P_m$. Firstly, let's see what happens when $P_0 > k$ (N/N^e $< P_m / k$), as shown in our third figure. In this case, producer surplus is reduced by D - F, which is positive (P_m maximises the firm's profits) and social welfare increases by E + F. A new price will be set by the firm if the increase in their profits is more than the menu cost. In other words, the firm will change its price if D - F > z.



• **Proposition 4.** Social welfare will decrease by the menu cost, if there is an expansion in demand and if the firm resets its price. If it doesn't, total surplus increases by E + F.

1.4.3 Third scenario

Now, let's see what happens if $N / N^e > P_m / k$, and therefore $P_0 < k$. Then, social welfare decreases by a positive or negative amount of I - J, which makes for an

uncertain welfare effect. The firm's profits, which are now negative, have been reduced by G + H + I. If G + H + I > z, then the firm will reset its price to P_m . Doing so would be socially optimal if I - J > z.





- **Proposition 5.** Social welfare (total surplus) will decrease by the menu cost z if the firm resets its price following the expansion in demand. Total surplus does not decrease by more than the menu cost (if the firm doesn't reset its price is because G + H + I < z, which implies that I J < z J G H < z and therefore the social welfare reduction I J < z).
- **Proposition 6.** When there is an expansion in the aggregate demand it may either lead to an increase in the welfare or may reduce it, but such an increase or reduction will never be more than the menu cost. While a contraction in the aggregate demand will decrease the welfare, this reduction in welfare will be more than the menu cost.

In order to defend his point of view Mankiw took the help of aggregate demand externality. He stressed the point that if there are beneficial externalities to price adjustment by any firm then that needs to be recognized. When the price reduction by one firm benefits the other firms as well it is called beneficial externality effect. If a high price charging firm reduces its price, then this in turn will result in slightly lower average price level which in turn will lead to an expansion in the aggregate income by causing a rightward shift in the LM curve. As there is an expansion in the aggregate income this will lead to the benefit of other firms as it will have a positive impact on the demand for their products. Since this benefit's other firms too, it is called aggregate demand externality. However, according to Mankiw this benefit is external to the firms hence they ignore it completely while taking their price making decision for their products. To quote Mankiw, "The firm makes decision by comparing the benefit of a price cut – higher sales and profits – to the cost of price adjustment. Yet because of the aggregate demand externality, the benefits to society of the price cut would exceed the benefits to the firm. The firm ignores this externality when making its decision, so it may decide not to pay the menu cost and cut its price even though the price cut is socially desirable. Hence sticky prices may be optimal for those setting prices, even though they are undesirable for the economy as a whole".

1.4.4 Conclusion

So all in all we see that Mankiw demonstrated that when aggregate demand expands private incentives ensure high price adjustment however the adjustment is small when there is a contraction in the aggregate a demand. Social planner presented their view by pointing out that prices may be stuck too high, but never too low, which points out the downward price stickiness, although not into an upward rigidity. However, Mankiw also pointed out to a more complete model (general equilibrium) which according to him will probably show higher degrees of price stickiness, since inter firm purchase will sharpen price rigidity. Therefore, we can conclude that small menu costs could mean large inefficiency effects which would certainly remain in a general equilibrium.

As far as the economic policies are concerned there is a requirement to alleviate these problems, Mankiw explains how an active monetary policy is required. Especially, he makes a mention of policies that aim at the pricing mechanism, such as tax-based incomes policy and other supply-side policies.

Check Progress

- 1. What do you understand by price setting under imperfect competition?
- 2. Explain price setting under imperfect competition with the help of example.
- 3. What do you understand by Menu Cost?

References: Macro Economics by N. Gregory Mankiw

1.5 Summary

- 1. A downward sloping demand curve of an imperfectly competitive firm implies that any price cut by the firm will lead to some increase in its sales, but rival firms will too follow the suit and are likely to cut their prices too, so it may not be a profitable idea to change or adjust prices.
- 2. As the firms under imperfectly competitive market face a downward sloping demand curve, a reduction in the price by the firm will increase the quantity demanded of the product, this is turn may lead to some gain in profits.
- 3. The price paid by the firm or the cost borne by the firm for not adjusting prices is the potential loss of consumer's goodwill.
- 4. The other aspect of perceived cost of price cutting during recession is that it may lead to higher price cuts by the rival companies and which may ultimately leads to a price war which harms every firm.
- 5. The price stickiness will depend upon the cost of price adjustment, if the price adjustment costs are high enough, then the price stickiness will be there. This implies that the price will not adjust or respond to changes in aggregate demand, or to the fluctuations in demand causing business cycles, whether it is recession or boom in the economy.
- 6. A firm dealing in a product having a low price elasticity of demand, the increase in profit is less sensitive to adjusting price to the exactly new profit-maximizing level.
- 7. The fall in the aggregate demand leads to a reduction in the output i.e. recession.
- 8. The price stickiness leads to recession which is mainly due to the failure of co-ordination between the rivals when the aggregate demand decreases.
- 9. To change prices, a firm has to print a new catalogue and send it to its customers, distribute new price list among its sale staff. Such costs of making price adjustments are called Menu Cost.
- 10. The firm makes decision by comparing the benefit of a price cut higher sales and profits to the cost of price adjustment. Yet because of the aggregate demand externality, the benefits to society of the price cut would exceed the benefits to the firm.
- 11. Sticky prices may be optimal for those setting prices, even though they are undesirable for the economy as a whole".

1.6 Questions

- Q1. Explain in detail about imperfectly flexible prices and what are the reasons of sticky prices?
- Q2. Explain imperfectly flexible price model in mathematical form.
- Q3. Explain price-setting under imperfect competition.
- Q4. Explain in detail the concept of menu cost.

Module 1

IMPERFECTLY FLEXIBLE PRICES - II

Unit Structure

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Real Rigidity
- 2.3 Quadratic Price Adjustment
- 2.4 Summary
- 2.5 Questions

2.0 Objectives

- To know the Concept of Real rigidity
- To know the quadratic price adjustment

2.1 Introduction

In macroeconomics, rigidities are real prices and wages that fail to handle to the extent indicated by equilibrium or if something hold one price or wage fixed to a relative value of another. Real rigidities are often distinguished from nominal rigidities, rigidities that don't adjust because prices are often sticky and fail to vary value whilst the underlying factors that determine prices fluctuate. Real rigidities, alongside nominal, are a key a part of new Keynesian economics. Economic models with real rigidities cause nominal shocks (like changes in monetary policy) having an outsized impact on the economy.

2.2 Real Rigidity

Large class of business cycle propagation mechanism are referred to as real rigidities. Real rigidities are the essence to any successful explanation of business cycles.

2.2.1 The definition of real rigidities

Let us suppose an economy that is at its flexible-price equilibrium, now suppose the money supply is increased with prices unchanged, so that the aggregate output increases. Now here, the question arises that how much a representative firm would want to increase its price if it faces no barriers to nominal price adjustment? Going by the definition, the firm would want to increase its price by a smaller amount in response to a given increase in aggregate output, the greater is the degree of real rigidity.

2.2.2 Diagrammatically Representation of Real Rigidity

Now the question arises that whether small frictions can lead to nominal disturbances which in turn can have large effects on aggregate economic activity which depends on the incentives that the individual firms gets to change their prices when aggregate output changes. For example, consider that there is an overall decline in the output in the economy. Here, the challenge which the firm faces is that when the demand for its product declines as a result of the fall in the aggregate production is whether it should continue with its current prices and reduce its output, or should it lower its price and thereby maintain its original level of output.

This issue can be analysed using the marginal revenue-marginal cost diagram in Figure 2.1.



In the beginning the economy is in the equilibrium, thus the firm's production level is at the point where its marginal cost is equal to its marginal revenue which is represented by Point A in the diagram. With a contraction in the output of the whole economy, the output shifts the demand curve of the firm – at a given price, demand

for the firm's product is lower. Thus, marginal revenue shifts in. If on the other hand, if the firm does not change its price, its output is determined by demand at the existing price that is point B. Over here, marginal revenue is greater than the marginal cost, so the firm has an incentive to reduce its price and increase its output. Now, when the firm changes its price, it produces at a point where marginal cost is equal to marginal revenue that is at point C. The additional profits to be gained from reducing price and increasing quantity produced is represented by the area of the shaded triangle in the diagram.

A crucial point is highlighted in the diagram that is the firm's incentive to reduce its price may be small even if it is greatly affected by the fall in the demand for its product. The firm would certainly prefer to face the original and the higher demand curve, but however, now it can only choose a point on the new demand curve. The firm may find that the gains from reducing its price are small even though the shift in its demand curve is large.

If the gains to the firm from cutting its price are indeed small, the behaviour of many such firms facing small frictions in price adjustment can cause an aggregate demand disturbance to have large real effects. Let us assume that the decline in the money supply is causing the underlying disturbance or there is some other adverse aggregate demand shift, and let us further assume that provisionally the firms do not cut their prices in response to such disturbance. In this situation, aggregate real output falls. The figure shows the situation faced by the representative firm. If the representative firm's incentive to adjust its price is small and there are frictions in price adjustment, then firms' conjectured behaviour of holding their prices fixed is indeed equilibrium. However, if there is a huge incentive for price adjustment then all the firms will cut their prices, and the final result will be negative aggregate demand shock which will only result in lower prices.

An incentive of the firm to change its price in response to the decrease in demand the size of the triangle in Figure 1—is determined by the responses of marginal revenue and marginal cost to the downturn in aggregate demand. Take marginal cost first. Since less output is being produced, less labour is demanded. With an upward-sloping labour supply curve, this implies a decline in the real wage, and hence in marginal cost. The cyclical behaviour of marginal cost also depends on the degree of short-run diminishing returns to labour; if the marginal product of labour rises quickly as labour input declines, the marginal cost curve is sheer (steep) even if the real wage is unchanged. The greater the marginal cost declines when there is a fall in the output, the greater is the firm's incentive to lower its price. Now consider marginal revenue. The greater the shift in marginal revenue curve to the left, the smaller the firm's incentive to lower its price. The size of the shift of the marginal revenue curve depends on the cyclical behaviour of the elasticity of demand. In the figure, the demand elasticity faced by the firm at its existing price is assumed not to change when aggregate output changes. In this case, marginal revenue at the existing price (which now corresponds to a lower level of output) is not affected by the change in economy-wide output. If the elasticity of demand at the existing price decreases when aggregate output declines, the shift in marginal revenue is larger; if the elasticity rises, the shift is smaller.

The framework set out in Figure 1 can be used to prove that simply adding imperfect competition and small barriers to price adjustment to the majority world view of the 1950s and 1960s is not sufficient to deliver a microeconomic basis for the view that aggregate demand shocks are central to economic fluctuations. The source of the difficulty lies in the labour market. If labour supply is relatively inelastic—surely the usual view 20 years ago, and probably the prevailing view today—and if there are no departures from Walrasian assumptions aside from the presence of small hurdles to nominal adjustment, then the decline in labour input associated with the decline in production leads to a large fall in the real wage.

In this case, marginal cost declines significantly in recessions. As a result, unless the elasticity of demand also falls substantially, firms' incentives to reduce prices are large. Back-of-the-envelope calculations for a simple model in which imperfect competition is the only departure from Walrasian assumptions show that if labour supply is relatively inelastic, firms' inducements to change their prices in the face of aggregate demand movements of a few per cent swamp any plausible barriers to nominal adjustment (Ball and Romer, 1990).

Thus, if the classical dichotomy is to fail, it must be that marginal cost does not fall sharply in response to a demand-driven output contraction, or that marginal revenue does fall sharply, or some combination of the two. At a more general level, the incentive to change price in response to a change in economy-wide output can be expressed as a function of two factors: the impact of the change on the firm's profit-maximizing real price, and the cost to the firm of a given departure of its real price from the profit-maximizing level. For the incentive for adjustment in the face of demand-driven fluctuations to be small, either profit-maximizing real price must respond little to changes in aggregate output—in the terminology of Ball and Romer (1990), the degree of "real rigidity" must be high—or considerable departures from profit-maximizing prices must have only small costs. In the simple model discussed above, the large changes in real wages in response to aggregate output movements cause profit-maximizing prices to be very responsive to

output—that is, real rigidity is low—and so the incentive for adjustment is large. Both a smaller cyclical sensitivity of marginal cost and a larger cyclical sensitivity of marginal revenue increase real rigidity, and thus reduce firms' incentives to adjust their prices. In short, a complete model of large real effects of nominal disturbances requires both nominal frictions and real rigidities.

Thus, if the classical contradiction is to fail, it must be that marginal cost does not fall sharply in response to a demand-driven output contraction, or that marginal revenue does fall sharply, or some combination of the two. At a more general level, the motivation to change price in response to a change in economy-wide output can be expressed as a function of two factors: the influence of the change on the firm's profit-maximizing real price, and the cost to the firm of a given withdrawal of its real price from the profit-maximizing level. For the incentive for adjustment in the face of demand-driven fluctuations to be small, either profit-maximizing real price must respond little to changes in aggregate output-in the terminology of Ball and Romer describes the degree of "real rigidity" must be high or considerable departures from profit-maximizing prices must have only small costs. The large fluctuations in real wages in response to aggregate output movements cause profitmaximizing prices to be very responsive to output-that is, real rigidity is lowand so the inducement for adjustment is large. Both a smaller cyclical sensitivity of incremental cost and a bigger cyclical sensitivity of marginal revenue increase real rigidity, and thus reduce firms' incentives to regulate their prices. In short, a complete model of great real effects of nominal disturbances requires both nominal frictions and real rigidities.

2.3 Quadratic Price Adjustment

2.3.1 Introduction

Higher competition among firms is mostly seen to put downward pressure on the price level. But in the presence of resistances on nominal price adjustments, the effects for short-run dynamics of inflation are unclear. Furthermore, the reaction of inflation and output to shocks may depend on the prevailing competitive environment. We uses the standard New Keynesian framework based on optimising behaviour of monopolistically competitive firms which face constraints on nominal price adjustments to examine these issues. It shows that expectations about firms' price-setting behaviour in the face of a structural change in competition determine the consequences for inflation dynamics and valuation of 'cost-push' or mark-up surprises.

In the New Keynesian context, the Dixit and Stiglitz (1977) elasticity of demand captures the degree of substitutability between goods. This elasticity is inversely

related to the preferred mark-up over cost that firms want to charge for their product. A higher substitutability between goods involves a higher level of competition among firms and a lower desired mark-up (a reduction in firms' pricing power). A structural increase in competition among firms relates to a one-off rise in the elasticity.

We consider modelling price-setting behaviour that are commonly used as micro foundations for the New Keynesian Phillips Curve (NKPC) within this framework. A model is convenient ways to describe firms' pricing behaviour in the goods market.

2.3.2 The Concept of Quadratic Price Adjustment Cost

The Rotemberg (1982) 'quadratic price adjustment cost' model (the R model) in which firms compare the profit loss from letting the desired nominal price move away from actual price with the cost of price adjustment. They choose the price in a way that minimises the two costs.

Higher competition in the R model *raises* the slope of the Phillips curve. The purpose is that in the occurrence of quadratic adjustment costs, each firm's pricing decision contains reducing profit loss from not charging the preferred price today and in the future. As the elasticity of demand rises and the economy come closer to perfect competition, not only does the level of preferred mark-up decrease but also varying prices turn into moderately cheaper. The last happens due the size of optimum price adjustment decreases. This effect encourages price elasticity in the R model and raises the slope of the Phillips curve.

When modifying prices a firm may not want a big difference in its price comparative to the average price so as not to lose market share. This concern for prospective market stake loss means that relative prices can be rigid or 'real rigidity' can prevail in the goods market as explained by Ball and Romer (1990) and Kimball (1995). Market share loss is bigger when the elasticity of substitution between goods is high, that is, when the degree of competition among firms is high. A higher competition suggests greater real rigidity and increases inactivity in price adjustments. This effect declines the slope of the Phillips curve. More clearly, for understanding the concept of quadratic price Adjustment we can explain the new Keynesian model and the Rotemberg (R) model.

(i) The New Keynesian model

Consider an economy with a representative household at time t that maximises a discounted sum of expected utilities:

$$E_t \sum_{j=0}^{\infty} \beta^j \left[\frac{C_{t+j}^{1-\sigma^{-1}}}{1-\sigma^{-1}} - \int_0^1 \frac{H_{t+j}(i)^{1+\phi}}{1+\phi} di \right]$$
(1)

Subject, to the standard budget constraint. The parameter β is the subjective discount factor $C_t = [\int_0^1 C_t(i)^{(\theta-1)/\theta} di]^{\theta/(\theta-1)}$

Dixit-Stiglitz constant-elasticity of-substitution consumption index, Ct(i) represents consumption of the ith good, $H_t(i)$ is the supply of type-*i* labour to the production of good of variety *i*, $\sigma > 0$ is the intertemporal elasticity of substitution of aggregate expenditure, Φ is the disutility of labour. For our purpose, the relevant utility-maximising condition is the intratemporal condition of the choice of labour supply of types *i*:

$$\frac{W_t(i)}{P_t} = \frac{H_t(i)^{\phi}}{C_t^{-\sigma^{-1}}}$$
(2)
Where $P_t = [\int_0^1 P_t(i)^{1-\theta_t}]^{1/(1-\theta_t)}$

is the price index. Wt (i) is the wage rate per unit labour of types i.

On the supply side, firms operate in a monopolistically competitive market and are uniformly distributed on the interval [0, 1]. Each firm *i* faces a demand curve, Yt(i),

$$Y_t(i) = \left(\frac{P_t(i)}{P_t}\right)^{-\theta_t} Y_t$$

$$Y_t = \left[\int_0^1 Y_t(i)^{(\theta_t - 1)/\theta_t}\right]^{\theta/(\theta - 1)} di$$
(3)

Where,

is aggregate demand, Pt(i) is the price of firm i's good, and Φt is the time-varying elasticity of demand for firm i that fluctuates around its steady-state level Φ . Firm i produce output using a technology

$$Y_t(i) = H_t(i)^{\alpha}, \ 0 < \alpha \le 1$$

$$\tag{4}$$

Where Ht (i) is the labour input and α is the elasticity of output with respect to labour. We implicitly assume that capital stock is 'firm-specific' and constant over time.

(ii) The Rotemberg (R) model: quadratic cost of nominal price adjustment

Following Rotemberg (1982), each firm faces a quadratic cost of nominal price adjustment, measured in terms of the final good and given by

$$\frac{c}{2} \left(\frac{P_t(i)}{\pi P_{t-1}(i)} - 1 \right)^2 Y_t \tag{5}$$

Where $c \ge 0$ determines the magnitude of the price adjustment cost and $\pi \ge 1$ is the gross steady-state inflation rate. Given (3), (4), (5), and wages in the labour market, a firm chooses a sequence for $P_t(i)$ to maximise the expected sum of future discounted profits.

$$E_{t}\sum_{j=0}^{\infty}R_{t+j}\left[\left(\frac{P_{t+j}(i)}{P_{t+j}}\right)^{1-\theta_{t+j}}Y_{t+j} - \left(\frac{P_{t+j}(i)}{P_{t+j}}\right)^{-\theta_{t+j}/a}\frac{W_{t+j}(i)}{P_{t+j}}Y_{t+j}^{1/a} - \frac{c}{2}\left(\frac{P_{t+j}(i)}{\pi P_{t-1+j}(i)} - 1\right)^{2}Y_{t+j}\right]$$
(6)

Where $R_t = \beta^t C_t^{-\sigma^{-1}}$ is the stochastic discount factor. In a symmetric equilibrium the optimal price P_t^* is the same for all firms, $P_t^*(i) = p_t$. In addition, Ht(i) = Ht, Yt(i) = Yt, Wt(i) = Wt and the aggregate resource constraint is

$$Y_{t} = C_{t} + \frac{c}{2} \left(\frac{\pi_{t}}{\pi} - 1\right)^{2} Y_{t}$$
(7)

Where $\pi_t = P_t / P_{t-1}$ is the gross inflation rate. The first-order condition for (6) can be written as

$$P_{t} = \left[\frac{1}{\left(\frac{\theta_{t}}{\theta_{t}-1}\right)^{-1} + \frac{c}{\pi\theta_{t}}\left(\left(\frac{\pi_{t}}{\pi}-1\right) - \beta E_{t}\left[\left(\frac{C_{t+1}}{C_{t}}\right)^{-\sigma^{-1}}\left(\frac{Y_{t+1}}{Y_{t}}\right)\pi_{t}\right]\right)}\right]\frac{1}{a}W_{t}Y_{t}^{1/a-1} = \mu_{t}\frac{1}{a}W_{t}Y_{t}^{1/a-1}$$

$$(8)$$

Where μ_t is the mark-up over the marginal cost, $1/aW_tY_t^{1/a-1}$.

In (8), there are two terms in the denominator of the mark-up, μ_t

The first term, $\phi t / (\phi t - 1)$, represents the mark-up and the second term

$$\frac{c}{\pi\theta_t} \left(\left(\frac{\pi_t}{\pi} - 1\right) - \beta E_t \left[\left(\frac{C_{t+1}}{C_t}\right)^{-\sigma^{-1}} \left(\frac{Y_{t+1}}{Y_t}\right) \pi_t \right] \right)$$

Represents the net cost associated with price adjustment. When there is no price stickiness (c = 0), the mark-up is the same as the desired mark-up, $\phi t / (\phi t - 1)$.

References: Advanced Macro Economics by David Romer

2.4 Summary

- 1. Rigidities in real prices aren't adequate to form rigidities in nominal prices and real effects of nominal shocks.
- 2. Little frictions in nominal adjustment, like costs of changing, prices, create only small non-neutralities.
- 3. However, substantial nominal rigidity will arise from a mixture of real rigidities and small nominal frictions.
- 4. The linking between real and nominal rigidity given the presence of nominal frictions both in general and for several specific sources of real rigidity like price of adjusting real cost and wages efficiency.
- 5. The Rotenberg 'quadratic price adjustment cost' model (the R model) in which firms compare the profit loss from letting the desired nominal price move away from actual price with the cost of price adjustment. They choose the price in a way that minimises the two costs.

2.5 Questions

- Q1. Explain in detail the concept of Real rigidity.
- Q2. Explain Concept of quadratic price adjustment.

NEW CLASSICAL ECONOMICS - I

Unit Structure

- 2.0 Objectives
- 3.1 Introduction
- 3.2 Concept of the New Classical Economics
- 3.3 The New Classical Rational Expectation Model
- 3.4 Policy Implication of the new Classical Rational Expectation Model
- 3.5 Concept and Meaning of DSGE
- 3.6 Dynamic Stochastic General Equilibrium Models
- 3.7 Summary
- 3.8 Questions
- 3.9 References

3.0 Objectives

- To know the views of New Classical Macro Economics
- To know the principles and policy implication of new classical Macroeconomics to relevance of current period
- To know the Concept of DSGE model

3.1 Introduction

In 1970s the new classical ideas were emerging and their concept of any cyclic fluctuations in economic activity had to be consistent with the concept of market clearing and optimizing behaviour by rational economic agents. This new statement of the classical ideas became to be known as new classical macroeconomics. The new classical macroeconomics has been developed by American economists and in particular by Lucas and Sargent.

The new classical macroeconomics challenged the Keynesian proposition that discretionary government policy can be used to stabilize the economy. The new

classical macroeconomics pointed out the failures of the Keynesian theory as the theory had failed miserably in mid-1960s which led to stimulate a critical reappraisal of the micro foundation of Keynesian analysis. The new classical macroeconomics explained the macroeconomic behaviour by forming a framework characterized by (a) market clearing and (b) optimizing behaviour.

3.2 Concept of the New Classical Economics

The new classical macroeconomics challenged and changed a part of monetarist and Keynesian views about the role that macroeconomic stabilization policy plays in the light of the classical school of thought.

At one place where Keynesian theory is of the view that the demand management policies both fiscal and monetary help in stabilizing the economy. The new classical macroeconomics firmly believed in active interventionist fiscal and monetary policies.

The new classical macroeconomics regarded both the policies as complementary to each other. Their idea depended more on the expansionary fiscal policy which controlled recession, existence of recession ultimately leads to rising unemployment with nearly zero growth in the economy. On the other hand they used deflationary fiscal policy with monetary policy to control inflation.

The monetarists believed that the economy with continue to be stable and when it is disturbed by some changes in the basic conditions it will quickly revert to its long-run growth path. They criticized the idea of discretionary fiscal and monetary policies.

The new classical macroeconomics policies involve long and variable time lags which can make them ineffective and destabilizing, but still they advocate annual fixed growth rate in money supply instead of discretion in monetary policy.

Friedman was of the view that fiscal policy only influences or affects behaviour of money. Therefore, government can follow a sound monetary policy by not interfering at all and thus giving total freedom to business and industry. This helps create a healthy environment for investment and growth.

An important post – Keynesian development in macroeconomics is the rational expectations model propounded by an American economist, Robert Lucas in the 70s. Since rational expectation model re-establishes many classical concepts and policy prescriptions, it is also called "New Classical Economics". The rational expectation model was developed against the background of both high inflation and high unemployment that prevailed in the US economy in the 1970s. As the coexistence of both high rate of inflation and high rate of unemployment seemed

to contradict the Keynesian theory, there was a lot of dissatisfaction with its calling for new explanation of the then prevailing situation of high inflation and high unemployment.

3.3 The New Classical Rational Expectation Model

3.3.1 Rational Expectation: Meaning

New classical economics is based on the rational expectation hypothesis of Robert Lucas. According to this hypothesis both the workers as well as the firms are not sure about their future and hence their decisions are based on their future expectations. The economic agents make use of all the available information to make best possible forecast and thus make rational expectations of the future.

Prior to this Philips curve model associated higher inflation with lower unemployment rate. However, Philips curve model assumed that workers and firms did not use the available information to make forecast and therefore would make the same mistake time and again. For example, in these previous theories higher inflation was assumed to raise workers' willingness to supply more labour as they thought their higher money wages brought about by high inflation meant higher real wages as a they did not realize that the prices of all the commodities would also rise. This monetary stimulus might cause a temporary boom. An important aspect of rational expectations model is that it believes equilibrium in which markets clear immediately.

3.3.2 Lucas Critique

They questioned the Keynesian and monetarist view that there will be slow adjustment of price expectations and for analysis of the effects of policy these expectations are assumed to remain constant in short run. The supporters of the rational expectations said that such expectation formation was quite impractical and was not possible in real world. Past behaviour of the prices cannot always be the basis of firms and workers expectations, as there may be changes in the policy which can prove them wrong.

Thus, the expectation to be rational the economic agents use all the information available to them in order to predict the price level according to the monetary policy adopted. If the expectations are rational the policy changes by the government will be well anticipated by the people. For example, if the Central Bank is known to respond in a certain systematically to follow expansionary monetary policy when the situation of unemployment of labour emerges, then people anticipate that the Central Bank will expand the money supply to tackle the unemployment problem and further that this will result in rise in price level.

3.3.3 New Classical model of Rational Expectation

For understanding of New Classical model of rational expectations, it is necessary to explain Lucas aggregate supply function and aggregate demand function.

. Aggregate Supply function

As per Lucas Aggregate Supply function, the real aggregate output represents the functional relationship of difference between the actual price level (P) and expected price level (P^e). Lucas supply function is written as:

$$\mathbf{Y} = \mathbf{Y}^* + \mathbf{\alpha} \left(\mathbf{P} - \mathbf{P}^e \right)$$

Where,

Y = Actual Aggregate output in a given period

 Y^* = Potential output corresponding the level of natural unemployment

 α = Constant value

P = Actual Price level

P^e = Expected price level

From the above Lucas supply function it is proved that if actual price level (P) > expected price level (P^e), actual aggregate output in short run (Y) would be greater than the potential Y*. The extent of Y will greater than Y* depend on the value of α . On the other hand, if actual price level (P) < expected price level (P^e), actual aggregate output in short run (Y) would be lesser than the potential Y*.

According to the Lucas approach in the short run, the actual price level of output is variable and it responds to the changes in the aggregate demand. However, it differs from the Keynesian theory as the wages here are not just given on the basis of the last period's equilibrium. Here, the wages are fixed in the beginning of the current period at the market clearing level, given the expected price level as determined by the anticipated demand conditions for the current period.

Price surprize is described as the difference between the actual price level and the expected price level (P-P^e). The firm expects a certain price level at the beginning of each period. However, if the actual price happens to be different then there will be price surprize. For example, if actual price level is more than the average expected price level, the firm will learn about it only slowly, since only after a certain time lag it realizes that all prices has risen. However, the firm knows quickly that price of its own product has risen. Thus, the firm perceives, through incorrectly, that the price of its product has risen relatively to others. Thus, the firms are 'fooled' in believing that their relative prices have risen. As a result of the rise in its relative price, the firm will increase its output.

Similarly, whenever there is a positive price surprize, the workers too are fooled into believing that their price, that is their real wage has risen relative to other prices. So, we can see when the price level is higher than the expected price level, the economy will produce higher output and employ more labour than when the price levels are at their expected level.

Aggregate Demand function

The second element in the rational expectation theory in the nature of aggregate demand. It is fluctuations in aggregate demand that bring about change in price level and output. In Lucas new classical approach aggregate demand is generally considered in terms of quantity theory as given below:

AD: MV = PY

Where,

M = Money supply

V = Income velocity of money

P = Price level

Y = Real income or aggregate output

In term of growth of the variables the above quantity theory equation can be written as;

$$\underline{\Delta M} = \underline{\Delta P} + \underline{\Delta Y}$$
$$M P Y$$

Note that velocity V is assumed to be constant, it disappear in the equation written in terms of growth of these variables.

Rewriting the above equation we have

$$\underline{\Delta P} = \underline{\Delta M} - \underline{\Delta Y}$$

$$P \qquad M \qquad Y$$

 $\Delta Y / Y$ which measures growth rate of output is generally written as g. Doing so we have

$$\underline{\Delta P} = \underline{\Delta M} - g$$
$$P \qquad M$$

The expected inflation rate by the firms and workers will depend on the expected growth rate of money supply ($\Delta M / M$) and the expected growth rate of output (g).

$$(\Delta P / P)^{e} = (\Delta M / M)^{e} - (g)$$

Now for simplifying the new classical model we take expected price level (P^e) as determined by expected money supply (M^e) and expected output level (Y^e) rather than expected growth rates (g^e) of these variables.

New Classical Rational Expectations Model

According to the New Classical Rational Expectations Model, expected price depends on the expected levels of the various variables within the model that actually determine the price level which in turn becomes the expected price level by the workers and suppliers of the output. These price-determining variable on the demand side are the expected level of money supply (M^e), government expenditure (g^e), tax collected (t^c) and the amount of autonomous investment (I^e).

On the supply side there are various important factors which determine the price level of the output; these factors include oil price, excise duties, custom duties, capital goods and the price of the raw material. In the new classical model the position of labour supply curve and aggregate supply curve of output depends on the expected values of these policy variables such as M^e, g^e, I^e, which determine the price level.

The effect of full-anticipated expansion in the money supply, say from M_0 to M_1 is explained by rational expectation model. In the figure given below money supply M_0 , government expenditure g_0 , tax collection t_0 and autonomous investment I_0 determines the aggregate demand curve AD₀. The supply curve is represented by SAS₀ which depends on the price level which is determined by money supply (M₀).



Figure No. 3.1

Other determining variables remaining constant, the aggregate demand curve shifts to AD₁ as the money supply increases from M₀ to M₁. Short run supply curves remaining at the same level SAS_0 the price level rises to P^{e_1} as the money supply increases. As the price level rises to P^e , the labour demand curve shifts to N_1^d which intersects the labour supply curve N^s₀ at point B and determines the wage rate W₁ as a result employment of labour increases to N₁. In the Keynesian model in the short run the expected price level is not related to current level of policy variables and therefore aggregate supply curve and the positions of aggregate supply and labour supply curves do not remain fixed in short run in the rational expectations model. The main reason for the same is that in the rational expectation model is that when expansionary fiscal policy is full anticipated in response to recession situation or rise in unemployment that may emerge. The public anticipates the increase in the money supply which results in a rise in the expected price level to P_e^{1} . This is due to rational expectations; the workers who supply their services are very well aware that increase in money supply will make the prices rise to P^e₁ price level. This rise in the expected price level will make workers demand more money wages and this will cause a leftward shift in the labour supply curve to $N_{1}^{s}(P_{1}^{e})$ and a leftward shift in the aggregate supply curve of output to the new position SAS₁ (P^e₁) as shown in the figure. It will be seen from Panel (A) that the new short run aggregate supply curve SAS₁ intersects the new aggregate demand curve AD₁ at point H and determines a higher price P^{e_2} .

As the price level rises to (P^e_2) the labour demand will further shift to left to new position N^d_2 (P^e_2) . With all these changes in the labour market and product market a new equilibrium will be established where the output and labour employment will be restored to their original levels, N_0 and Y_0 respectively. Wage rate will rise to the same extent as the rise in the price level.

Thus, according to the rational expectations model while the price level and the money wage rate will raise permanently on one hand, on the other hand output and employment level will remain the same. According to the rational expectations the original levels of employment and the output will be restored in short run and there is no time gap in the adjustment process because changes in the price level are correctly perceived by the workers as the money supply is increased by the policy makers.

3.4 Policy Implications of New Classical Approach

The rational expectation model points out the ineffectiveness of the economic policy as it shows that the real variables output and employment levels remain unaffected even if expansionary monetary policy is followed. The new classical economists point out that discretionary demand management policies are ineffective whether they are monetary or fiscal measures to attain economic stability in their view of rational expectations by labour suppliers and other economic agents. According to the new classical economists the workers don't make systematic mistakes in their price predictions. In the rational expectations theory not only policy actions by the government (or the central bank in case of monetary policy) but also the price effects of the policy are correctly predicted. This results in immediate response to the anticipated price and renders economic policy ineffective; thereby there is no impact on the output as well as the employment level.

In the figure below presents the new classical view of effects of decline in private investment demand. Panel (A) shows the product market the aggregate demand curve with private investment demand equal to I_0 is AD_0 and aggregate curve is SAS_0 . The equilibrium price P_0 and output Y_0 is determined at the intersection of aggregate demand curve AD_0 and the short run supply curve SAS_0 . Similarly in the corresponding situation in the product market the demand curve of labour is N^d_0 given the price level P_0 determined the product market and N^s_0 is the supply curve of labour. The wage rate W_0 is determined by the supply curve of labour N^s_0 and demand curve of labour N^d_0 .





In fig. If the workers with their rational expectations anticipate the decline in investment demand, they would predict a fall in price level to P_1 . With workers anticipating the price level to P_1 they would supply more labour as their real wages would rise with a fall in the price level to P_1 , money wages remaining at same level that is W_0 . This results the supply curve of labour will shit to the right to N_1^s

indicating more labour will be supplied. With labour supply curve shifting rightwards short run aggregate supply of output will also shift to the right to new position SAS₁ in panel A. At original output Y_0 the new aggregate supply curve SAS₁ together with new aggregate demand AD₁ determine price P₂. It will be seen from panel B that with price level equal to P₂ labour demand curve shifts further to the left to new position N^d₂ which together with labour supply curve N^s₁ determine the wage rate W₂ and employment N₀ which represents the full employment of labour. Thus, in the new short-run equilibrium in case of anticipated change and with the assumption of rational assumptions, prices and wages has fallen sufficiently which helps restore equilibrium of potential output Y₀ and employment N₀ which prevailed initially.

Like classical economists, the new classical economists too were opposed to the idea of adopting expansionary monetary and fiscal policy to encourage the private investment demand to attain stability in output as well as employment. The new classical economists assumed that the rational expectation which helps the economy to sustain the demand shocks such as decline in private investment. This brought about the irrelevance of economic policies to stabilize economy.

Check Progress

What do you understand by New Classical Economist views?

Explain the Rational Expectation Model with the help of diagram.

Explain Implications of New classical Economists.

References: Macro Economics by Dr. H. L. Ahuja

3.5 Concept and Meaning of Dsge

3.5.1 Introduction

Economics is a social science which studies the human behaviour as regard to problem of choice in order to satisfy their unlimited wants with help of limited resources at their disposal. This gives rise to the concept of scarcity which refers to limited resources which are used to satisfy unlimited wants of the society. It is due to this scarcity that gives rise to questions like: what to produce? How to produce? How much to produce? Economics divides the problems into two categories microeconomics and macroeconomics. Microeconomics studies the economic problems at individual level whether it is an individual, a firm, consumers or households. While the macroeconomics studies the whole economy, it focuses on aggregated sectors within the economy. Here, the major stress is on policy recommendations, evaluation of aspects like general price level, employment and overall economic output.

From above we can see that macroeconomics studies the performance of the economy as a whole. It tries to bring to areas within the economy which are hindering macroeconomic objectives.

Macroeconomics raises questions which involve balancing between various aspects of the economy. To implement successful policies it is very important to have a proper understanding of the strength of the competing aspects of the policy question at hand. To understand the strength of these aspects it is important to run experiments in the economy, to understand and evaluate the outcomes. This however, is not possible to do due to various factors like cost, time and ethical reasons, thus such experiments are run on the models developed to understand economies.

To understand this in a better way, let us consider a policy question that has competing aspects. How will the economy be affected if the government spending is increased? The study which answers this question suggests that an increase in the government spending would boost aggregate demand and output. This would however lead to a reduction in the private spending, which in turn would result in a reduction in the output. This mainly happens because of the concerns about fiscal solvency.

Model building involves some aspect of the theory; this is mainly because the model should be a representative of some aspect of 'real-life'. However, the main problem with this approach is that we don't come to know whether the effect of the theory is stronger than the effect of some external factor. This assessment is done by Dynamic Stochastic General Equilibrium (DSGE) models should be utilized.

3.5.2 Meaning of DSGE

Dynamic Stochastic General Equilibrium (DSGE) or DGE or SDGE model is based on applied general equilibrium theory and microeconomic principles. It is a method in macroeconomics which tries to explain economic phenomena like economic growth, business cycles and the effects of economic policy through econometric models. Like other equilibrium models DSGE analyses the interaction of many microeconomic decisions and aims to describe the behaviour of the economy as a whole. DSGE models consider the decisions which correspond to main quantities studied in macroeconomics such as labour demand, labour supply, investment, saving, consumption etc.

As the name suggests, DSGE models are dynamic (studies how the economy develops over a period of time), stochastic (considers the fact that the economy is affected by random shocks), general (refers to the entire economy as a whole), and of equilibrium (subscribing to the Walrasian general equilibrium theory).

3.6 Dynamic Stochastic General Equilibrium (DSGE) Models

According to macroeconomics (and macroeconomic research), DSGE models are very good representations of how does a market economy works. It gives an alternative approach to the traditional approach which was a static representation of the economy, and can be used for various purposes. In order to analyse the economic policy, DSGE models considers three important and interrelated aspects which are demand, supply and the monetary policy.

The DSGE models' equations are based on the assumptions regarding the behaviour of the main agents within the economy that is households, firms and the government. These agents that are households, firms and the government interact with each other in the market until some 'general equilibrium' point is attained. In this type of economy it is assumed that there are only two type of goods, one intermediate goods and the other final goods. Intermediate goods are used in the manufacture of final goods. On the other hand final goods are the ones which satisfy the current needs of the households in the economy.

In the model, the households are the final consumers of the final goods produced by various firms in the economy. As there are there two types of goods in the economy that is intermediate goods and the final goods so there are two types of firms as well, one producing the intermediate goods and the other one producing the final goods in the economy. These firms then package their differentiated goods and sell them in the market.

Of all the three interrelated aspects that is demand, supply and monetary policy, the monetary policy component of DSGE model is the stochastic in nature. It means that there is some part of the model which is randomly determined. These events are unpredictable and don't have any stable pattern of their occurrence. This results in economic fluctuations and adds uncertainty in the economy

Now understanding the relationships between the agents, assumptions about each agent are made and individual sets of equations are then developed.

Maximize Utility DSGE Model

Max Et =
$$\left[\sum \beta^{t} \left\{ \left(C_{t}^{1-\sigma} / 1-\sigma\right) - \left(L_{t}^{1+\alpha} / 1+\sigma\right)\right\}\right]$$

(Ct, Lt, Kt)
Where,
 $t = \text{Time}$
 $E = \text{Expectations}$

 β = Discount factor

L = Number of hours work

 σ = Relative risk aversion

 α = Marginal disutility with labour supply

The major problem of the household is to maximize utility which can be done by increasing consumption which increases utility and on the other hand longer working hours would decrease utility.

Since households cannot consume unlimited number of goods, as they are subject to budget constraint which says that all sources of income must be equal to all uses of income.

Budget Constraint DSGE Model

 $P_t (C_t + I_t) \leq W_t L_t + R_t K_t + \pi_t$

Where,

- P = Price Level
- I = Investment

W = Wage Level

- L = Number of hours Worked
- R = Return on Capital
- $\pi = \text{Dividends}$
- t = Time

When we consider the maximization problem it can be found that (with all other factors remaining constant) any increase in the consumption can only happen when working hours are increased or with longer working hours. Thus, a trade-off can be seen between consumption and leisure. A detailed evaluation will reveal that the
household must choose between consumption of additional goods today itself or future consumption. Which of these effects would be stronger?

Production function DSGE Model

 $\mathbf{Y}_t = \mathbf{A}_t \mathbf{K}_t^{\alpha} \mathbf{L}_t^{1-\alpha}$

Where,

Y = Outputt = Time A = Total factor of productivity α = Elasticity of capital

 α can also be thought of as capital's share of output and (1- α) would be labour share of output.

For the production of goods and services the firm uses inputs like capital and labour. Ideally, the production function should exhibit a constant return to scale. Here, the increase in the output is exactly in the same proportion as increase in the inputs, this suggests that there is no wastage of inputs. After achieving the point of maximization, it is normally found that there is a decrease in the real wages which in turn would lead to higher quantity of labour being demanded. This normally happens as at lower wage rate; the firms are willing to hire more labour.

Maximise Profit DSGE Model

```
max. \pi_t = A_t K_t^{\alpha} L_t^{1-\alpha} P_t - W_t L_t - R_t K_t
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Where,

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\pi = \operatorname{Profit}
t = \operatorname{Time}
K = \operatorname{Capital}
\alpha = \operatorname{Capital's \ share \ of \ output}
L = \operatorname{Labour}
1 - \alpha = \operatorname{labour's \ share \ of \ output.}
P = \operatorname{Price \ level}
W = \operatorname{Wage \ rate}
R = \operatorname{Return \ on \ Capital}
```

While operating in a perfectly competitive market the firm's goal is to maximize profits. Here, the assumption of perfect competition would not always be true, but it is assumed as it represents the ideal situation and efficiently operating markets. In perfect competition situation firms will not earn any profit in the long run. As there are no barriers to new entrants due to perfect competition the when market price rises more firms will enter into the market to earn higher profits, but as soon as these firms enter the market the price will drop down to the earlier levels.

Once the optimum conditions are reached the market will clear off or achieve "General Equilibrium" when all the internal factors of the model which define the equilibrium are fully satisfied. This means that from the previous example: When the prices are given, the household will decide as to how much it should invest, consume and work where the basic aim of the household is to maximize utility. At the same time a firm will have to make decisions like how much to produce by choosing optimum amount of labour and capital, taking input prices as given and subject to technology.

Over here, we are discussing the economic scenario where we are considering economic activity and trying to analyse and evaluate economic policies. It is believed that DSGE models are applicable to many more scenarios and situations. Now let us take an example of a content creation platform is trying to get more and more users to publish more and increase platform's overall engagement. Can adding a new feature of say, premium users be a good idea? The premium users would have access to exclusive groups and features which the regular users would not have access to.

This theory suggests that such schemes will encourage users to join the exclusive user groups; this will lead to increase in the engagement. On the other hand concerns about exclusion can cause creators to think negatively and reduce the overall usage of the platform. Now to understand which of these outcomes are more likely, given the relative strength. For assessing this DSGE models should be used.

Check Progress:

1. What do you understand by DSGE Models?

3.7 Summary

According to the classical economists to stable aggregate output and employment and to manage aggregate demand there is no need of Government or Central Bank interference in the form of either fiscal or monetary policies.

Similarly new classical economists too asserted the view of non-intervention of the government and Central Bank.

The new classical economists advocated and supported the idea of anticipated change in aggregate demand and supply, wage of labour and price level of output change in a way that restores equilibrium at full of employment level of output. Due to such similarities in their view rational expectations model is referred to as new classical economics.

The DSGE models' equations are based on the assumptions regarding the behaviour of the main agents within the economy that is households, firms and the government. These agents that are households, firms and the government interact with each other in the market until some 'general equilibrium' point is attained.

DSGE attempts to economic concepts like economic growth, business cycles and the effects of economic policy through econometric models based on applied general equilibrium theory and microeconomic principles.

3.8 Questions

- Q1. Define New Classical Economics in detail.
- Q2. Examine New Classical Economics based on Rational Expectation model.
- Q3. What are the Policy Implications of New Classical Approach?
- Q4. Define DSGE Model in detail.

3.9 References:

Macroeconomics by David Romer Macroeconomics by Olivier Blanchard

Unit 2

4

NEW CLASSICAL ECONOMICS - II

Unit Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Concept of Government Budget Constraint
- 4.3 Money / Bond Financing of Budget Deficit
- 4.4 Deficit Financing of Budget Deficit
- 4.5 Wealth Effect of Debt Financing
- 4.6 Debt Financing of Budget Deficit: The view of Ricardian Equivalence
- 4.7 Summary
- 4.8 Questions

4.0 OBJECTIVES

To know the concept of Government Budget constraint

To know the impact of money / bond financing of Budget Deficit of the economies.

To know the impact of deficit financing of budget deficit of the economies.

To know the wealth effect of debt financing

To understand the Ricardian Equivalence of debt financing of budget deficit

4.1 INTRODUCTION

Direct and indirect taxes are a major source of its receipt through which it finances its expenditure. However, when the government expenditure increases, the government finds it difficult raise further funds from taxation route, therefore it resorts to borrowing funds from the public or printing money to finance its budget deficit. An increase in taxes on the other hand would act as a disincentive to work more, would adversely savings and investment and would also encourage tax evasion. Laffer curve concept brings out the point that an increase in the tax rate beyond a certain point would lead to a decline in the revenue from taxes. So here we see that there is clear limitation of increasing revenue through taxes to finance the increased expenditure of the government.

4.2 CONCEPT OF GOVERNMENT BUDGET CONSTRAINT

When financing of the increased expenditure becomes increasingly difficult for the government through normal taxes, it faces a resource constraint resulting in budget deficit which is also nowadays called fiscal deficit. Government budget constraint is reflected in budget or fiscal deficit.

The general form of government budget constraint is written as:

 $\mathbf{G} = \mathbf{T} + \Delta \mathbf{B} + \Delta \mathbf{M} \qquad \dots (1)$

Where,

G = Government Expenditure (including subsidies and interest payments on debt

T = Tax revenue

 ΔB = New borrowing from the market (through sale of bonds and securities)

 ΔM = New printed money issued to finance government expenditure

According to the budget constraint equation (1), government expenditure in a year can be financed by tax revenue (T), new borrowing (ΔB) by the government from the market (both within and outside the country) through sale of its bonds and by creating new high powered money (ΔM) which is also called money financing. Budget constraint equation can be re-written as

 $G - T = \Delta B + \Delta M$ (2)

G - T = Budget deficit (also called fiscal deficit) that must be financed by new borrowing (ΔB) by the government through sale of bonds and creation of new high powered money (ΔM) which is called money financing. Thus,

Budget deficit = New Borrowing (i.e. sale of Bonds) + Printed money

Government can finance its fiscal deficit by either printing money (also called seiniorage) or by public borrowings which can be in form of selling bonds to the public which includes insurance companies, banks and financial institutions. Such borrowings add to the government debt. Government pays interest annually on its debt and to repay the principal amount on maturity of such bonds or securities.

J. M. Keynes placed his point view, while asserting that during recessionary conditions which primarily arise due to deficiency of aggregate demand, adoption of deliberate policy of framing budget is necessary to get rid of recession and once again restore full employment equilibrium. Recently, also many economists are arguing over the appropriate methods of financing the budget deficit and its consequences on the economy as whole. It is very crucial to discuss the results of budget deficit and mode of financing the persistent large budget deficit which occurs each year irrespective of fact whether the economy is a developed economy like United States or a developing economy like India. This has resulted in a dual problem with mounting burden of public debt on one hand and inflation on the other.

Check Progress:

1. Explain concept of Government Budget Constraint with the help of equation?

4.3 MONEY / BOND FINANCING OF BUDGET DEFICIT

The government meets its increased expenditure and finances its deficit by printing high powered money. The revenue which the government raises through printing of money is called seignior-age. By printing notes in order to finance its budget deficit the government increases the money supply in the economy. Two views have been kept forward regarding the effect of increase in money supply on inflation. As per the Keynesian view the increased money supply during depression when both labour and production capacity are lying idle due to lack of aggregate demand, prices won't rise much and the effect of the increase in money supply will lead to a raise in output or income. With the rise in the real income, given the rate of taxation will bring higher revenue in form of taxation which will ultimately lead to a reduction in the budget deficit in the short run. However, on the other hand if the economy is operating at a near full employment, printing money to finance the deficit will give rise to inflation. Printing of the currency notes by the government in order to raise revenue for financing the budget deficit will cause inflation and is like an inflation tax. The main reason of this happening is that the government is able to get resources through printed money which causes inflation and reduces the real value of holding of money by the public.

First of all let us explain a situation in the Keynesian model where the price level is fixed, and the economy is in recession mainly due to demand deficiency and a high level of unemployment of resources prevails in the economy. The tax function can be written as:

$$\mathbf{T} = \mathbf{t} \left(\mathbf{Y} \right)$$

Where,

t = Rate of tax

Y = Real income

T = Total tax revenue

If G is government expenditure, then budget deficit (BD) is given by

BD = G - t(Y)(1)

If G - t(Y) = 0, budget deficit will be zero and therefore the budget will be balanced budget. If G - t(Y) > 0 there will be budget deficit which is known deficit budget. If the Government finances its deficit through money creation, then the short-term macro equilibrium can be written as

$$Y = Y (G, M)$$
 (2)

The short run equilibrium which is represented in the fig. is a simple IS-LM. Here the equilibrium income Y_0 and interest rate r_0 are determined by the intersection of the IS and LM curves at point E. Now suppose, if at this equilibrium G - t(Y) > 0. In order to meet this budget deficit government creates high powered money. Due to this the money supply in the economy increases and LM curve shifts to the right to the new position LM₁.

Figure No. 4.1

It can be seen in the above figure that as the level of equilibrium income increases to Y_1 the interest rate falls to r_1 . As it is assumed here that the economy is in depression expansion in money supply will lead to increase in demand but will not cause any rise in price level.

The adjustment process under this simple IS-LM model with fixed price level when new money is created to meet budget deficit is shown below

$$dM / dt = [P \{G - t (Y)\}]$$
(3)

Substituting Y by Y (M, G) in equation (3) above we have

$$dM / dt = [P \{G - t (YM, G)\}]$$
(4)

In the equations (3) and (4) above shows the growth the high-powered money(M) over a period of time which helps in financing the budget deficit which is G - t(Y) multiplied by the price level. If there is a balanced budget where G - t(Y) = 0 over the years, from equation (3) it follows that dM/dt = 0.

In the above model since a depression situation is being represented, the price level would remain unchanged even when more money is created to finance budget deficit. However, if the rate of growth of money exceeds this with a stable demand function for the currency, inflation will result.

Check Progress:

1. What do you understand by bond financing of budget financing?



4.4 DEFICIT FINANCING OF BUDGET DEFICIT

4.4.1 Concept

The government finances the budget deficit by borrowing from the public which it does by issuing bonds to the public. The government sells these bonds which carry interest through financial intermediaries like banks and financial institutions. The banks subscribe to the bonds issued by the government with currency deposits of the public. Therefore, debt financing of the budget deficit is also known as bondfinance of budget deficit. The funds so borrowed by the government are used to increase its expenditure; however this results in an increase in public debt which has both short run and long run consequences. Budget deficit may also result due to reduction in taxes even though the government expenditure remains constant. This deficit too can be financed by issuing bonds to the banks or public. The government has not only to pay interest on the borrowing it does from the public but has even to repay the principal sum so borrowed for which it may levy higher taxes in future. The Keynesian economists have advocated the use of expansionary effect of debt financing of government expenditure or budget deficit. According to the Keynesian model the increase in government expenditure through use of borrowed money with price level remaining constant results in an upward shift in expenditure (C + I + G) curve. The increased debt financed government expenditure will bring about expansion in output as well as the income. As the income will rise, with increase in output, at a given tax rate the tax revenue collected will also rises this in turn will reduce the budget deficit or even ultimately eliminate the same and the budget will become a balanced budget. This can be shown through IS-LM model where IS and LM curves are drawn in the fig. where the money supply is given in the economy with Y* is the full employment level of output





With debt-financing increasing in the government expenditure IS a curve shift to the right from IS_0 to IS_1 with LM curve remaining the same, even though equilibrium is at initial income level Y_0 . This results in an increase in the national income to Y_1 . This will result in an increase in the tax revenue collection of the government and in turn the budget deficit will be reduced and even eliminated over a period of time. In the fig. it can be seen that this will lead to an increase in the interest rate but however, it will not full offset the expansionary effect as debtfinance increases the government expenditure.

4.4.2 CRITICISM OF DEFICIT FINANCING OF BUDGET DEFICIT

The debt-financed government expenditure is hugely offset by the crowding-out effect of debt financing on private investment, this point have been brought out by the critics. The crowding-out effect on private investment takes place in various ways.

The rate of interest rises as government borrows funds to finance the budget deficit this is due to the fact it will lead to the increase in demand for lendable fund. The rise in the interest rate will lead to a decline in the private investment. Thus, debtfinancing increases government expenditure which leads to crowding-out of private investment.

Crowding out effect, affects the private investment as net expansionary effect of increase in government expenditure is negligible. At the same time the society has to bear the burden of increase in public debt due to debt-financed expansion in government expenditure. If the budget deficit is caused to reduction in taxes, even if government expenditure remains constant, then also there will be a rise in the interest rate which in turn will cause crowding out effect on private investment.

The main reason for this is the reduction in taxes increases the consumption expenditure which in turn reduces the savings of the people. This leads to reduction in savings which causes interest rates to raise leading to a fall in the private investment.

Check Progress:

1. Explain the concept of Budget deficit through deficit financing issuing currency notes.

What are the limitations of deficit financing of budget deficit?

4.5 WEALTH EFFECT OF DEBT-FINANCING

While discussing the crowding out effect, the wealth effect of debt financing has completely been ignored. While issuing bonds to finance the budget deficit government helps in creation of private wealth. This is mainly due to the fact that such bonds are considered to be wealth by the people to whom they are allotted. Patinkin and Friedman have included the concept of wealth in their money demand function. According to their model, apart from other factors, real value of wealth determines demand for money. Wealth effect of bond financing of budget if recognized, then it exercises important influence on the dynamic behaviour of the economy. While debt-financing of budget deficit government issues bonds to the public which increases the wealth of people which in turn raises the demand for money. With increase in the demand for money and supply of money remaining constant there will be a leftward shift in the LM curve, for instance, from LM₀ to LM₁ in fig. (Note: when financing of government expenditure is done by printing of new currency notes, LM curve will shift downward, i.e. to the right).



With an increase in the government expenditure, IS curve shifts to the right to the new position IS_1 which in turn raises the aggregate income, the wealth effect of bonds issued by the government to finance the budget deficit causes a leftward shift in the LM curve which leads to an increase in the rate of interest and thereby crowding out of the private investment. As per the Friedman model the wealth effect is quite substantial and completely offsets the expansionary effect of the increase in the government expenditure. In the figure initially the equilibrium level of income is at Y_0 , with an increase in the government expenditure which is being financed by the issue of bonds to the public the IS curve shifts from IS_0 to IS_1 and

due to the wealth effect LM curve shifts leftwards to LM_1 . Here we can see that the interest rates rises from r_0 to r_1 which does not have any effect on the level of income which remains unchanged at Y_0 level. As there is an increase in the interest rates the private investment falls so much so that it completely neutralizes the expansionary effect of debt-financed budget deficit. Due to this, the budget deficit continues to exist and debt goes on accumulating and becomes unmanageable.

Conclusion

Over here we have seen that when the budget deficit is debt-financed it leads to an expansionary effect on the economy however this has been challenged on the ground of crowding-out effect. However, according to the views of various economists the crowding out effect of debt financing has been highly exaggerated. In fact, crowding out effect of debt financing of budget deficit has a limited or negligible impact especially when the economy is working at less than the full employment level of income. Mostly, to meet the budget deficit the government floats bonds to finance the same to overcome economic depression when there is under-employment of resources equilibrium and because of this there exists an output gap. Evidences show that the wealth effect of sale of bonds is not significant.

Check Progress:

1. Explain Wealth effect of debt financing.

4.6 DEBT-FINANCING OF BUDGET DEFICIT: THE VIEW OF RICARDIAN EQUIVALENCE

Keynesian views on fiscal policy were criticized by the early neo classical economists as according to them it ignored "crowding out effect". Crowding out occurs when there is a rise in the interest rates due to expansionary fiscal policy which ultimately leads to a decline in the business investment thereby limiting or reducing the effects of the fiscal expansion policy. The Keynesian economists ultimately accepted the fact of crowding out effect and now the focus of debate shifted to the fact of how much crowding out actually occurs. The neo classical economists kept their view forward and said that the fiscal policy was totally ineffective as increase in the government expenditure would lead to an equal decrease in the private investment spending, this would neutralize the effect of the increase in government expenditure and ultimately there will no effect on the aggregate demand. Against this, the Keynesian economists argued for incomplete crowding out, thus they accepted the fact that though the fiscal policy would be weaker than what they originally thought but still would be effective to a certain extent.

New criticisms of the fiscal policy were introduced by Robert Barro and other new classical economists. If the people are having rational expectations, then any change in the government budget may have an impact on their private saving. For example, if the government has a budget deficit, the people may feel that higher budget deficit would mean that they will have to pay more taxes in future to clear off all the government borrowings, so they should start saving now. On the other hand, if the government prepares a surplus budget, the people may feel that with surplus budget or a low deficit budget the government is in no need of funds and they may expect a tax cut in the tax rates in future and this would not encourage current savings in the economy.

According to Ricardian equivalence the theory that the rational private households might shift their savings in order to offset the government borrowings or savings. It is known as Ricardian equivalence as the idea is related to the writings of the economist David Ricardo in early 19th century (1772-1823). If this theory of Ricardian equivalence is completely true, then if there is any increase in government expenditure would lead to an increase in budget deficit which would lead to a decrease in the consumption expenditure which in turn would lead the households to save more as they may anticipate future tax liability. This would neutralize the effect of government expenditure on aggregate demand and the fiscal policy would be totally ineffective. According to the theory of Ricardian equivalence an increase in government borrowing would increase the private saving by an equal amount, while on the other hand any decrease in the government borrowing would reduce private savings. Sometimes this theory holds true whereas at other times it may not hold true at all.

Definition of Ricardian equivalence: Here the idea is that if the consumers anticipate that they will receive a tax rebate or a tax cut which will be financed by government borrowings then they also anticipate there will be a rise in future taxes. So one can say that their lifetime income remains the same and so the consumer's spending would also remain the same.

Similarly on the other hand, if there is a higher government spending which are being financed by borrowings, it will imply that there will be lower spending in the future. For this theory to hold true, if the tax cut is financed by higher government borrowings then such borrowings would have no impact on the aggregate demand as the consumer would save the tax rebate or tax cut to pay the future increase in taxes.

Assumptions of Ricardian equivalence

Income Life-cycle hypothesis: Consumers would like to spread their consumption over their entire course of life. Thus, if the consumers are anticipating any rise in taxes in the future then they will save from their current tax cuts or rebates so that they are able to pay future tax rises.

Rational expectations: Consumers have rational expectations so if there is any tax cuts they respond to the same to realizing that there might be a probably a future tax rise.

Perfect capital markets: If in need the households can borrow to finance their consumer spending.

Intergenerational altruism: If there is any tax cut or tax rebate for the current generation it may imply higher taxes or tax rise for the future generations. Therefore, the current generation would respond to current tax cuts or rebates by trying to save and give more wealth to the next generation so that they can pay for the future tax rises.

Impact of tax cuts under Ricardian Equivalence



The principle behind Ricardian equivalence can be illustrated by this simple tradeoff. Cut in the tax rates leads to an increase in the disposable income in the short-term, however in the long-term the disposable income reduces. From this, the rational consumers always believe that their life time income will not change even if there is a tax cut or a tax rebate.

However, in reality it is only the private sector that sometimes adjusts its savings that also only partially to offset government budget deficits and surpluses. When the budget deficits are very huge there are some signs of increase in the savings. Various studies in the U.S. have shown that when the government borrowing increases by \$1, there is an increase in the private saving to the tune of 30 cents. Even the World Bank studies which were conducted in late 90s, having a look at the government expenditure and private saving behaviour around the world, found similar results.

So when the government budget runs into huge deficits there is an increase in the private savings to a certain extent, and similarly these private savings drop drastically when the government budget runs into large surpluses. However, it is observed that the offsetting effect of the private savings as against government borrowings are much less than the one is to one ratio. So the fiscal policy can be less effective in absence of Ricardian equivalence. The effect also varies from country to country, time to time and also over short run and the long run.

Problems with Ricardian equivalence

There are various problems with this theory of Ricardian equivalence

Consumers are not rational.

A lot of households would not anticipate that the tax cuts or tax rebates would ultimately lead to tax rise in the future. On the other hand, many households are not able to predict the future budget deficits and so are unable to predict future tax increases as well.

If the economy is at Point A

An increase in the government spending can lead to a fall in the private spending. There is a crowding out effect, but however if the economy is at the point of inefficiency (C) then it is quite possible that government spending can increase without any fall in the private sector spending.

The idea tax cuts are saved is misleading.

During recession the average propensity to consume may decline, however this is different to marginal propensity to consume. Evidences based on the studies shows

that people do spend some of the tax cuts, even if their average propensity to save increases.

Tax cuts can boost growth and diminish borrowing requirements.

During recession the government borrowings increases mainly due to factors like lower tax revenue, higher spending on unemployment benefits etc. If tax cuts and rebates increase spending in the economy and encourage economic growth, this increased growth will in turn lead to better tax revenue which will help reduce government borrowings. So if the growth rate of the economy increases and the economy is able to recover from the recession then this will improve government' fiscal position.

No Crowding out in a recession.

During recession expansionary fiscal policy is a way of utilizing private saving in the economy, as during recession private sector saving rise mainly due to lack of confidence. Though it is generally believed that more the government spending financed by borrowing will lead to a decrease in private sector spending. However, this is not always necessary when government uses the private sector savings in order to increase aggregate demand.

Multiplier effect.

An increase in the government spending may lead to an increase in the spending in the economy which may finally lead to an increase in the GDP which may be much larger than the increase in the government spending in the economy.

Check Progress:

1. Explain the concept of Ricardian equivalence.

4.7 SUMMARY

When government finds it difficult to raise revenue to finance its increased expenditure through taxation then the government faces revenue constraint and the government has to resort to budget deficit.

Budget deficit financing is done by two important internal resources either by issuing bonds or through printing money.

When government sells bonds and securities or prints new money in the market to fill the gap of revenue and expenditure, it is called money/ bond of budget finance but it creates inflation in the economy.

When government issues bonds to fill the gap between revenue and expenditure is called bond finance of budget deficit. According to this method government can eliminate or reduce budget deficit.

4.8 QUESTIONS

Explain Government Budget Constraint in detail.

Explain Bond financing of budget financing with the help of diagram.

Examine the concept of Deficit financing of budget deficit with the help of diagram. What are its limitations?

Explain Wealth effect of debt financing with the help of diagram.

What is Ricardian equivalence? What problems are associated with Ricardian equivalence?



NEW KEYNESIAN ECONOMICS - I

Unit Structure:

- 5.0 Objectives
- 5.1 Meaning and introduction to New keynesian Economics
- 5.2 Mankiw's New Keynesian Model
- 5.3 Mankiw's New Keynesian model in mathematical form.
- 5.4 New Keynesian Economics and Disequilibrium.
- 5.5 Questions
- 5.6 References

5.0 Objectives

- To understand New Keynesian model
- To know the concept of stickiness in prices under New Keynesian Economics.
- To understand the concept of menu cost
- To interpret mathematical derivation of mankiw New Keynesian analysis.
- To understand the concept of Disequilibrium.

5.1 The new Keynesian Economics.

The new Keynesian have given us short run price stickiness by using microeconomic theory and thus form theoretical foundations. The New Keynesian Economics is based on the imperfect competition under imperfectly competitive firm have the downward Sloping demand curve. The downward slope of demand curve under imperfect competition implies that cut in price by firm will cause some increase in sales but rival firms are likely to cut their prices too so that it may not be profitable to change or adjust prices.

Elements of New Keynesian model:

- 1. A New Keynesian model believe in imperfect competition.
- 2. Earlier Keynesian model was based on money wage rigidity. The new Keynesian model is interested in focus on price stickiness
- 3. A new Keynesian model also assume the stickiness of real variables such as real wages, relative price level in the face of changes in Aggregate demand.
- 4. New Keynesian model is demand determined It assume that firms set prices and produce whatever is demand. Thus, with the increase in demand firms produce and sell more output if they do not change their prices.
- 5. A New Keynesian model assumes that demand for labour depends on real aggregate demand and Real wages. Due to fall in aggregate demand for output employment and a decline and thus leading to more unemployment. If wage not is rigid that will affect employment and Hence unemployment will also increase more.

5.2 Mankiw's New Keynesian model:

Traditional Keynesian model assume that perfect competition prevails in product market. The New Keynesian model is believer of the thought that firm must not be working perfect competition. Because under perfect competition in the product market prices are determined by demand for and supply of a product an individual firm can not influence or no control over the price of the product. Under perfectly competitive firm their is absence of stickiness of prices.

On the contrary Mankiw and other New Keynesian economists explain that under imperfect competitive market

Eg. monopoly and oligopoly type of market

In the product market, the firms prefer to keep their prices constant (i.e. sticky) basically when there is decrease in aggregate demand. The slope of demand curve under imperfect market for product is downward sloping. Any volatility i.e. changes in market structure say fall in aggregate demand due to contraction in money supply, firm under imperfectly competitive market does not reduce price, due to which he may loose some of customer but not all of them. According to Richard Froyen "Monopolist competitors and oligopolist have some influence over the price of their products. In fact the incentive to lower prices may be fairly weak for those type of firms. If they hold to their initial price when demand falls, they

will lose sales, but the sales they retain will still be at the relatively high initial price. Also, if all firms hold to the initial price, no Individual firm will lose Sales"

Menu cost: a menu cost is the cost to a firm resulting from changing its prices. The basic reason of not changing price according to the Mankiw and other new Keynesian economists is that due to change in aggregate demand for their product, firm has to undergo several adjustments which involve some cost. To change prices, firm has to bear problems like a firm has to print a new catalogue and forward it to its consumers, distribute new price list among its sales staff. The system of involving cost of making price adjustment are called menu cost. This occurs in case of restaurants practice. When hotels or restaurants changes prices they print new menus and incur cost on it.

Some of the economist argued upon the believes of new Keynesian economists. According to them menu cost effects are quite small and hence it is not that much impactful behind stickiness of price in the face of decrease in aggregate demand. Though the explanation of New Keynesian economists for price stickiness has been criticized but Mankiw argues that "small does not mean inconsequential; even though menu cost are small, they can have a large effects on the economy as a whole."

Mankiw recommended aggregate demand externality.

<u>Aggregate demand Externality has beneficial effect</u> – It refers to a price by a firm will not influence or affect positively and benefit other firms too. According to Mankiw, "The firm makes decision by comparing the benefit of a price cut higher sales and profit to the cost of price adjustment yet because of the aggregate demand externality, the benefit to the society of the price cut would exceed the benefit to the firm. The firm ignores this externality when making its decision, so it may decide not to pay the menu cost and cut its price even though the price cut is socially desirable. Hence sticky prices may be optimal for those setting prices even though they are undesirable for the economy as a whole."

Other factors responsible for sticky prices :-

- 1, Potential loss of consumer goodwill
- 2. Higher price cuts by rival firms
- 1. When firm raises the price of his product, consumer goodwill is lost but cut in prices by a firm during the period of recession indicates that it will raise when economy recover from recession period. Changing price due to increase in cost of production is understood to consumer. But such price

change is not much influential to consumer so do not react to change in price. Thus, firms prefer to keep prices sticky.

2. Other reason for price stickiness can be : cost cutting prices during the period of recession is that it can lead to higher price cuts by the rival firms or it may even create the situation of price war which harm every firm in the market structure. This is applicable in oligopolistic market where each firm keep cut throat competition related to price. They keep their eyes on the pricing decision of their rival firms.

Thus, we can conclude that if the above cost of price adjustment are high enough, there will be price stickiness. And if prices do not adjust in response to changes in aggregate demand, the volatility in demand influence business cycle, which leads to recession and booms in the economy.

5.3 Mankiw's New Keynesian Model in Mathematical form:

The mathematical representation of Mankiw New Keynesian model is based on basic assumptions. Let assume that there are large number of firms. Each firm as some / partial monopoly over its products. The example of such market is monopolistic competitive market and oligopoly market.

- ⇒ Let Yi is the demand facing by each firm. Pi is the relative price of the product of a firm to the overall price level (P)
- \Rightarrow And Y is the aggregate demand for the product

Hence Demand function for each firm

$$y_i = \left(\frac{P_i}{P}\right)^{-e} Y_{e>1} - \dots$$
(1)

- Equation (1) represents that demand for a firm's product depends on its relative prices $\left(\frac{P_i}{P}\right)$
- Price elasticity of demand (e) and
- Aggregate demand (Y)

To make it more easy Mankiw assume that real aggregate demand (Y) is determined by the real money supply, i.e. $Y = \frac{M}{p}$

Substituting $\frac{M}{P}$ for Y in equation (1) we get,

$$Y_i = \left(\frac{P_i}{P}\right)^{-e} \cdot \frac{M}{P}$$
 (2)

Equation (2) represents that demand facing a firm depends on its relative price to the overall price $\left(\frac{Pi}{P}\right)$ and money supply $\left(\frac{M}{P}\right)$ which determine aggregate demand. Besides, the relative price of a firm determines its relative position on the given aggregate demand for the product.

An imperfectly competitive firm will set its price by adding a mark-up over marginal cost.

Hence,

$$Pi = \frac{e}{e-1} \frac{w}{MP_{L}}$$

Here $\frac{e}{e-1}$ is mark-up
 $\frac{w}{MP_{L}}$ is marginal cost

A firms profit which we denote by π can be obtained by multiplying the difference between price and Marginal cost multiplied by the amount of output demanded and sold.

Thus, Profit (π) = $\left(Pi - \frac{W}{MP_{L}}\right)$ Yi ------(4)

Now suppose the nominal money supply decreases due to which there is decreases in aggregate demand, with price remaining unchanged. In terms of equation (2) with the fall in M, demand for output of each firm, Y will decline which will result in recession, price of each firm remaining unchanged.

Thus, fall in demand requires reduction in prices by the firms. Reduction in price by firms leads to downward – sloping demand curve will lead to more sales and profits.

But price adjustment by firms according to Mankiw would yield only second order gain and even small menu cost exceed it. Hence firm will not adjust prices. Resulting to no change in average price with the change in i.e. by reduced demand conditions for output recession will take place in the economy. Hence deduction in output (Y) of the firm, the profits as measured by equation (4) will fall.

Important to note is that Mankiw explains that as compared to menu cost of price adjustment optimum gain from price cutting will be minute very small.

Conditions of Second Order:

1. If the difference between the existing price and profit – maximising (i.e., optimal) price is small, the potential gain of making price adjustment is very small.

2. If price elasticity of demand for firm's product is low, the increase in profit is less sensitive to adjusting price to the exactly new profit maximising level.

Thus firms do not adjust prices in the face of change in demand because in their price – making decisions, they do not take into account the external demand benefits of adjusting their prices.

Hence from above explanation, we can conclude here that price level (P) and relative prices of the firms remains same. Thus, reduction in aggregate demand results in reduction in output i.e., recession in the economy.

Price adjustment and co-ordination failure:

As it is proved mathematically as well that firms do not adjust price even though aggregate demand fall, due to which recession in the economy prevails. Recession is the situation which is socially undesirable for the economy. Because during recession, economic variables/activity slow down. Low productivity, less output, low national income ultimately reduces GDP of economy.

Hence co-ordination among firms become necessary. But due to lack of coordination among firms, uncertainty prevails in the product market. Firms anticipate that what prices other firms will be setting.

Thus, according to Mankiw, "If the two firms could coordinate, they would both cut their prices and reach the preferred outcome. In the real-world coordination is often difficult because the number of firms setting prices is large. The moral of the story is that prices can be sticky simply because people expect them to be sticky, even though stickiness is no one's interest."

5.4 New Keynesian Economics and Disequilibrium:

The non - Walrasian disequilibrium approach to macro-economics received a significant but relatively short-lived interest in the 1970's and early 1980's, after which it became forgotten as macro-economic research shifted again its interest to New Keynesian model based on the assumptions of market clearing. The Neoclassical model assumes price and wage flexibility, while New Keynesian just inverse of it, that is some degree of rigidity in prices and/or wages, leading to short run fluctuation in output and unemployment around their potential.

The disequilibrium approach does not rely on the general equilibrium assumption and instead consider the possibility of significant non market clearing i.e., continuous divergence between supply and demand, implying rationing by the short side of the market – to explain unemployment and business cycle fluctuation. It defines regions of disequilibrium and analyses disequilibrium as a result of shocks, policy adjustment and wage and price adjustments. The New Keynesian models given that disequilibrium approach rely on the restrictive and unnecessary general equilibrium assumption, viz. equality of demand and supply in the goods and labour market.

<u>The significant disequilibrium</u> framework in the labour market is given by the labour demand and labour supply functions, the short side principle determining actual employment and a nominal wage adjustment equilibrium that incorporate the excess labour as its main element.

The nominal wage adjustment (Price adjustment) function determines that wages adjust to any (ex-ante) excess demand or supply in the labour market. The process of adjustment of wages and prices to disequilibrium is sometimes referred to as Neo Keynesian case, wage adjust faster than price

- ⇒ Disequilibrium analysis distinguish four different macroeconomic regimes.
- 1) <u>Keynesian unemployment</u> is characterized by excess supply in the goods and labour market.
- 2) <u>Classical unemployment</u> is characterized by excess demand in the goods market and excess supply in the labour market.
- 3) <u>Repressed Inflation</u> occurs in the case of excess demand in both the goods and labour market.
- 4) <u>Labour Hoarding / underconsumption</u> results in case of excess supply in the goods market excess demand in the labour market.
- Different regime have different implication over economic activity. The Keynesian unemployment regime focuses on monetary and Fiscal stimuli to increase output and employment toward actual position of equilibrium. Factors responsible for disequilibrium need to be adjusted with respect to price and wages which is inherently slow in Keynesian model.
- ⇒ On the contrary, the classical unemployment regime concentrates on reduction of real wages to increase employment; reducing taxes on labour income.
- ⇒ The repressed inflation regime requires restrictive monetary and fiscal policies to reduce inflation.
- ⇒ The labour hoarding regime needs an increase in wages to restore equilibrium in goods and labour market.

A disequilibrium model with regime switches behaves in an intrinsically non-linear manner due to the occurrence of regime switches. It produces different policy prescription.

5.5 Questions

- Q1. Explain New Keynesian Economics.
- Q2. Describe Mankiw's New Keynesian Model.
- Q3. Mathematically describe Mankiw's New Keynesian Model.
- Q4. Describe New Keynesian economics and disequilibrium.

5.6 References

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6

NEW KEYNESIAN ECONOMICS - II

Unit Structure:

- 6.0 Objectives
- 6.1 New Keynesian Economics and Multiple Disequilibria
- 6.2 Hysteresis Reconstructing the Keynesian multiplier
- 6.3 New Keynesian (N.K) Model of inflation
- 6.4 Questions
- 6.5 References

6.0 Objectives

- To Understand the concept of New Keynesian economics and multiple disequilibria
- To know the Hysteresis Reconstructing the Keynesian multiplier
- To understand N.K model

6.1 New Keynesian Economics and multiple Equilibria:

As per the study of John H. Cochrane, Standard Solution of New Keynesian model observed deep recession and deflation in a liquidity trap, when the natural rate of interest is negative and the nominal rate is stuck at zero.

6.1.1 New Keynesian economics is a school of macroeconomics that strive to provide microeconomics foundation for keynesian economics. Like new classical approach, New keynesian macroeconomics analysis assumes that household and firms have rational expectation. New keynesian believe that there exist imperfect competition wage and price stickiness and other form of market failure exist in New keynesian model economy due to these factors fail to attain full employment.

Discretionary policy making may lead to multiple equilibria in linear quadratic rational expectations models once the possibility is taken into account that the policy makers and other agent may respond to lagged endogenous variables that do not affect their current payoffs according to Blake and Kirsanova

6.1.2 Multiple equilibria is the existence of more than one solution to the equations describing the equilibrium of an economic model. The multiple equilibria can be locally unique or these can be a continuum of equilibria. If the equilibria are locally unique there is generally an odd number of them. This fact is useful in computing the set of Nash equilibria for a game: Example - if there are two pur strategy equilibria there must be at least one mixed strategy equilibrium.

Modern New Keynesian economics can be interpreted as an effort to combine the methodological tools developed by real business cycle theory with some of the central tenets of Keynesian economics tracing back to Keynes Own General Theory, published in 1936.

Modern framework of fluctuation pioneered by real business cycle theorist is a reliance on dynamic, stochastic, general equilibrium modern macro or New Keynesian economics adopted static, deterministic and partial framework.

6.1.3 Business cycle approach

- 1) The behaviour of households, firms and policymakers
- 2) Some market clearing or resources constraints
- 3) The evolution of one or more exogenous variables which fluctuate in the economy.

Addition in or changes prescribed by New Keynesian Economist in business cycle apparatus.

- 1) It introduces nominal variables explicitly prices, wages, a nominal interest rate
- 2) It departs from the assumption of perfect competition in the goods market, allowing for positive price mark-ups.
- 3) It introduces nominal rigidities, generally using the formalism proposed by Calvo (1983), whereby only a constant fraction of firms, drawn randomly from the population are allowed to adjust the price of their goods.

The assumption of imperfect competition is often extended to the labour market as well with the introduction of wage rigidities (nominal or real)

6.1.4 Properties of New Keynesian economy

- 1) Exogenous changes in monetary policy, have non-trivial effects on real variables, not only on nominal ones.
- 2) The economy's equilibrium response to any shock is not independent of monetary policy rule in place.

Relationship of New Keynesian Economy

- 1) The Dynamic is equation interpret the current output gap is equal to the difference between the expected output gap one period in the future and an amount that is proportional to the gap between the real interest rate and the natural interest rate.
- 2) New Keynesian Phillips curve (NKPC) represents that inflation depends on expected inflation one period ahead and the output gap.
- 3) It represents interest rate rule, which describes how the nominal rate of interest is determined.



Figure No. 6.1

The Basic Keynesian model

In the above diagram bit represents the equilibrium of economy. The AD schedule combines the dynamic is equation and the interest rate rule, giving rise to an inverse relation between inflation and the output gap, for any given expectations, NKPC Schedule represents positive relation between the same two variables presented by the New Keynesian Phillips curve, given inflation expectations. The economy's equilibrium is determined by the intersection of AD and NKPC curve at point E°.

6.1.5 Two dimensions of New Keynesian model of multiple equilibria

- An Exogenous monetary policy shock will affect not only nominal variable, but also real ones. Leads to output and inflation keeping natural rate unchanged.
- 2) Monetary policy non neutrality occurs because the response of output (and other real variables) to a non-monetary shock, i.e a shock that changes the natural levels of output and the interest rate, adopted by central bank.

6.2 Hysteresis Reconstructing the Keynesian multiplier

Hysteresis in economics refers to an event in the economy that persists even after the factors that led to that event have been removed or otherwise run their course. Hysteresis can include the delayed effects of unemployment whereby the unemployment rate continues to rise even after the economy has recovered. Hysteresis can indicate a permanent change in the workforce from the loss of job skills making workers less employable even after a recession has ended.

In New Keynesian model hysteresis takes the form of a decrease in labour market matching efficiency as the average duration of unemployment rises. Hysteresis is presented to generate larger and more persistent responses of the unemployment rate and unemployment duration to productivity intertemporal preferences and monetary shocks.

Professor Blanchard and summer (1986) has coined the term hysteresis high unemployment and in the context of Europe in the 1980s featured an "insider - outsider" mechanism.

Model:

With the contribution of continuous efforts taken by various economist e.g. Ravenna and Walsh (2011) krouse and Lubik (2007) etc model has been framed.

6.2.1 Household

A representative household of unit measure manimises expected lifetime utility from consumption according to the following problem.

$$U = E \sum_{t=0}^{\infty} \beta^t D_t \frac{C_t^{1-\sigma}}{1-\sigma}$$
(1)

- σ is the inverse of the intertemporal elasticity of substitution.
- C is consumption is an aggregate of market produced goods C^m and output from home production Z^h is the unemployed household members productivity and L is the fraction of the household that is employed. Thus $C = C^m + Z^h (1-L)$
- The discount factor, β is multiplied by an intertemporal preference shifter, D - variation in the household impatience shocks to this variable can be thought of as representing shocks to desired saving which might for example, results from a financial crisis.

Discount Shock

 $Dt = PD In D_{t-1} + \sum D_t$ (2)

D has a mean of 1. The household can purchase one period nominal bonds with a payoff of 1 for price q, and market produced consumption goods at price P. It earns wage W, and receives the profits \equiv from the final goods firms.

Its budget constraint is

$$P_t C_t^m + q_t \beta_{t+1} \leqslant \omega_t L_t + \equiv \beta_t \tag{3}$$

Household Optimization implies

$$q_{t} = \beta E \frac{D_{t+1}}{D_{t}} \left(\frac{C_{t}}{C_{t+1}}\right)^{\sigma} \frac{1}{\pi_{t+1} + 1}$$
(4)

Where π_{t+1} is the inflation rate between t and t + 1

This implies that an increase in Dt, ceteris paribus lower the price of bonds (or, alternatively, raises the nominal interest rate, i, where $qt = \frac{1}{1+i_{+}}$)

6.2.2 Intermediate goods production:

Firms derive demand for labour and use it to produce a homogeneous intermediate good using a linear technology

$$Y_t = Z_t L_t - {}_k V_t \tag{5}$$

• V is number of vacancy

• productivity Z has a mean of one and follow the process

In
$$Z_t = P_z \ln Z_{t-1} + \sum_z t$$
 (6)

6.2.3 The labour Market

Separations are assumed to occurs at an Exogenous rate δ and hires are given by H, So the labour employed at date t is given by

$$L_{t} = (1 - \delta) L_{t-1} + H_{t}$$
(7)

The number of unemployed at the beginning of period t is given by

$$U_{t} = 1 - (1 - \delta) L_{t11}$$
(8)

matches are formed according to the matching function

$$H_t = A_t V_t^2 U_t^{t-\alpha} \tag{9}$$

- A is productivity of the matching technology
- Labour market tightness is the ratio of vacancies to unemployed $x = \frac{V}{U}$

• The probability that a vacancy is successfully filled is thus $Ax^{\alpha-1}$, which is decreasing in x,

while the probability that an unemployed worker will find a job given by Ax^{α} The average duration of unemployed, denoted M, evolves according to

$$M_t = \frac{U_{t-1}}{U_t} (1 - x_{t-1}) M_{t-1} + 1 \tag{10}$$

use of bar sign to represent steady state the steady state duration of unemployment is given by the inverse of the hiring rate i.e $M = \frac{1}{Ax^{\alpha}}$ Hysteresis enters the model as a decrease in matching efficiency as the duration of unemployment increase according to

$$A_t = \bar{A}_e - \gamma \left(\frac{M_L}{M} - 1\right) \tag{11}$$

Where \bar{A} is a normalisation constant When $\gamma = 0$ it represents " No hysteresis " according to (Ball 1999). In the absence of hysteresis firms respond to the shock by sharply reducing vacancies which leads to a jump in unemployment. Hysteresis implies that hiring will be more costly in the future, so in the presence of hysteresis firms will not cut back their hiring as much in the present. The smoother adjustment of vacancies under hysteresis causes unemployment to rise for several period before beginning to fall because of matching efficiency is lower after the shock, hysteresis implies firms need to post more vacancies in the later periods.

- The decrease in the productivity can be leading to negative supply shocks ultimately leading to inflation in the economy because of such impact output gap also held in the economy ultimately through Taylor rule there is increase in rate of interest. Due to hysteresis, inflation and interest rate return to their steady state more slowly overtime.
- The natural rate of unemployment can be provided by the unemployment rate that would prevail under flexible prices and real wages, taking as given the changes in hiring cost due to hysteresis. As per the study of stiglitz (1994) imperfect capital markets and credit rationing may well exacerbate the effect of recessions, hampering the recovery of the growth rate even further. Other than that recurrent negative demand shocks, such as those deriving from austerity or labour market flexibilization policies, might yield reduced long run rate of growth. A first microeconomic channel which might induce hysteresis is the lower innovation rate associated with a reduction in the aggregate demand, which turn out in a decline in the productivity growth.

A revival of the debate on hysteresis has emerged in the aftermath of the Great Recession countries GDP, unemployment and multiple other economic variable are still below the required rate if it relate with the 2008 Recession period which lead to important strong notion of hysteresis.

6.3 New Keynesian Model of Inflation

6.3.1 New Keynesian macroeconomics models have become workhouse for monetary policy analysis by academic economists and central banks. It relates to the nominal rigidities via monopolistically competitive firm and household that set optimal prices and wages at infrequent intervals.

New Keynesian models introduced three networking channel via which inflation is costly.

- Since firms set prices at different times, there is price dispersion across firms. This price dispersion increases at higher rates of tread inflation and entails a loss of efficiency in production.
- 2. Since firms set prices under monopolistic competition, their prices are higher than their marginal cost of production. The rate of trend inflation has an effect on the average mark up set by firms and therefore on the size of the distortion that results from monopoly power, which constitute an additional source of inefficiency.
- 3. At higher level of trend inflation, firms pricing decision are relatively less sensitive to their marginal cost monetary policy acts via its effects on aggregate demand which in turn is related to firm's real marginal cost. Therefore, monetary policy becomes less effective at higher rates of inflation. This leads to higher variability of inflation, which is also costly.

6.3.2 New Keynesian Phillips curve, consistent with the rational expectations. Some of the famous formulation has been used to by John Taylor and Stanley Fischer using of Calvo pricing, The form of price rigidity faced by the Calvo firm is given as follows.

=> Each period, only a random fraction $(1-\theta)$ of firms are able to reset their price; all other firms keep their prices unchanged when firms do get to reset their price, they must take into account that the price may be fixed for many periods. It is believe that they do this by choosing a long price, Z_t that minimises the "loss function"

$$L(z_t) = \sum_{k=0}^{\infty} (\theta \beta)^k E_t (z_t - P_{t+k}^*)^2$$
(1)

Where β is between zero and one and P_{t+k}^* is the log of optical price that the firm would set in period t+k if there were no price rigidities.

Optimal Reset Price

The actual solution for the optimal value Z_t (i.e. the price chosen by the firms who get to reset) is quite simple. Each of the terms featuring the choice variable Z_t - that is, each of the $(z_t - P_{t+k}^x)^2$ terms - need to be differentiated with respect to Z_t and then the sum of these derivatives is set equal to zero.

$$L'(z_t) = 2 \sum_{k=0}^{\alpha} (\theta \beta)^k E_t(z_t - P_{t+k}^*) = 0$$
⁽²⁾

Separating out the Z_t terms from the P_{t+k}^* terms this implies (3)

$$\sum_{k=0}^{\alpha} (\theta\beta)^k = \frac{1}{1-\theta\beta} \tag{4}$$

To re-write the equation as

$$\frac{z_t}{1-\theta\beta} = \sum_{k=0}^{\alpha} (\theta\beta)^k \varepsilon_t P_{t+k}^*$$

$$z_t = (1-\theta\beta) \sum_{k=0}^{\alpha} (\theta\beta)^k \varepsilon_t P_{t+k}^*$$
(5)
(6)

All this equation says that the optimal solution is for the firm to set it's price equal to a weighted average of the prices that it would have expect to set in the future if there weren't any price rigidities unable to change price each period, the firm chooses to try to keep close "on average" to the right price.

This is assumed as "frictionless optimal" price P_t^* . The firms optimal pricing strategy without frictions would involve setting prices as a fixed markup over marginal cost.

$$P_t^* = \mu + mC_t \tag{7}$$

The optimal reset price can be written as

$$z_t = (1 - \theta\beta) \sum_{k=0}^{\alpha} (\theta\beta)^k E_t \left(u + m_{\mathcal{C}_{t+k}} \right)$$
(8)

The New- Keynesian Phillips curve

The behaviour of aggregate inflation in the Calvo Economy.

The aggregate price level is the calva economy is just a weighted average of last periods aggregate price level and the new reset price, where the weight is determined by θ' .

$$P_t = \theta P_{t-1} + (1-\theta)z_t \tag{9}$$

The above equation can be re- arranged to express the reset price as a function of the current and past aggregate price levels

$$z_{t} = \frac{1}{1-\theta} (P_{t} - \theta P_{t-1})$$
(10)

Equation (8) for the optimal reset price, the first order stochastic difference equation

$$y_t = ax_t + bE_{ty_{t+1}} \tag{11}$$

Can be solved to give

$$y_t = a \sum_{k=0}^{\alpha} b^k E_t x_t + k \tag{12}$$

Examining equation (8) , we can see that Z_t must obey a first order stochastic difference equation with

$$y_t = Zt$$
(13)

$$x_t = \mu + mc_t$$
(14)

$$a = 1 - \theta\beta$$
(15)

$$b = \theta \beta \tag{16}$$

Reset price is

$$z_t = \theta \beta E_1 z_{t+1} + (1 - \theta \beta)(\mu + mC_t)$$
(17)

Substituting in the expression for z_t in equation (10) we get

$$\frac{1}{1-\theta} \left(P_t - \theta_{P_{t-1}} \right) = \frac{\theta\beta}{1-\theta} \left(E_{tP_{t+1}} - \theta p_t \right) + (1-\theta\beta)(\mu + MC_t)$$
(18)

It can be simplified

$$\pi_t = \beta E_{\pi_{t+1} + \frac{(1-\theta)(1-\theta\beta)}{\theta}}(\mu + mC_t - P_t)$$
(19)

Where $\pi_t = P_t - \theta_{P_{t-1}}$ is inflation rate. This equation is known as the New-Keynesian phillips curve. It states that inflation is a function of two factors

i) Next periods inflation rate, $E_t \pi_{t+1}$

ii) The gap between the frictionless optimal price level

 $\mu + mC_t$ and the current price level P_t .

Another way to state this is that inflation depends positively on real marginal

$$\cot mC_t - P_t$$

Firms in the Calvo model would like to keep their price as a fixed markup over marginal cost if the ratio of marginal cost to price is getting high (i.e if $mC_t - P_t$) then this will spark inflationary pressures because those firms that are resetting prices will, on average, be raising them

6.3.3 The NKPC and Lucas critique:

It is widely accepted that inflation expectations will move upwards overtime if output remain above its potential level and that is little or scope for policymakers to choose a trade of between inflation and output which is in the form of

$$\pi_t = \pi_{t-1} + \alpha - \beta \mu_t$$

So there is relationship between change in inflation and level of unemployment. According to the NKPC, low inflation can be achieved immediately by the central bank announcing (and the public believing) that it is committing itself to eliminating positive output gaps in the future.

Clarida, Gali and Gertler (1999) presents a compact version of the standard New Keynesian model which embodies nominal price rigidity only wages are flexible and the labour market clears at all times. Extending the model to include nominal wage rigidity is straightforward, but leads to a more complicated system of equation.

In imperfectly competitive firms like monopolistic competitive market firms take into account their cost of production and the expected future path of prices over the horizon for which they fix their prices.

New Keynesian phillips curve (NKPC) current inflation to future expected inflation

 $\pi_t = \lambda x_t + \beta E_t \pi_{t+1} + \mu_t$

- Here π_t is the deviation of inflation from its long -run level.
- x_t Is the output gap, the proportional divergence between the current level of output and the level that would prevail if prices were perfectly flexible.
- E_t Is the expectation operation conditional on information available at time t
- U_t is the disturbance term that is tacked on to the equation and has the interpretation of a cost push shocks.
- β is a parameter that measures individuals subjective discount rates
- λ is a positive parameter that depends on the characteristics of firms production function, the degree of substitutability across different types of goods, the frequency at which firms change their price and on β .

6.3.4 Assumptions to derive NKPC

- 1) Firms have a constant probability of being able to revise their prices in any given period as per the study of calvo(1983)
- Either the long run trend rate of inflation is equal to zero (following yun 1996), in period when firms do not reoptimize their prices at a rate determined by trend inflation.
- 3) The NKPC is derived by aggregating the optimal price setting decision across firms and then taking a first order approximation of the resulting equation around the trend rate of inflation, which must be zero unless the yun (1996) assumption is used.
- 4) The aggregate capital stock is fixed in the short run, but capital can be reallocated instantaneously and costlessly across different firms.

6.3.5 The cost of inflation in New Keynesian models

By implementing the pricing behaviour of firms in long run equilibrium, it is possible to show that there is a negative trade - off between average (trend) inflation and output in New Keynesian marco economic model according to Ascari (2004).

Causes of negative trade off

- 1) If firms fix their prices for several periods, their relative prices will decline over time if trend inflation is positive.
- 2) Firms will front -end load their prices so that they are initially higher that the overall price level when firms are allowed to
- 3) Firms will produce less of their goods than is socially optimal when they first set their prices and as inflation erodes their relative price, will wind up producing too much of their goods. If a social planner could allocate resources he or she would equalize the marginal productivity of each type of good produced by the monopolistically competitive firm.
- 4) Price dispersion is an increasing function of trend inflation and Real Gross Domestic product (GDP) is a decreasing function of steady state inflation

Taylor pricing, the quantitative effects of price dispersion are smaller by an order of magnitude than under calvo pricing

Taylor pricing holds that firms keep their prices constant for a fixed, rather than a random , number of period with positive trend inflation the firms with the lowest relative prices have not changed their prices for the number of periods equal to one less than the average length of the price contract .
Under calvo pricing, the firms with the lowest relative prices have kept their prices constant for an indefinitely long period of time, even if the average number of period between price change is relatively low.

The quantitative difference for price dispersion between calvo pricing and taylor pricing has important consequences for the welfare cost of trend inflation.

The inflation rate at which the average markup is minimized depends on all the structural parameters of the model including the elasticity of substitution across different type of goods and the average length of the nominal price rigidity.

When the prices of all firms increase at the rate of inflation, the slope of phillips curve is independent of trend inflation.

6.3.6 Monetary policy becomes less effective at higher rate of inflation:

The reduced effectiveness of monetary policy is a cost of inflation. Ascari and Ropele (2006) show that, under discretionary monetary policy, it is optimal for the central bank to respond less strongly to variations in inflation resulting from cost-push shocks.

Implications for monetary policy.

The three channel through which inflation is costly have implications both for monetary policy in the long run (the choice of the steady state level of inflation) and for the conduct of short- run stabilization policy (the optimal degree of price level stability)

6.3.7 Optimal trend inflation in New Keynesian model:

- 1) According to walman (2001) price dispersion is minimized in the steady state when trend inflation is equal to zero. The cost resulting from the markup distortion are minimized at a low positive rate of inflation, when choosing an optimal rate of trend inflation the costs of these two distortions would have to be balanced at the margin.
- 2) As per the study of Amanoet at (2007) and Ambler and Entekhabi (2006) if the trend rate of technological progress is positive, the trend rates of wage and price inflation would have to differ so that real wages could grow along the economical balance growth path. In the New Keynesian model technical progress increases the benefits of lowering the trend rate of price inflation towards zero.
- 3) The flattering of the Phillips curve at higher rates of trend inflation would also favour a trend inflation rate of zero in order to maximize the efficacy of monetary policy.

- 4) New Keynesian model concerns the optimal degree of price level variability.
- 5) Great Economist Good friend and king assumes only nominal price rigidity, and they believe that monetary policy. as optimal if it allows the economy to attain the same equilibrium that it would under flexible prices.

Thus, from above we can conclude that New Keynesian models have immensely enriched our qualitative understanding of the costs of inflation. They can be implemented by central banks for the foreseeable future as forecasting tools and for analysing the optimal conduct of monetary policy.

6.4 Questions

- Q1. Explain N.K model of macroeconomics, with respect to inflation.
- Q2. What do you understand term Hysteresis Reconstructing the Keynesian multiplier.
- Q3. Describe the New Keynesian Economics and multiple Disequilibria.

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7

MACROECONOMIC POLICY - I

Unit structure:

7.0 Objectives

- 7.1 Macroeconomic Policy
- 7.2 Rules versus Discretion
 - 7.2.1 Rules versus discretion argument in monetary policy
 - 7.2.2 Viewpoints of different economists on rules vs discretion
- 7.3 Credibility & Reputation

7.3.1 Importance of Credibility and Reputation

- 7.3.2 Reputation and Credibility: An Alternative Keynesian Approach
- 7.4 Questions
- 7.5 References

7.0 Objectives

- 1. To understand macro economic policy
- 2. To know the importance of rules and discretion in monetary policy.
- 3. To establish the relationship between credibility and reputation.
- 4. To understand the Keynesian approach to reputation and credibility

7.1 Macroeconomic Policy

Macroeconomic policy focuses on limiting the effects of the trade cycles to achieve economic goals. Macroeconomic policies are designed to achieve specific objectives. Aims at a stable economic environment to attend sustainable economic growth.

Like price stability, full employment, maximize the level of national income, current account balance, providing economic growth to raise the utility and standard of living of participants in the economy. Several secondary objectives are held to lead to the maximization of income over the long run. These policies are

designed to influence the aggregate Supply and aggregate demand of the given economy. Fiscal policy functions over the level and types of taxes levied and the level and form of government borrowing, changes in the level and configuration of government spending. Governments provide open stimulus to economic activity through recurrent and capital expenditure, and indirectly, through the effects of spending, taxes, transfers on private consumption, investment, and net exports. Fiscal policy is the only arm of macroeconomic policy openly controlled by the government. Under current institutional provisions, Fiscal policy aims at inducing aggregate demand by fluctuating tax- expenditure-debt program of the government. The credit for using this kind of fiscal policy in the 1930s goes to J.M. Keynes who discredited the monetary policy as a means of attaining some of the macroeconomic goals. Monetary policy may be defined as a policy employing the central bank's control of the supply of money as an instrument for achieving macroeconomic goals. Traditional monetary policies include the adjustment of interest rates, open market operations, and setting bank reserve requirements. Supply-side policies are designed to make markets work more efficiently. There are two main types of supply-side policies. Free-market supply-side policies involve less or no government interference via policies to increase competitiveness. For example, privatization, deregulation, lower income tax rates, and reduced power of trade unions. Interventionist supply-side policies involve government intervention to overcome market failure. For instance, government spending will be higher on transport, education, and communication. Supply-side policy instruments are Selling state-owned assets to the private sector. Deregulation- is the exclusion of government power in a particular industry, usually endorsed to create more competition within the industry. Over the years, the struggle between proponents of regulation and deregulation has shifted market conditions. Reducing income tax rates. - increase the incentives for people to work harder, leading to an increase in labor supply by an increase in labor hours offered and more output. Similarly, a cut in corporation tax gives firms more retained profit they can use for further investment and serves as an incentive. Deregulate Labour Markets- Reducing the power of labor unions, reducing unemployment benefits, removing minimum wages All these reforms aim at making the labor market more flexible. E.g. When it is easier and/or cheaper for firms to hire and fire workers, they will be more likely to hire. Deregulate financial markets. - deregulation of financial markets can surge the volatility of interest rates. before July 1991 the RBI regulation put ceilings on the interest rates that could be paid on various categories of deposits by banks and other financial (depository) institutions. In the present scenario, commercial banks and other banking institutions can fix their rates of interest. Increase free-trade. by reducing tariff barriers and other obstacles to trade.

The exchange rate adjustment is another policy measure. Demand and supply in the foreign exchange markets lead to the establishment of a nominal exchange rate at a point in time. An exchange rate adjustment is a procedure adopted to eliminate the valuation effects arising from movements in exchange rates from data expressed in a common currency. in the given unit we will observe the relationship between exchange rate and inflation targeting as a macroeconomic policy measure In the real world scenario many policies are subject to both inside and outside lags, in the time from which it is recognized that policy should be applied to the time it is applied (inside lag), and from the time policy is applied to the time it has effects(outside lag). It is commonly supposed that fiscal policy (i.e. changes in tax rates or government spending) has a very long inside lag, but a short outside lag. Budgets are often passed late. Monetary policy is assumed to have a very short inside lag, but a long outside one. Largely because of its short inside lag, and because fiscal policy may have concerns other than economic stabilization, we shall make the common assumption that only monetary policy is used to stabilize output.

The macroeconomics theories are propounded by various branches like classical, new classical, Keynesian, New Keynesian. monetarist. let us view some of their area of work as we are going to explore the next topics in the light of these macroeconomic policies.

7.2 Rules vs Discretion

Economists generally categorize policy-making frameworks as either rules or discretion. Rules offer time consistency. The outcome demanded by the public in the short run is consistent with the outcome anticipated in the long run. Monetary policy with rules has the following facets -policy responses that follow pre-specified plans, directions to markets instead of leaving it on agents. Rules make it easier for policymakers to be seen as credibly committed to a good policy and evading easy temptations such as short-term inflation to facilitate employment growth.

Types of rules

- a) Constant money growth rule: The money supply is kept growing at a constant rate regardless of the state of the economy. money is the sole source of fluctuating demand
- b) Activist rule: Policy should react to the level of output as well as to inflation.

considers both output gap $(y - y^p)$ inflation $(\pi - \pi^T)$ [The output gap is an economic measure of the difference between the actual output of an economy and

its potential output. Potential output is the maximum amount of goods and services an economy can turn out when it is most efficient—that is, at full capacity. Often, potential output is referred to as the production capacity of the economy. And inflation gap is Real or Actual GDP – Anticipated GDP]

According to Kydland & Prescott, (1977) Rules are valuable because the public observes policymakers and expectations that affect their likely actions. In the 1930s monetary rules were also promoted by Henry Simons to reduce uncertainty about the price level and, thereby, facilitate private-sector planning. The best illustration of such rules can be by Milton Friedman, suggesting a constant money growth rule as a reasonable policy. One more such rule was also formulated by Stanford Economist John Taylor. In his recommendations for central banks to keep interest rates relatively high (tight monetary policy) when inflation is above its target that is when the economy is above its full-employment level & a relatively low-interest rate in the opposite situation.

There has long been debate over whether the policy should be set by following a rule or by using discretion, which is reoptimizing uninterruptedly. It might initially seem that since under discretion, one always has the option of following a rule, that rules would always be dominated by discretion. We shall see later that this is not the case, because the very ability to be free to act may create undesirable consequences. We will focus on the case for simple rules, rather than more complicated ones but keeping in mind that in principle rules could be enormously complicated. The traditional case for rules has focused on the uncertainty associated with economic policy. It may well be the case that if the effects of the policy instrument on output are not well understood, that policy might be destabilizing rather than stabilizing. We will look at this argument which illustrates this point coming from the views of Milton Friedman.

Suppose there is some variable Xt that the policymaker wishes to stabilize. Let Zt denote the behavior of that variable when economic policy is applied, and let Yt be the effects of the policy on the variable. Then Zt = Xt + Yt, or the behavior of the variable under policy = the behavior without policy + the effects of the policy. Stabilization policy will only be effective when $\sigma_z^2 < \sigma_x^2$ or the variance of the variable under the policy is lower than the variance without policy. From the definitions of X, Y and Z we see that:

$$\sigma_z^2 = \sigma_x^2 + \sigma_y^2 + 2 r_{xy} \sigma_x \sigma_y$$

Where

 r_{xy} is the correlation between x and y. Hence policy is only stabilizing if

$$r_{xy} < - \frac{1}{2} \frac{\sigma y}{\sigma x}$$

First, note that this indicates that policy essentially is countercyclical. Second, note that the requirements this condition places on the policy may be hard to fulfill in practice. If the standard deviation of the effects of the policy is equal to the standard deviation of the policy variable itself, then the policy must go in the right direction at least half of the time (i.e., the correlation must be between (-5 and -1). The presence of lags may result in policymakers stimulating the economy as recovery is already beginning or dampening it as it reaches its peak. Note that this condition is more easily met the smaller the effects of policy on the variable are. It is reasonable to assume that policy effects are smaller than the variance of the policy is. Simple policy rules, in which, for example, the rule is to fix the growth rate of some policy instruments are examples of policies with small variance. Discretionary policies also in principle could have a small variance, although in practice they may not. Thus this relationship has been taken as a suggestion that simple policy rules are most likely to be stabilizing.

Whereas discretion provides widespread latitude to design the best policy in response to the given situation. new policy each period provides flexibility in unforeseen scenarios. If the discretionary policy is chosen by policymakers, then they make no obligation to future actions or activities. They may implement a policy more expansionary than firms and general people expect, as a result, there will be an increase in the economic output and reduce unemployment in the short run. when the environment is uncertain and policy-makers proclamations are credible by the general public in such cases Discretion may better serve the public interest. They may have better inflation performance in the long run if they do not try to surprise people with an expansionary policy.

7.2.1 Rules versus discretion argument in monetary policy

As Mishkin and most economists characterize inflation targeting as a monetary policy framework that can be called "limited discretion" or constrained discretion which combines the advantages attributed to the traditional rules with discretionary policy. Thus, they discard the impression of dichotomy rules - discretionary policy. as rules can be too rigid as they cannot see any contingency, another problem with rules is they do not follow the use of judgment. Thirdly if rules are imposed without proper knowledge of the model of the economy any policy rule will be proved to be wrong. Further structural changes in the economy would lead to a change in coefficients in economic models this makes the case for discretion. Monetary

policy credibility problem occurs when those who set the monetary policy wants to achieve an optimal monetary policy rule or a plan for future policy at a time t_0 , chosen arbitrarily. The monetary authority will have to maximize a function under certain constraints derived from the need to ensure the balance of the private sector. When they select the best policy for a time (t_0+s) in the future the policymaker must take account of how the policy for the period (t_0+s) will affect the behavior of private economic agents from time t to time (t_0+s) When it comes to (t_0+s) arises the following problem: the trajectory of monetary policy determined at time t will be any longer optimal? A policy is a time consistent if the activities planned at a time t_0 for time (t_0+s) remains optimal when it comes to being implemented effectively at the time (t_0+s) . Usually, according to expert studies of monetary policy, it will no longer be optimal. Since consumer decisions taken between times t_0 and (t_0+s) have been already adopted, monetary policy can no longer influence them. Monetary policymaker faces problems, other than those which were valid at the time t_0 this will make him prefer a different policy. In this case, the original choice that he did will be dynamically inconsistent. An optimal monetary policy strategy at the time t_0 is dynamically inconsistent if at the time (t_0+s), when should be adopted is no longer optimal.

In general, there must be some externalities and should not be a sufficient number of tools to control them (a condition which usually occurs in most economies) for that dynamic inconsistency

phenomenon to appear. If monetary policy decision-maker is obliged to respect for the period

 $(t_0 + s)$ the conduct determined at the time t_0 because the cost of monetary policy change is too large, the dynamic inconsistency problem becomes irrelevant. In reality, monetary policy is conducted in a discretionary environment in which decisions are taken sequentially and a review of the decisions taken by policymakers is a common practice. In this case, private agents will anticipate the future incentive of monetary policymakers to abandon the plan proved to be optimal ex-ante and would expect instead to be implemented an ex-post optimal policy. Kydland and Prescott (1977) show that, in a discretionary environment, in which policymakers will choose to follow the strategy taking into account only the present situation, this will not normally result in maximizing the social function.

Starting from the benefits it might produce unexpected inflation by increasing output and hence, reduce unemployment below the natural rate and also increase government revenue by nominal depreciation of government debt, which would have the same effect as levying a new tax income, Barro and Gordon (1983) show

that a rule-based monetary policy leads to lower costs than a discretionary policy. In the case of using monetary policy rules, the bank will choose the level of inflation which agrees with expected inflation. The consequence of this leads to lower costs related to inflation, the use of monetary policy rules leads to more satisfactory results than discretionary policy, which coincides with inferences extended by Kydland and Prescott. The existence of inflation bias in the case of discretionary policy occurs for two reasons: One is the fact that the central bank is stimulated to produce inflation more than the expected inflation when economic agents' expectations are set and the second reason is that the central bank can not constrain to gain a zero rate of inflation.

An explanation is that monetary policymakers cannot be credible regarding the policy of zero rates of inflation. Thus, even if he announces that the inflation rate will be zero and the judgments of private agents will be based on the assumption that inflation will be zero, is in his interest to induce a rise in the price level.

7.2.2 Viewpoints of different economists on rules vs discretion

The argument of rules versus discretion was originated in the writings of Henry Simons. A policy rule can be specified as fixing the quantity of currency and demand deposits, or general as when the monetary authority announces to the public the course of action it will take for various states of the economy, putting its reputation behind it. Although rules can be set up in an equation form, such as the Taylor Rule, they require variables such as the natural level of output and expected prices that are only approximate.

A rule can be active, as when it is increasing the money supply when the economy is on a decline,

When the money supply is increased by a fixed percentage annually it's called the passive policy rule.

Meaning-wise rules are normative but some of them are descriptive, meaning that they predict values close to what the authorities allow. The danger with rules is the tendency to substitute administrative authority for rules, which tends to weaken competition and expand government activities. In 1990, President George H. W. Bush switched the term "policy rule" with "policy system" in his message to Congress. Discretion requires delegating responsibilities to economic institutions such as the Federal Reserve (or central bank) to decide macroeconomic objectives and policies as they see suitable. The world of uncertainty demands discretionary policies as per Kenneth Arrow. A decision improves with time and experience, which requires information that is available only sequentially. A decision-maker such as the central bank analyzes the problem at hand and decides on the best policy action to take. The discretionary policy may be inconsistent when it does not change the initial conditions that create a disruption. or shortsighted when a policy requires lags to materialize. The argument over rules versus discretion empirically continued. If a rule is placed on the money supply, the monetarists look for an underlying link between money and prices. The definition of money and a stable velocity-of-circulation function are necessary for empirical investigation. A currency plus demand-deposit definition is not sufficient for rules to work because people hoard money (preferring liquidity), many "near money" substitutes may exist, wage and price rigidity exist. If wage and price rigidities are only slight, then a rule might work, but it would need the nonexistence of substitutes such as equity or bonds; it would also require that loans be held for long periods so that repayment on the principal is not required. For Simon, such a systemic policy appears paradoxical, as it would necessitate an intelligent monetary system on the one hand and credibility of rules on the other.

Milton Friedman extended the argument by articulating two rules on the money supply, the k-percent rule, and a Friedman rule, which he later referred to as the "5 percent and the 2 percent rules," respectively. In the 5 percent rule, "the aggregate quantity of money is automatically determined by the requirements of domestic stability". To cover the international scene as well, Friedman complemented the 5 percent rule with a flexible exchange rate. The 5 percent rule, however, runs up against rigidities and lag effects in the economy, which are short-run in nature. The long-run 2 percent rule requires nominal interest rates to equal the opportunity cost of producing money for the interest rate to be approximately zero. More recently Geoffrey Brennan and J. Buchanan have accepted monetary rules on political grounds –containing discretion, permit the central bank to generate higher socially optimal inflation rate .so that they can enjoy the revenue from money creation.

The exploration for a stable velocity-of-money function was secondary. Because the velocity function was variable in the short run instead Friedman turned to more general shreds of evidence, including the use of his permanent-income concept for further empirical analysis. According to Finn Kydland and Edward Prescott 1977, policy rules could improve social optimum. A change in administration leads people to change their expectations and their current decisions. People have expectations about the tax policies of different administrations. Once people have some knowledge of such changes, they adjust their expectations and set into motion a series of changes that may or may not get into an equilibrium under the current state of the economy. Some policy rules are suboptimal in the sense that their response mechanisms depend on early conditions, and to continue the initial policy in consequent periods is not optimal. Robert J. Barro and David Gordon opined that people would adjust their expectations of inflation to eliminate surprise inflation, creating a potential for a higher money supply and inflation in equilibrium. If policy rules are implemented, such expectations-driven inflation would not occur, but policymakers would have an incentive to break the rule—cheating—because higher inflation means less unemployment and more growth, according to the Phillips curve.

Policymakers and the public are in a game-like situation if policymakers are concerned about their "reputation" or "credibility." The incentive to be credible is based on the substitution of short-term incentives for higher-level incentives from lower inflation in the long run. Taylor extended his policy rule to price and nominal income rules for the open economy under fixed versus flexible exchange rates.

7.3 Credibility and Reputation

In the mid-1980s with the branch of New Classical economics (rational expectations) revolution there was a paradigm shift in terms of monetary policy operation with the formation of a new consent, where price stability became the main objective for the monetary authority Based on the working of economists like Muth, Lucas, Sargent, and Wallace --monetary policy should not be used to affect real output and employment, but to keep inflation under control. Provided there is the absence of informational barriers and money illusion. The combined acceptance of the following assumptions like rational expectations, a continuous marketclearing equilibrium economy assuming fully flexible prices, and the profit-utility maximizing behavior, bring forward several important deductions about economic policy inferences. Among these inferences we can identify, the monetary policy inefficacy to upset output and employment at short and long terms; the disinflation costs that fall on real activity; the time-inconsistency problem from optimal discretionary policies; the importance of reputation and credibility for the monetary authority and its policies, respectively, and; the development of " technology commitment " and rules that restrict monetary policy and attempt to avoid the inflationary bias and the time-inconsistency problem.

As New Classical economics has progressed significantly. These developments in monetary theory have highlighted the importance of the central banks' reputation and the credibility of their policies for the conduction of monetary policy and the perceived results in the economy... While new models regarding credibility and reputation have combined New Classical assumptions within their frameworks leading, at the same time, the acquired results to become well-matched with the notion of monetary policy neutrality, they also reinforced the idea that monetary

policy will be more effective if the goals and aims monitored by central banks are considered credible by the public and if the policy is applied by central banks with a strong reputation of being an institution mainly worried about price stability. The theoretical foundation that explains the development of works concerned with the reputation and credibility of central banks and their policies is based on the literature of 'Rules rather than discretion. The arguments regarding the monetary policy's credibility and the central banks' reputation were presented for the first time by Fellner and by Kydland and Prescott (1977) - for the case of credibility and, later, by Barro and Gordon for the case of reputation - when they analyzed economies presenting high and unwanted inflation rates. An attempt was made to prove that credibility and reputation represent key elements for finding the solution to the inflationary bias and the time-inconsistency problems by the works of both Kydland and Prescott and Barro and Gordon. Credibility is associated with the degree of confidence that the public has in the central bank's ability and determination to keep itself on an announced goal and to achieve it, that is, if the policies (or plans) are credible, reputation is related to the public's belief about the preferences of the policymaker and to the expectations formed by the public about the actions that monetary authorities will take. Hereafter reputation is subject to public expectations about actions by the central bank and monetary authorities' Monetary policies will be more effective and then will achieve a good amount of credibility if central banks strengthen their reputation and follow a rule concerned with inflation stability. Central bankers and economists have acknowledged some basic principles guidelines for central banks to conduct their policies and better reach their goals.

These principles are price stability, fiscal policy should be aligned with monetary policy, time-inconsistency is a problem to be avoided, monetary policy should be forward-looking, accountability, monetary policy should be concerned about output as well as price fluctuations and stability of the financial system, sustainable economic growth, low unemployment rate, monetary policy working through real interest rates and expectations. With the concepts of the monetary economy, effective demand and Keynesian liquidity preference, the possibility for output and employment improvement as well as inflation stability has become the goals for central banks. Thus, the progress concerning the influence of reputation and credibility over the economy must be enlarged assisting the examination of a new approach that considers that monetary policies are not neutral. The role of central bankers' reputation and the credibility of their policies must be replaced since both exercise influence over the expectations of the public, causing changes in aggregate demand. The capability of central banks in particular and monetary policy, in

general, to affect the actual and future economic performances through public decisions depends on their ability to influence private-sector expectations regarding not only the future path of the interest rate and the future state of the economy but also the way they implement actual and future policies, make their announcements and account to the public. Exploring the concepts of reputation and credibility and their importance in a context where central banks' policies are not neutral, that means, monetary policies affect real and nominal variables. How the reputation is developed by the monetary authority and the commitment to a strict rule-based policy affect the state of expectations, and then the economic performance, enabling a particular situation that we call "credibility trap" - which makes monetary policy ineffective to affect real activity when necessary.

7.3.1 Importance of Credibility and Reputation

At the same time that macroeconomic theory suffered radical transformations, led by the revolution of rational expectations, a new discussion emerged from the following problem: how social losses should be minimized when actions of economic policy must be taken at several periods. Let's suppose the following situation to understand the time-inconsistency problem: the government formulates what it considers to be an optimal policy as a dominant player and then announces its intentions to the private sector who is a follower of policies; if this policy is believed, then in the next periods, it may not remain optimal, since the government finds that it has an incentive to go back on a promise on its previously announced optimal policy. In this sense, an optimal policy suggested at time t is timeinconsistent if re-optimization at t + n implies a different optimal policy, consequently, time-inconsistent policies will significantly weaken the credibility of future announced policies.

The argument of the New Classical approach that since the monetary authority has no pre-commitment with an announced policy and usually makes use of its discretionary powers, it will have an incentive to cheat, making the announced policy time-inconsistent and then non-credible. The approach secures those discretionary policies produce sub-optimal results since display an inflationary bias. Here so-called considered as optimal policy loses its credibility due to time inconsistency hence increases its chances to become neither feasible nor optimal.

The orthodox approach about credibility:

With the provisions, the economic system and active policies are eminently stable. Besides, it suggests that monetary policies would only be effective if, policymakers would have an incentive to cheat to promote output increases (even if transitory). However, once private agents' expectations about inflation are corrected, unemployment would lean to yield its natural rate, but with a higher equilibrium inflation rate. It means that optimizing actions implemented by a monetary authority with discretionary powers tend to carry the economy to suboptimal equilibriums, with higher levels of inflation. Hence the conclusion is the possibility of changing the monetary supply exogenously, trying to make less than the natural rate of unemployment, leads to losses of monetary policy credibility since agents recognize the incentive to promote unexpected expansions. Therefore, credibility improvements are unequivocally related to the expectation that monetary policy is not going to change, that is, the monetary authority will follow its announcements and will be executed based on mechanisms that make discretionary actions impossible.

According to economists Blackburn and Christensen "the concept of credibility is not well defined in economics and has received different interpretations by different authors. Perhaps the most general interpretation is the extent to which beliefs about the current and future course of economic policy are consistent with the program originally announced by policymakers". Whereas Drazen presents two different perceptions about credibility: the first one is the credibility of the policymaker means the policymaker will do what exactly he says and the credibility of the policy means the expectation that policy would be carried out. New Classical economics suggests, for a monetary policy to be considered credible it must follow a rule in which the agents will believe that the monetary authority is not going to break a promise. Hence, to affirm that a policy is credible the public must believe in the rule and, through expectations, in the results, the monetary authority is trying to reach. As expectations are well-thought-out in important monetary program elements, the lack of credibility of a certain policy may thwart, or even obstruct, the reach of a certain goal due to formed expectations. The policy is credibility criteria are based (a) on the expectations formed by the public about its effects on the economy, (b) on the policymaker's credibility and reputation, and (c) on the circumstances the policymaker is going to face. A policy may be feasible in one set of circumstances, but not in others, that is, "expectations of how external environment will develop, rather than the credibility of the policymaker, will then be crucial in assessing whether the policy is credible" (by DRAZEN)

A credible monetary policy, following the New Classical thought, have the following features:

Firstly, Policy implementation is done by an independent central bank through a rule which bounds the monetary authority's actions, avoiding the time-inconsistency problem and the inflation bias; Secondly, seeks to keep inflation under control considering that output and employment will be at their natural rates

of employment and output at the long term; Thirdly, converges the expectations of the public to its goal, and consequently, makes the public believe that the implemented policy will be carried out and the goal will be reached as fast as possible, and; reductions in the costs of disinflation in the short run whenever a policy against inflation must be implemented.

Central banks will attempt to establish a specific sort of reputation, to achieve the credibility of their policies and affect the expectations of people. The concept of reputation can be thought of in terms of the actions an agent is expected to take. "Reputation often refers to generally held beliefs about an individual's or a group's character " According to the reputation built by central banks, the public forms expectations about the policymakers' future actions. For instance, as the monetary authority's reputation of being tough on inflation becomes stronger, it strengthens the confidence in expectations regarding future monetary authority's actions seeking to establish and maintain a stable price environment. This is the sort of reputation that the New Classical economics suggests to central banks; an institution that must attempt to build the reputation of being hard on inflation. According to this approach, the monetary authorities' future actions against inflation.

Economic entities and units are often concerned about central banks'. Since the public attempts to foresee central banks' future activities based on what it has observed in the past - and, of making use of all available information - it is important to perceive that reputation plays a fundamental role for that because it reflects some sort of repeated behavior that policymakers have always presented.

Barro and Gordon were the first to build a game model to analyze policymakers' reputations. Backus and Driffill added to this an infinite time horizon model in which the public is uncertain about the preferences of the policymaker. The subsequent models inspired in the works of Kydland and Prescott, Fellner suggests that there is no case for the shortcut to gain credibility and make reputation stronger hence both must be built and nurtured over time. The New Classical economics regards that central bank can best improve their credibility and reputation by keeping a consistent record of inflation within the target and by not complying with pressure for short-term gains in economic growth at the expense of long-term price stability. Moreover, the monetary policy should be conducted by a stringent rule that makes the public's expectations about policymakers' future actions well-matched with the reputation of being an institution tough on inflation.

Undeniably, credibility and reputation can considerably improve the effectiveness of monetary policies since they increase the confidence of the agents on expectations regarding future central banks' actions. Policy signals from credible monetary authorities with resilient and well-defined reputations will be better understood and generally accepted by market participants and the public, resulting in a more effective monetary transmission mechanism through expectations and a lower cost of disinflation whenever a policy of this sort might be implemented.

The New Classical models used the Phillips curve to describe the trade-off between unemployment (output) and inflation whenever unexpected monetary policies were implemented. As these models make use of rational expectations, the inexistence of the trade-off is accepted in the long term, suggesting that central banks should pursue only price stability. In other words, monetary policies must not be used to affect real activity, because a higher rate of inflation and the output and the unemployment at their natural rates will be the long-run results. So, the central banks' reputation must be of an institution tough on inflation which will not implement policies attempting to keep unemployment below its natural rate, that is, an institution that will follow rigorously the monetary rule to keep inflation low and stable and to increase the credibility of its policies.

Sicsú (1997) criticized the basic assumptions of New Classical monetary policies models. He argued that the economy does not have a natural tendency toward an equilibrium position; the equilibrium stability property would not prevail if expectations, nonetheless rational, may be heterogeneous. Hence, if expectations may be heterogeneous, they can also be disappointed and then mistakes can happen. Mistakes can change the parameters that sustain the equilibrium position suitable to the natural rate of unemployment. Consequently, the unique property will not be valid either. Chick (1983), however, argues against the use of the Phillips curve as a general and representative model of the economy's functioning. The alternative Keynesian approach, here proposed, also argues against the use of the New Classical Phillips curve as the framework which may represent the general functioning of the economy and which will guide monetary policy. The work of Libânio (2008) explores the idea that aggregate demand matters for economic activity, both in the short run and in the long run. To that extent, it discussed the endogeneity of the natural rate of growth, Recent models that consider the modus operandi(procedure) of the economy based on the New Classical assumptions suggest central banks implementing and following some sort of nominal interest rate rule to control inflation. Although, as this rule does not consider the kind of inflation pressure, treating any kind of inflation as being caused by demand, tends to punish output and employment in the short run and to reduce the potential of growth in the long run, therefore, in the future, leading to a situation that we call "credibility trap".

7.3.2 Reputation and Credibility: An Alternative Keynesian Approach

According to Keynesians, in the context of the monetary economy "fluctuations in effective demand and employment occur because, in a world in which the future is uncertain and unknown, individuals prefer to retain money, postponing consumption and investment decisions". The expectations and the state of confidence of the agents play important roles in the decision-making process in an environment of "fundamental uncertainty". Hence, money and monetary policies also play important roles, as the agents, in conditions of uncertainty, may prefer liquidity instead of acquiring goods through consumption or investment. To find out how central banks can affect the performance of the economy through the influence of their reputation and the credibility of their policies, it is necessary to understand how economic agents make decisions based on their expectations and their state of confidence in these expectations. Therefore, it is essential to know the determining elements of expectations and confidence and how these elements are affected by central banks' reputation and credibility.

It is a consent among economists that expectations are an important monetary policy transmission channel. In this sense, aiming at linking the reputationcredibility binomial with the process of expectations formation. As full knowledge does not exist at the moment in which a relevant economic decision must be taken, the economic agents make use of the available information, their tacit knowledge about the living context and about the institutions (central bank) able to affect them, and their imagination informing potential set-ups. Based on these elements, they form expectations that will guide their decisions in a monetary economy. As these expectations are considered an important monetary transmission channel, the monetary authority will increase its possibility of reaching its goals if the agents share the same beliefs about the future and if they are endowed with enough confidence in the expected results which are capable of affecting their concerns. Confidence is a fundamental component of the transmission process of monetary policies through expectations; it reflects the agents' perceptions and degree of belief concerning the disposition of the monetary authority and the way it conducts the monetary policy.

The concept of central banks' reputation -according to the Keynesian approach involves the agents' state of perception concerning the preferences of the monetary authority, the actions expected to be taken by the monetary authority, and the monetary authority's character and features. When this discernment suddenly

changes modifications may emerge in the uncertainty perceived, provoking the worsening of the "state of expectations" of the public through the state of confidence. Consequently, the uncertainty perceived, affected by the public's knowledge, may increase or decrease as per central banks' reputation, to the credibility of the policy adopted, and, to the context in which central banks acts. Although the central banks' reputation depends on past events, it can affect expectations about future events. Therefore, it is expected that monetary authorities, presenting a solid and well-defined reputation of being institutions concerned with price stability and growth. Reputation and credibility serve as catalyzers in the process of merging expectations and confidence to the policymakers' scheduled objectives. The confidence in monetary policies and on central banks is decisive for the monetary policy effectiveness through expectations. Growth needs to induce the agents to change financial assets for capital goods, that is, to change interest gains for expectations of promising future profits. Monetary establishments must be also capable of establishing a stable price environment that will reflect itself on the public's expectations regarding the central banks' commitment to keeping inflation low and stable. If the private sector expects that the goals for inflation and growth are going to be reached and when central banks revealed their commitment to both and have been coordinating their policies with the other economic policies, doing whatever is necessary and coherent for that to happen, hence the private sector will consider these beliefs when deciding and will readjust prices and form expectations for inflation and demand growth based on these pieces of information. As central banks present a strong and defined reputation and act implementing credible and coordinated policies aiming at promoting inflation stability and economic growth, their ability to influence the "state of expectations" towards more investment decisions is improved. Inversely, central banks presenting a fragile reputation, in a context of uncertainty and assuming the New Classical recommendations make the agents' liquidity preference increase because they find it difficult to keep interest rate variability low. When assuming the idea that monetary policy is not neutral in either the short or the long terms and recognizing that the public not only forms expectations for inflation, but also for future events that may affect its business' profitability, central banks can be effective in changing both real and nominal variables. With the idea that monetary policy is not neutral, it is conferred to central banks a wider field of action than the one proposed by the New Classical approach. With the method central banks conduct their policies, choose their instruments and coordinate their policies with the other policies, besides providing information for the process of expectations formation, add knowledge on how they understand the operation of the economy.

For a monetary policy to be considered credible, it must be considered efficient. As per Sicsú (2001), an efficient monetary policy would aim at unambiguous goals, leaves the least room for its tools to be used in contradiction with each other, or with other policy tools, makes use of tools suitable for its goals, gives out clear signals to agents and financial markets to stimulate them to act in the same directions desired by the policymakers, and can reach a specific goal without damaging the economic performance as a whole. In this way, an efficient monetary policy, and thus credible, must be performed by an institution competent in reducing uncertainties, coordinating expectations, and following unlike but feasible objectives - and not only low and stable inflation, though this is a very important objective.

The debate concerning how the monetary policy should be conducted and what are its effects on the economy has always been the core of the "rules rather than discretion" literature, which in turn, is supported by another discussion: whether the monetary policy neutrality in both the short and the long terms is valid (and effective) or not. Broadly those who defend the neutrality argue in favor of the need of using some strict rule-based policy to guarantee (i) the application of dynamically consistent actions, (ii) the avoidance of the inflation bias, and, as a consequence, (iii) the accomplishment of the main central bank objective which is stable and low inflation - according to the New Classical economics. Central banks attempt to thrive in forming a low and stable price level which supports reducing inflation variations and interest rate variations to get desirable growth However, the use of a strict monetary policy rule, through interest rate manipulations is capable of reducing and stabilizing the observed inflation as much as the inflation expectations, in a situation of high idle capacity and considering that monetary policy can affect output and employment; it may lead the economy to present low economic growth rates below those socially desirable, as much as it creates an adverse environment for investment decisions.

The Keynesian approach, suggests that full employment, as well as inflation stability policies, should be implemented by the combination and coordination of three types of instruments: monetary policies, fiscal policies, and income policies. Fiscal Policy was designed to sustain long-term expectations as to the aggregate level of income the state was committed to supporting. Income policies would regulate the wage/price relation to avoiding cost inflation. The role of monetary policy, under these conditions, would be to provide active balances for transaction needs and to prevent increases in liquidity preference from being translated into higher interest rates that could threaten investment. These policies should be jointly applied. None of them can be thought of as Keynesian when taken in seclusion because they would create difficulties for the economy that could end up in a crisis.

Hence the definition and design of policies should consider the following principles: institutions should be created to achieve more efficient and permanent coordination of agents, allowing them to develop coherent strategies; a set of instruments must be developed, paying particular attention to the timing of their operation, and; specific policies should be chosen not in isolation but as parts of a global plan to control and to steer the economy (these should not be fiscal policies decided independently of monetary policies or any other).

In the post-Keynesian approach, there are many and different causes for inflation, and, hence, there are several types of inflation Conferring this view, these are the types of inflation that may be classified: wage inflation, profit, or degree of monopoly inflation imported inflation, demand inflation, inflation of decreasing returns to scale, tax inflation, and, inflationary shocks. Since different forms of inflation are recognized, accordingly, for each type of inflation, a specific antiinflationary tool should be used. For instance, the cases of wage and profits, degree of monopoly, inflation should be fought through the strategy of tax-based on incomes policy; regarding imported inflation, a combination of exchange-rate, monetary, tax, and industrial policies could be used; tax inflation should be avoided themselves through fiscal by governments policies committed with macroeconomic stability as a whole, and not just with price stability. Demand inflation, according to post-Keynesians, should be fought through contractionary macroeconomic policies, mainly through reductions in government spending. Post-Keynesian suggest much more than an anti-inflationary macroeconomic policy, to improve the macroeconomic performance as a whole, the chances of the existence of the "credibility trap" are reduced.

According to the alternative Keynesian approach, central banks improve their capacity to affect the "state of expectations" of the agents, and then, through monetary interventions succeed in reaching their predetermined goals as fast as possible and with more effectiveness, they must define and strengthen their reputation and implement efficient and credible policies, without neglecting their capacity and responsibility to improve the economy as a whole - it means that output and employment must not be set apart.

Undoubtedly, monetary policy exerts influence on inflation through interest rate manipulations provided that it affects aggregate demand. However, the inflationary process is not always associated with demand warming, which requires other sorts of economic policy interventions. By reducing the way of dealing with inflation to a unique instrument and by assigning to central banks the exclusive commitment to price stability, other aspects of economic life which have the power to compromise the potential of economic growth in the long term may be affected.

One such argument is by the New Classical economics, for the adoption of a rule for the monetary policy (like an interest rate rule) is its effects upon expectations of inflation and then upon the observed inflation. Those who defend the conduction of the monetary policy over a rigid rule judge the success of the policy built exclusively on inflation performance, that is, based on the deviations of the inflation or the expectations of inflation to the target. They attribute virtually zero weight to real activity performance or any other possible economic objective. These results are not taken by the parameters and/or statistics that appraise the success of monetary policy and its credibility.

The rule-based policy for combat inflation over interest rate manipulations makes no distinction between the firms and or the markets that are responsible for the process of inflation and those that are not. As a consequence, many firms which are acting compatibly with price stability will be punished when the interest rate is raised. Some of these firms may not resist high financial costs and the weak demand, starting a process of bankruptcy that will result in a higher unemployment rate. Other firms may give up on realizing the investments that will be necessary to absorb the workers still unemployed. So, when it is recognized that the beginning of an inflationary process may not always be attributed to an increase in demand, it gives rise to the need of issuing a precise inflationary diagnosis which will be conclusive for the choice of the instrument or for the combination of instruments that will help to reduce and stabilize the inflationary process.

When central banks act over a firm mechanical interest rate rule concerned with only one objective, that is, aiming at maintaining inflation low and stable, it disregards the process of price formation as a result of distributive conflict between groups and agents with specific goals, meaning that the rule affects distinct economic groups with different additions in a different way; the different impacts on firms presenting different cost structures, resulting on particular sorts of reactions from the firms, and; the consequences for the process of fund accumulation. Therefore, this kind of policy is not suggested for this purpose as well as the development of a reputation following the New Classical ways, since they do not allow the creation of a favourable environment for the course of economic growth. Instead, they create a situation of "credibility trap" for central banks, making it impractical through expectations channel for central banks to improve the economic performance as a whole; Since to keep this reputation monetary authorities must track the rule which jeopardizes the economic growth. Let's consider the Keynesian approach for a successful monetary policy must take into account the acquired economic growth, the obtained inflation' stability, the installed capacity used to level, the promoted income distribution, and the acquired monetary-financial system stability. Central banks must regard the impacts of their policies upon the process of pricing and their significances for the internal fund accumulation, as well as upon liquidity preference and investment decisions.

7.4 Questions

- Q1. How does discretion policy differ from policy rule?
- Q2. What is the Importance of credibility and reputation in formulating economic policy?
- Q3. Explain the reputation and credibility in the light of Keynesian and post-Keynesian approaches?
- Q4. Explain the viewpoints of different economists on rules vs discretion?

7.5 References

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MACROECONOMIC POLICY - II

Unit structure:

8.0 Objectives

- 8.1 Dynamic Inconsistency banks8.1.1 Dynamic consistency in banks, financial intermediaries
- 8.2 Financial Intermediaries and Unconventional Monetary Policy8.2.1 Instruments of unconventional monetary policy
- 8.3 Inflation Targeting and Exchange Rates
- 8.4 Questions

8.0 Objectives

- 1. To understand the concept of dynamic consistency and inconsistency in the banking system.
- 2. To know the impact of unconventional monetary policy.
- 3. To establish a relationship between financial intermediaries and unconventional monetary policy
- 4. To know various instruments of unconventional monetary policy.
- 5. To establish the relationship between inflation targeting and exchange rates.

8.1 Dynamic Inconsistency

In economics, dynamic inconsistency is a situation in which a decision maker's preferences change over time in such a way that a preference can become inconsistent at another point in time.to understand this concept we must understand time preferences In economics, time preference is the current relative valuation placed on receiving a good or some cash at an earlier date compared with receiving it at a later date.^[1]Time preferences are captured mathematically in the discount function. The higher the time preference, the higher the discount placed on returns receivable or costs payable in the future. Decision-makers themselves may change their preferences at different points of time, inconsistency occurs when their own choices or preferences are not aligned Time inconsistency

means that there is a disagreement between decision-makers' different selves about what actions should be taken. Formally, consider an economic model with different carefully worked-out weights placed on the utilities received by each self. Consider the possibility that for any given self, the weightings that self places onset of the utilities could differ from the weightings that another given self places on the set of utilities. The vital consideration today is the relative weighting between two particular sets of utilities. If the relative weighting is the same for one given self as it is for a different given self, then we have a case of time inconsistency. here the decision-makers will have to select time-inconsistent preferences. If the relative weightings of all pairs of utilities are all identical for all given selves, then the decision-maker has time-consistent preferences.

In various forms, dynamic inconsistency rises as an outcome of "projection bias". The behavioral tendency is to mispredict their upcoming marginal utilities by assuming that they will remain at present levels and consistent. This leads to inconsistency as marginal utilities for any individual change over time in an unexpected way for example. tastes, preferences, and habits keep changing altering consumers' preferences. However, empirical research makes a strong case that time inconsistency is, in fact, standard in human preferences. This would infer discrepancy by people's different selves on decisions made and a rejection of the time consistency aspect of rational choice theory. Economic models include decision-making over time with the assumption that decision-makers being exponential discounters.

A discount function is used in economic models to describe the weights placed on rewards received at different points in time. For example, if time is discrete and utility is time-separable, with the discount function F(t) having a negative first derivative and with Ct defined as consumption at time t, total utility from an infinite stream of consumption is given

$$U(\{C_t\}_{t=0}^{\infty}) = \sum_{t=0}^{\infty} f(t)u(C_t)$$

Ct is defined as consumption at time t the discount function F(t) having a negative first derivative.

Consistent policy:

Let P be a sequence of policies for periods of 1 to T (maybe infinite and will be represented by t in the following example)

(1)

(4)

And D is the corresponding sequence for the economic agent's decisions.

$$P = (p_1, p_2, p_3, \dots, p_T)$$
$$D = (d_1, d_2, d_3, \dots, d_T)$$

The social objective function (S) which is aimed to be achieved will be

S $(d_1, d_2, \dots, d_T, p_1, p_2, \dots, p_T)$

Further, agent's decision in period t depends upon all policy decisions as well as past policy decisions as follows

$$d_{t} = D_{t} (d_{t,..,d_{t-1}}, p_{1},...,p_{T})$$
(2)

where 1 < t < T

In such a framework an optimal policy if it exists, is that feasible P that maximizes equation (1) subject to constraints equation (2)

The concept of consistency in this scenario is defined as follows:

A policy P is consistent if, for each period t, Pt maximizes (1), taking as given previous decisions,

 $d_1...d_{t-1}$ and those future policy decisions (P_s for s>t) are similarly selected.

The inconsistency of the optimal plan is demonstrated by a two-period example. For T=2, P2 is selected to maximize

$$S(d_1, d_2, p_1, p_2)$$
 (3)

Subject to $d_1=D_1(p_1,p_2)$

And $d_2 = D_2(d_1, p_1, p_2)$

For a plan to be consistent, p2 must maximize (3), given the past decisions p1,d1, and constraint (4) assuming differentiability and an interior solution, then necessarily

$$\frac{\delta S}{\delta d2}$$
 . $\frac{\delta D2}{\delta P2} + \frac{\delta S}{\delta P2} = 0$

Exponential discounting yields time-consistent preferences. Exponential discounting and, more generally, time-consistent preferences are often assumed in rational choice theory since they imply that all of a decision maker's selves will agree with the choices made by each self. Any decision that the individual makes for himself in advance will remain valid (i.e., an optimal choice) as time advances, unless utilities themselves change.

The empirical research makes a strong case that time inconsistency is, in fact, standard in human preferences. This would imply disagreement by people's different selves on decisions made and a rejection of the time consistency aspect of rational choice theory.

8.1.1 Dynamic in consistency in Banks and Financial Intermediaries:

Central banks now view transparency as a crucial tool for effective policymaking. In contrast to the old central banking world of purposeful concealment to maximize discretion, rule-like behavior encourages households, businesses, and financial market participants to anticipate central bank actions that are consistent with keeping inflation low and stable. An effective way to reduce the time-inconsistency problem is to give central banks. The primary goal of maintaining price stability and ensuring the independence of the central bank to achieve the target without government interference. Such an institutional commitment to price stability can enhance the credibility of monetary policy and improve its performance. Increase employment levels or, in a more general outlook, the level of economic activity usually substantiated by the existence of distortions in the input market, for example, distortionary taxation of labor or the presence of transfer programs policymakers suffer from dynamic inconsistency monetary with inflation expectations, as politicians are best off promising lower inflation. But once tomorrow comes lowering inflation may have negative effects, such as increasing unemployment (tradeoff between inflation and unemployment). Dynamic inconsistency rises as monetary policymakers choose to pursue shortterm goals leading to missing the long-term goals. Expansionary monetary policy will lead, in the short term, quicker economic growth and reduce unemployment, and those who choose the monetary policy coordinates will be tempted to adopt this path, although in the long-term positive results are offset by prices and salaries rises in the private sector, caused by a relaxed monetary policy. Consequently, in the long-term inflation will increase, its negative effects altering the economic situation. According to McCallum central banks can discern long-term negative effects of those temporary positive in the short-term and avoid them, as long as they are independent. In most cases, dynamic inconsistency is caused by political pressures on monetary policymakers. Dynamic inconsistency of monetary policy is an ex-post deviation from the ex-ante formulated plans when these plans would have been implemented. Details stemming from the existence of dynamic inconsistency in monetary policy refers to monetary authority under pressures from the government desires to lead towards suboptimal levels in terms of economic activity eroding the real value of public debt if they generate inflationary surprises,

inflationary consequences of devaluations assumed to improve the current account situation. Central bankers make their commitment to price stability to gain credibility. One way is to ensure that their prospect is long enough that they will not abandon the long-term goal of low inflation for the short-term advantage of a temporary boom. Over the past quarter-century, this persuasive logic has led governments in much of the world to delegate monetary policy to independent central banks with legally mandated objectives, supervised by officers with long terms. To enhance policy effectiveness constrained discretion is used by central bankers and developed a regime of inflation targeting. At the same time, supporters of policy rules like Taylor, as well as legislators, policy rules to further limit discretion. Inflation targeting is the prevailing monetary policy command in countries that produce about two-thirds of global GDP. Inflation targeting depends on transparency and communication to raise the cost of reneging on the price stability commitment. Policymakers not only announce a quantitative target for inflation over at least the next several years, but they routinely report publicly on their progress in realizing their objective. And, when they adjust their instruments, central bankers justify their actions in terms of the impact it will have on achieving their commitment. One of the proposals to counter the dynamic inconsistency of monetary policy and reducing the inflation bias refers to the delegation of monetary policy formulation and implementation to a "conservative" central banker, defined as an inflation-averse individual, aversion higher than the social ones. This delegation does not eliminate the dynamic inconsistency problem but reduces the inflation bias. Walsh (1995) suggests that, rather than worry about the pursuit of a conservative central banker, the society should stimulate monetary authority through a performance contract, so when it pursues its interests, simultaneously maximizes the welfare of the society. The gain of such a deal is that its application is independent of informational asymmetry and also of the effort made by policymakers to implement monetary policy, viewing the performance concerning contractual obligations being made only about monetary variables are open in public to observe.

Lately, inflation targeting has become the prime monetary policy in countries that produce about two-thirds of global GDP. Inflation targeting depends on transparency and communication to raise the cost of reneging on the price stability obligation. Policymakers not only announce a quantitative target for inflation over at least the next several years, but they frequently report publicly on their progress in realizing their objective. And, when they adjust their instruments, central bankers justify their actions in terms of the impact it will have on achieving their commitment.

Although the too-big-to-fail guarantee is explicitly a part of bank regulation in many countries, it is observed that bank closure policies also suffer from an implicit "too-many-to-fail" problem: when the number of bank failures is large, the regulator finds it ex-post optimal to bail out some or all failed banks, whereas when the number of bank failures is small, failed banks can be acquired by the surviving banks. This gives banks incentives to herd and increases the risk that many banks may fail together. The ex-post optimal regulation may thus be time-inconsistent or sub-optimal from an ex-ante viewpoint. In contrast to the too-big-to-fail problem which mainly affects large banks, we observe that the too-many-to-fail problem affects small banks more by giving them stronger incentives to herd.

History suggests, particularly in the outcome of the financial crisis of 2007-2009, one of the largest problems facing prudential regulators has been that of Too big to fail (TBTF). To stop a financial collapse and another Great Depression, regulators in the United States and elsewhere have frequently used public money to bail out the creditors of the largest, most connected, and most complex intermediaries. In addition to popular revulsion, these bailouts have created a moral hazard—encouraging financial behemoths to take risks in good times that make the system more vulnerable to crisis. It is appealing for policymakers merely to pass legislation prohibiting bailouts. The Financial CHOICE Act, approved by the U.S. House, takes exactly this approach. However, as we have argued before, this approach is destined to fail. Modest declarations lack credibility and not able to limit the risk-taking conduct of TBTF firms. When in crisis, policymakers will come under tempting pressure to prevent a financial failure through bailouts. A need arises, future legislators will pass new laws cancelling anything in place.

TBTF looks like a problem of time consistency. If in a future crisis, the perceived alternative is the collapse of the financial system and depression, policymakers will go back on any "no bailout" promise they could make. A supervisory central monetary authority that forces enormous financial establishments to internalize the spill overs of their behaviour onto the financial system as a whole will create credibility to contain the TBTF problem. In our view, such a regime has three gears: high capital requirements that force intermediaries to self-insure against losses; stress tests that safeguard capital adequacy even under the most severe hostile conditions; and an effective resolution regime that offers for automatic recapitalization of weakened financial behemoths as well as temporary government provision of resolution funding. The indication is that the method to avoid a future bailout is to ensure that the alternative is not economic adversity. A financial

intermediary such as a commercial bank, investment banks, mutual fund, or pension fund investment banks, stockbrokers, and stock exchanges. is an economic entity that acts as the middleman between two parties in a financial contract. Many intermediaries take part in securities exchanges and utilize long-term plans for managing and growing their funds. The overall economic stability of a country may be displayed through the actions of financial intermediaries and the growth of the financial sector.

Financial intermediaries offer many paybacks to the average consumers from asset management to safety, liquidity, and banking-related economies of scale and asset management. Financial intermediaries move funds from parties with excess capital to parties needing funds. The procedure generates efficient markets and drops the cost of conducting business. Through a financial intermediary, savers can pool their funds, allowing them to make large investments, which in turn benefits the entity in which they are investing. At the same time, financial intermediaries pool risk by spreading funds across a diverse range of investments and loans. Loans advantage households and countries by allowing them to devote more money than they have at the present-day time.

8.2 Financial Intermediaries and Unconventional monetary policy

Monetary policy affects the real economy in part through its effects on financial institutions. High-frequency occasion studies show that the introduction of unconventional monetary policy had a strong, beneficial impact on banks and, especially, on life insurance companies and other financial intermediaries.

Unconventional monetary policy is an instrument used by a monetary authority that falls out of line with traditional measures. Non-standard monetary policies received importance during the 2008 financial crisis when the primary means of traditional monetary policy, which is the adjustment of interest rates, was not enough. These policies contain quantitative easing, forward guidance, and collateral adjustments. Unconventional monetary policies came to fame during the 2008 global financial crisis when traditional monetary policies were not enough to pull up the economies of developed nations. Worldwide central bankers are discovering that monetary policies they once viewed as unconventional and temporary are now proving to be conventional and long-lasting.

2008 financial crisis and since year 2020,2021 coronavirus pandemic, enforced to make choices away from conventional monetary policies. The Federal Reserve, European Central Bank, and most of their international counterparts have become more aggressive and innovative than ever in protecting their economies from

recession and the threat of deflation. "The coronavirus crisis is many times more destructive than the financial crisis of 2008," said Steve Barrow, head of foreign exchange strategy at Standard Bank. "There's every reason to believe that the move to tighter monetary policy will take as long and probably much longer than the postfinancial-crisis period." Central banks of Australia, New Zealand, and Canada purchased government bonds for the first time this year with the latter also purchasing corporate debt. South Korea and countries like Sweden & South Korea began purchasing company bonds and commercial paper. More central banks are also embracing so-called forward guidance, in which they necessitate keeping their policy loose for a certain period to boost the assurance to investors. Traditional monetary policies include the adjustment of interest rates, open market operations, and setting bank reserve requirements. Unconventional monetary policies include quantitative easing, forward guidance, collateral adjustments, and negative interest rates. Application of both traditional and unconventional monetary policies, governments were able to pull their countries out of the recession

In the case the economy is going through a recession, a country's central bank will implement an expansionary monetary policy. This includes the lowering of interest rates to make money cheaper to boost spending in the economy. An expansionary monetary policy also shrinks the reserve requirements of banks, which increases the money supply in the economy. Lastly, central banks purchase Treasury bonds on the open market, increasing the cash reserves of banks. A contractionary monetary policy would entail the same actions but in the reverse direction.

Throughout the 2008 financial crisis, global economies were viewing to pull their countries out of recessions by implementing expansionary monetary policies. However, because the recession was so bad, standard expansionary monetary policies were not enough. For example, interest rates were dropped to zero or near zero to fight the crisis. This, however, was not enough to improve the economy. To supplement the traditional monetary policies, central banks implemented unconventional measures to pull their economies out of financial distress

8.2.1 Instruments of unconventional monetary policy

Unconventional Monetary Policies work through instruments like Quantitative Easing (QE), Forward guidance, Negative Interest Rates, and Collateral Adjustments during a recession, a central bank can buy other securities in the open market outside of government bonds. This process is known as quantitative easing, and it is considered when short-term interest rates are at or near zero. During the Great Recession, interest rates were near zero. QE lowers interest rates while increasing the money supply. Financial institutions and intermediaries are then

flooded with the capital flow to promote lending and liquidity. No new money is printed during this time. one such illustration is, during the recession, the U.S. Federal Reserve began buying mortgage-backed securities (MBSs) as part of its quantitative easing program. During its first round of QE, the central bank purchased \$1.25 trillion in MBS As a result of its QE program, the Fed's balance sheet improved from about \$885 billion before the recession to \$2.2 trillion in 2008 where it leveled out to about \$4.5 trillion in 2015. Forward guidance is the method by which a central bank communicates to the public its intentions for future monetary policy. Such notice allows both individuals and businesses to make spending and investment decisions for the long term, thereby bringing stability and confidence to the markets. As a result, forward guidance impacts the current economic conditions.

Several countries adopt negative interest rates throughout the financial crisis. This policy suggests central banks charge commercial banks an interest rate on their deposits. The idea is to tempt commercial banks to spend and lend their cash reserves rather than storing them. The storing of cash reserves will lose value due to the negative interest rate. Collateral adjustment as an unconventional monetary policy tool. central banks also extended the possibility of what resources and assets were permissible to be held as collateral against lending facilities. the most liquid assets should be held as collateral, though, in such difficult times, more illiquid assets were allowed to be held as collateral. Central banks then assume the liquidity risk of these assets. Unconventional monetary policy can also have undesirable impacts on the economy. If central banks implement QE and increase the money supply too quickly, it can lead to inflation. It happens if there is too much money in the system but only a certain amount of goods available. Negative interest rates can also have concerns by encouraging people not to save and rather to spend their money. Furthermore, QE increases the balance sheet of a central bank, which can be a risk to manage, and also unintentionally determines the types of assets available to the private sector, possibly leading it to buy riskier assets

Unconventional monetary policy has the same aims as conventional monetary policy. It can lower interest rates further than is possible by adjustments to the policy interest rate alone (which may be at its effective lower bound). As with a lower cash rate, this reduces the cost of borrowing, puts downward pressure on the exchange rate, and leads to higher prices for some assets than otherwise (which makes it easier for people to borrow and increases their confidence to spend). Unconventional policy measures that offer liquidity to stressed financial markets also support financial stability. Through forward guidance reduces uncertainty about the future stance of monetary policy.

The negative side of unconventional monetary policy

inclination of central banks to provide liquidity may decrease the incentive of icial institutions to hold adequate buffers, which could make future episodes nancial stress more likely. Damage bank profitability and reduce the capacity inks to lend, allow less productive firms to continue when they would not nally be viable (though this is not relevant for firms that would otherwise ate normally if not for the economic consequences of COVID-19) fuel cessary increases in asset prices (e.g. rising prices of houses and shares) ite weak economic growth. The part of monetary policy and fiscal policy can me unclear because, if the central bank is purchasing large amounts of rnment bonds at low-interest rates, this could be interpreted as government ding (a fiscal activity) being financed by money creation. Political or social ons can arise if the central bank's asset purchases are seen to oportionately benefit some groups in society.

Inflation Targeting and Exchange Rate

e central bank's asset consumptions are seen to disproportionately advantage groups in society then political or social tensions can arise an effective role he exchange rate in policy implementation under an inflation-targeting ground can reduce conflicts between the inflation objective and other iderations. Establishing strong policy implementation can be especially enging for inflation-targeting emerging economies due to their policy legacy heir less developed financial markets. Under inflation targeting, the interest s the main monetary policy tool for influencing activity and inflation. Country rstanding proposes that foreign exchange market intervention should be emented in the most systematic way possible. Transparency for the role of the ange rate concerning policy objectives, operational procedures, and ex-post ation reduces the possibility of confusion about the inflation target. There are s to the transparency of foreign exchange policy implementation, and the try's experiences propose some comprehensive policy transparency practices. presence of deeper foreign exchange and domestic money markets enhances ffectiveness of changes in the policy stance, including through better signaling licy intentions. Money market development makes it possible to use domestic etary instruments rather than relying excessively on foreign exchange vention, and it also facilitates sterilization

ording to a study by. Beldi Lamia Mouldi Djelassi how the adoption of inflation ting influenced exchange rate pass-through (ERPT) and volatility. The pieces

of evidence suggest that ERPT has declined after inflation targeting adoption for both price indexes consumer and producer prices for most economies analyzed. Additionally, results show that the inflation targeting system can reduce exchange rate volatility and inflation volatility in all countries. Therefore, the implementation of an inflation-targeting regime contributes to price stability through the decline of exchange rate pass-through and exchange rate volatility. During the 1990s, many countries have realized that in the medium and long run, upholding a low and stable rate of inflation is vital. A high and variable rate of inflation causes adverse social and economic effects in terms of price distortions that cause the resources to be diverted to less productive and conspicuous consumption. It results in lower levels of savings and investment that will adversely affect the long-term growth of the economy. To protect from the falling value of money, people will hedge into real estate and purchase precious metal that reduces the available financial savings. In an open economy, it can result in a flight of capital that causes an unsustainable balance of payments. Further, the short-run trade-off between unemployment and price level does not result in higher levels of output and employment in the long run. The use of intermediary targets like money supply, interest rates, and nominal GDP does not give reasonable results. Consequently, the central banks have initiated to directly target the rate of inflation itself.

8.3.1 Exchange rate pass-through

Exchange rate pass-through (ERPT) is defined as the percentage change of domestic prices resulting from a 1% change in the exchange rate between domestic and foreign countries. Let's see how the exchange rate pass-through has evolved for both advanced and emerging market economies. We notice that exchange rate pass-through in emerging economies on average reduced after the financial crisis and that this decline in pass-through is linked to declining inflation. By contrast, in advanced economies, where inflation has inclined to be consistently low, exchange rate pass-through has also remained low. despite the recent decline of ERPT in emerging economies. The results are consistent with the implications of the menu cost theory of price setting: when inflation is higher, exchange rate changes are passed through more quickly and to a larger extent because firms have to adjust prices regularly anyhow.

A floating exchange rate rule constitutes a prerequisite for well-functioning inflation targeting regime capital mobility and independent monetary policy cannot coexist with a pegged exchange rate regime. The link between inflation targeting and the floating exchange rate has led some economists to state that one of the costs of the adoption of an IT regime is the higher volatility of exchange rates. Several

methods have emerged to examine the effects of inflation targeting on the volatility of the exchange rate. Indeed, many studies compare the volatility of exchange rates under inflation targeting with fixed or managed exchange rate regimes.

Nevertheless, Edwards suggests that it is not a correct strategy to compare these different monetary policies for exchange rate volatility analysis. He presents that the appropriate approach to evaluate the volatility of exchange in the inflation targeting regime should be made by controlling the effects of the exchange rate regime.

The- pass-through from changes in the exchange rate to inflation is important for any relatively open flexible exchange rate economy.it operates through the effects of The pass-through from variations in the exchange rate to inflation is significant for any relatively open flexible exchange-rate economy. Pass-through operates directly through the effect of exchange rate movements on prices and indirectly through the impact of exchange rate movements on aggregate demand and prices. Generally, the empirical literature finds that pass-through from exchange rate changes into import prices is less than one owing to a variety of factors, particularly transport costs, distribution costs, and price discrimination. Pass-through has been on a trend decline around the world find a threefold decline in pass-through during the 1990s. The reasons for the decline include worldwide disinflation, pricing to market, and credibility gains. Pass-through is relatively important for emerging economies with smaller track records. Emerging markets generally have a low level of financial market development, categorized by limited instruments and thin trading, which in turn are not able to play an important role in stabilizing domestic output in the face of external shocks. ERPT appears to decrease with the level of development and increase with openness, and emerging economies have higher and added variable inflation, experience greater exchange rate volatility, and are more dollarized. Those economies that adopted full-fledged inflation targeting has been found to reduce pass-through. This advocates that the emerging economies with other anchors have to deal with larger exchange rate pass-through. Huge, rapid, and uncertain pass-through can lead central banks to put weight directly on the exchange rate to reduce the level and volatility of inflation. A change in the exchange rate can rapidly raise inflation and inflation expectations, thus compelling the central bank to quickly take action to influence the exchange rate by changing interest rates or prevailing in the foreign exchange market. However, these dealings may indicate the imprint that the central bank upkeeps the exchange rate above and beyond its impact on inflation. Foreign exchange intervention is covered Output Stability Many emerging economies aim to manage the exchange rate to mitigate the impact on the output of relatively short-term exchange rate movements.

As per IMF staff reports on flexible exchange-rate emerging economies find that intervention is used to limit exchange rate volatility, although the reasons for such intervention are not always fully expressed. Studies show that exchange rate volatility has a substantial but small negative effect on trade. using the exchange rate to flat output volatility can create confusion regarding the obligation to an inflation target as objective. Full-fledged inflation-targeting economies with long track records can be relatively transparent and find it easier to credibly explain to the markets the rationale for exchange rate-flattening interventions. In contrast, economies with less of a commitment to an inflation target and a tinier track record have a tougher time intervening to smooth volatility in a way that is clear to the market. Supposedly, such intervention should be aimed at non-permanent exchange rate shocks, which raises the challenge of arbitrating the duration of such shocks. a developed country with a supportive set of economic and structural policies allows for a credible commitment to an inflation target and less reliance on managing the exchange rate. Such trade-offs are the outcome of credibility commitments A large dose of credibility is needed for an emerging economy to reap the benefits of a fullfledged inflation-targeting as a nominal anchor, which allows the floating exchange rate and thereby enables policy implementation. Also, economies with flexible exchange rates that have yet to adopt explicit inflation targets can be considered in transition to a single nominal anchor, and completing this transition requires establishing the groundwork for a credible commitment to the inflation target. To observe these differences in credibility across economies with different monetary and exchange rate regimes, credibility is roughly proxied here by the actual inflation outturn and by market ratings of long-term local-currency-denominated government debt. The inflation-targeting economies have much better inflation outturns. Stumpy inflation signs that a central bank can make a credible commitment to an inflation target. low and positive inflation is supportive of high and stable long-term growth such a monetary policy supportive of long-term growth can be more credible. The lowest inflation rates in present years have been in the inflation-targeting advanced economies, followed by the inflation-targeting emerging economies; the emerging economies with other anchors have had the highest inflation rates. The inflation-targeting economies have higher ratings of long-term indigenous currency-denominated government debt. Such estimation is forward-looking and directly captures market perceptions of the degree of longterm market confidence in the stability It would be preferable to use market-based measures of central bank credibility. In realism, such measures are available for

only a few economies. In addition, comparisons of actual versus targeted inflation are excluded by the absence of stable quantitative targets for many economies. Indicators of the stability of inflation expectations in the face of inflationary shocks would be another good measure of managing the exchange rate to smooth output volatility. which eventually is the responsibility of the central bank even though it reflects factors beyond the scope of monetary policy.

The inflation-targeting advanced economies have the uppermost ratings, followed by the inflation-targeting emerging economies and the emerging economies with other anchors. These indicators of credibility, roughly, suggest that higher credibility is associated with a smaller role for the exchange rate. credibility for inflation targeting has been extensively examined. All inflation-targeting economies are fairly large and developed, which advocates that inflation targeting requires size and a somewhat advanced economy. An inflation-targeting central bank needs the directives to follow the inflation target and sufficient discretion and autonomy to fix its monetary instruments as per requirements. A vigorous fiscal position is crucial, whereas monetary policy should be dominated by fiscal priorities because even suboptimal policies can hurt credibility in a country with high debt and a short history of sound, fiscal management results indicate that the publically announced implementation of inflation targeting strategies by central banks in emerging markets, often with much fanfare, is a substantive deviation from past monetary policy formulation and sharply different from non-targeting emerging markets. As our theoretical model calculates, however, inflation targeting emerging markets is not following "pure" inflation targeting strategies. Instead, we find that external variables play a very important role in the policy rule-inflationtargeting central banks in emerging markets systematically respond to the real exchange rate. Of the inflation targeting group, those with a particularly high concentration in commodity exports change interest rates much more pro-actively to real exchange rate changes than do the non-commodity intensive group. In general, results are robust to a variety of model formulations and estimation strategies.

The influence of real exchange rates is robust in those countries succeeding in IT policies that are relatively intensive in exporting basic commodities. This is not surprising since this group is the most vulnerable to terms-of-trade and real exchange rate disturbances. Moreover, the real exchange rate stabilization objective does not seem to be influencing central bank interest rate-setting
indirectly because it is a good predictor of future inflation, as would be the case if inflation is a good predictor and the central bank is forward-looking, i.e. the real exchange rate is not a strong predictor of future inflation in emerging markets. Real exchange rate stabilization in commodity-intensive countries appears to be related to adverse real output effects related to real exchange rate volatility.

Theoretically, the real exchange rate to the behavior of monetary policy in an IT regime is presented in a simplified version, where the policymaker is concerned about real exchange rate volatility. The wish to mitigate exchange rate volatility follows the logic, that exchange rate volatility reduces productivity in developing countries, attributing it to financial channels. Find that the of private credit to GDP) have been heavily exposed to the adverse repercussions of exchange rate volatility.

The adverse effect of volatility may be the result of increasing the expected cost of funds in circumstances where agency and contract enforcement costs are prevalent, the financial system is shallow, and trade openness is important. the adverse effects of exchange rate volatility are larger for the less financially developed countries. These situations tend to be intensified in developing countries relying heavily on mineral and other commodity exports. A greater weight on justifying exchange rate volatility inclines towards increase the sensitivity of the policy rule to exchange rate changes, possibly with sizable welfare effects.

The main aim is stabilizing the real exchange rate in the short-run, where the policymaker presumes, that the equilibrium REER(real effective exchange rate) is highly determined, thus most of the short-run shocks may replicate transitory instabilities. This presumption reflects both the persistency of the REER, and the wide standard errors associated with predicting equilibrium exchange rates There are, of course, other possible reasons why a central bank pursuing an IT strategy will choose to also concern itself with the exchange rate. This is true especially in emerging markets given their shallow currency markets, their short history of stable inflation, the importance of the exchange rate as an anchor for expectations, and the probability of currency mismatch exposure in strategically important sectors. Given these considerations, we test the degree to which the policy rule adopted by IT commodity-intensive developing countries differs from that of the IT noncommodity exporters, finding support to the greater sensitivity of commodity IT countries to exchange rate changes.

Let us see one real-time data in Table no. 1

WHY THE EXCHANGE RATE PLAYS A LARGE ROLE IN EMERGING ECONOMIES

(Indicators of credibility)

	8	1		
				Rating of Long-Term
Policy Name	1997–	2002–07	2005–07	Local- Currency-
	2007			Denominated-
				Government Debt
Inflation-				
targeting				
advanced				
economies				AAA
Median	2.3	1.9	1.8	
Standard	1 1	1 1	1.2	
deviation	1.1	1.1	1.5	
Inflation-				
targeting				
emerging				
economies				BBB
Median	6.6	5.1	4.9	
Standard	11.6	4.3	2.5	
deviation				
Non-inflation-				
targeting				
emerging				
economies				BB+
Median	9.9	11.0	9.4	
Standard	20.6	10.6	15	
deviation	29.0	10.0	4.5	
Pegged-				
exchange-rate				
emerging				
economies				BBB
Median	3.7	5.6	7.5	
Standard	18.6	6.4	4.2	
deviation				

Table No. 8.1Average Consumer Price Index Inflation

To comprehend the dissimilarities in credibility across economies with different monetary and exchange rate regimes, credibility is roughly proxied here by the actual inflation outturn and by market ratings of long-term local-currencydenominated government debt. The inflation-targeting economies have much better inflation outturns (Table no. 1) A reasonably sized and developed country with a supportive set of economic and structural policies allows for a credible commitment to an inflation target and less reliance on managing the exchange rate. A large dose of credibility is needed for an emerging economy to reap the benefits of a full-fledged inflation-targeting nominal anchor, which liberates the exchange rate to float and also helps policy implementation. Furthermore, economies with flexible exchange rates that have yet to adopt explicit inflation targets can be considered in transition to a single nominal anchor, and completing this transition requires establishing the groundwork for a credible commitment to the inflation target. To better understand the differences in credibility across economies with different monetary and exchange rate regimes, credibility is roughly proxied here by the actual inflation outturn and by market ratings of long-term local-currencydenominated government debt.

Conclusive remarks on -The Role of the Exchange Rate during the Transition to Inflation Targeting

The exchange rate plays a significant yet ill-defined part in the policy framework of emerging economies that have a flexible exchange rate but not a full-fledged inflation-targeting framework (referred to here as "emerging economies with other anchors"). These economies manage the exchange rate more actively, and policy implementation tends to be based on foreign exchange intervention that is more ad hoc and less market-based. Exchange rate channels are probably stronger and more uncertain for typical emerging economies with other anchors because they are less financially developed, are more dollarized, and have less overall credibility compared to inflation-targeting emerging economies. Starting an extra orderly, consistent, and market-based role for the exchange rate is vital in making the transition to inflation targeting. It also suggests that giving the exchange rate a larger weight in the interest rate reaction function or using the exchange rate as the operating policy target, can generate better macroeconomic performance than using a policy reaction function dominated by the interest rate. The degree of domestic money market development helps shape the choice of the operating target during the transition. Reducing the weights of the exchange rate in the reaction function over time is a practical way to transition to an inflation-targeting regime. Central banks moving toward inflation targeting generally need to strengthen their macroeconomic analysis and develop a systematic approach to policy decisionmaking. Financial market development improves policy implementation by reducing the need to depend on foreign exchange intervention and by enabling sterilization.

8.4 Questions

What is dynamic inconsistency in economics? Explain its relevance to banks and financial intermediaries?

- Q1. What are the instruments and aims of unconventional monetary policy?
- Q2. Exchange rate and inflation targeting play important role in emerging economies?
- Q3. Exchange rate pass-through is relevant to both advanced and emerging market economies. Explain.
- Q4. Is there any negative impact of unconventional monetary policy?

8.5 References

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