Modern Welfare Criteria

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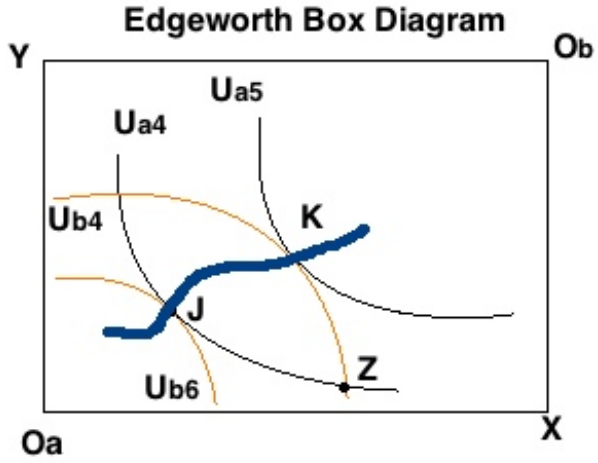
General Equilibrium and Perfect Competition

General Equilibrium of Exchange and Consumption

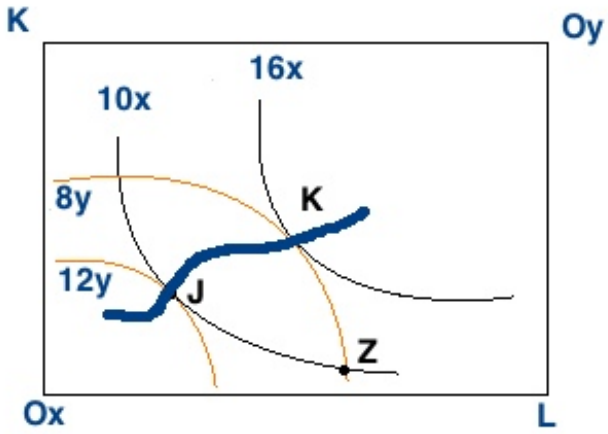


1. We assume that there is no production and the economy is a pure exchange economy. There are 2 individuals and 2 goods, who will exhaust the goods together. Naturally they will consume until $(MRS_{x,y})_A = (MRS_{x,y})_B$. But we don't know beforehand what will be the exact equilibrium. But if we know the initial distribution, we can define the boundary within which the equilibrium solution will lie.
2. Thus the initial distribution of goods and their relative bargaining strengths will determine the equilibrium position. This general equilibrium determines not only the final distribution of goods but also the rates of exchange or relative prices. Note that however, we can't determine absolute prices from here, we can only determine relative prices.

Show that in PC, General Equilibrium can exist

1. This ca be shown using the fact that under PC, relative prices which A is facing will be same as relative prices which B is facing and hence $MRS_{x,y}$ for both will be same.

General Equilibrium of Production

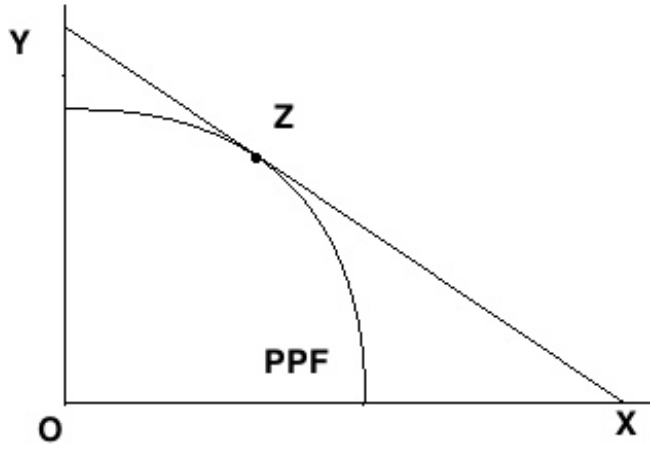


1. We assume that all labor is homogenous, receives equal wages, total quantity of each factor (L and K) is fixed, the production function is continuous and twice differentiable and the technology is given which together with factor endowments limits the production possibilities. Naturally the equilibrium condition is $(MRTS_{L,K})_X = (MRTS_{L,K})_Y$.

Show that in PC, General Equilibrium can exist

1. This can be shown using the fact that in PC, both firms face same (w/r).

General Equilibrium in Product Mix



1. @ equilibrium, $(P_x/P_y) = (MC_x/MC_y) = MRTS_{x,y} = (MU_x/MU_y)_A = (MU_x/MU_y)_B$. This is the condition of general equilibrium in the product mix. It can be seen that if P_x/P_y is given (along with w/r and the technology), the general equilibrium of production will reach a unique point.

Show that in PC, General Equilibrium can exist

1. This can be shown using the fact that in PC, MC_x/MC_y and P_x/P_y are same for anybody in the market.

Show that in PC, Pareto Optimal solution can be reached

1. To show this we must prove that in PC equilibrium, it is not possible to increase the satisfaction of people by producing more of one good and less of other. This is ensured by the condition P = MC. We know that price of a good is the value the consumer attributes to it or his satisfaction. MC of a good represents the opportunity cost of the good (for instance w represents the opportunity cost of the worker to pay him just enough so as to make him forego his leisure or another job). If P > MC, it is possible to increase the satisfaction of the consumer by producing more of the good by withdrawing resources from the production of another good.

Types of SWF

1. The first type of swf ignores individual preferences and takes the preferences of a benevolent dictator or the state as the swf.
2. The second type is individualistic swf (means the swf depends upon the utilities of the individuals and the determinant of an individual's utility is his own perception of his welfare and no one else's) but it strictly avoids interpersonal comparisons of utility. Now given the set of U_i when we try to define a function over it to get the swf, we are imposing value judgements. Example is Pareto.
3. The third type is individualistic swf and it also allows for interpersonal comparisons of utility. Utilitarian swf is one such swf where the sum of all cardinal utilities is maximized.

Total Utility Maximization as a Social Welfare Function
(a) Principle

1. Let there be a cake the size of which remains fixed. Each person is homo economica i.e. gets more utility the larger his share of the cake and gets utility only from his share of the cake and his utility increases at a diminishing rate as the amount of his cake goes up. The utilitarian objective is to maximize the total utility irrespective of distribution which can be achieved when all marginal utilities are same.

(b) Sen's Critique

1. Neglects inequalities among total utilities of individuals: Utilitarians also argue that equality of marginal utility embodies equal treatment of everyone's interests. But it can be questioned that whether the size of marginal utility irrespective of total utility can be considered as an equality criteria. Utilitarian principle can lead to equal total

utilities only if it is assumed that everybody is same i.e. has same utility functions - something too wishful in real world since different people may need different amount of goods to be pleased to the same extent.

2. Ignores non utility information like the 'force' of one's claim and concerned solely with total utility gain: Utilitarian principle would entail that even the minutest gain in total utility is enough to override any distributional inequalities. Similarly if person A as a cripple gets half the utility that the pleasure-wizard person B does from any given level of income, then in the pure distribution problem between A and B the utilitarian would end up giving the pleasure-wizard B more income than the cripple A. The cripple would then be doubly worse off: both since he gets less utility from the same level of income, *and* since he will also get less income. Utilitarianism must lead to this thanks to its single-minded concern with maximizing the utility sum.
3. Ignores non utility information like 'how' the utilities are derived: If someone derives utility by discriminating against others, this principle still accepts it. In an ex ante Rawlasian situation everyone would prefer more equality. But in ex post situation winners will prefer more inequality and this is thus 'unfair' according to what they would have agreed ex ante.

Leximin as a Social Welfare Function

(a) Principle

1. Utility equality preference: If there are 4 utility levels a, b, c, d in decreasing order of magnitude. In a purely ordinal comparison based on rankings only (and ignoring intensities) a pairing of (a,d) is considered to be more unequal than a pairing of (b, c) and hence the state (b, c) is preferred or at least not considered inferior by a swf which is concerned solely with equality.
2. Suppes' utility dominance: A utility distribution x is considered to be dominant or at least as good as y if (a) each person in state x has at least as much utility as himself in state y, or (b) each person in state x has at least as much utility as the other person in state y.
3. Leximin principle: If we combine the utility equality preference and Suppes' dominance principle, then we get leximin i.e. among two different states one state is better if the total utility of the worst off person is higher than the total utility of the worst off in the other state. If the worst utilities are equal in the 2 states, we look at the next worst. If they are equal as well we look at the next next worst and so on.

(b) Sen's Critique

1. Ignores magnitudes of utility gains and concerned solely with equality: It is insensitive to the magnitudes of potential utility gains and losses. In the a, b, c, d example, leximin will assert the superiority of (3, 2) over (10, 1) as well as (4, 1). Thus it is not at all concerned with how much is the total utility.
2. Ignores the 'how many' question: If in state y the utility of the worst off person is marginally higher than in state x but the utilities of all other persons is lower leximin still prefers y.
3. Utility based: It suffers from the same disabilities which any utility based criteria would suffer i.e. it is dependent on individual utilities which can be different for the same amount of income or basket of goods. It will give more income to people who are harder to please. It will provide more income to the cripple but only because he derives less utility from a given income and not because he suffers from a capability disadvantage.

Rawlasian Criteria as a Social Welfare Function

(a) Principle

1. First principle: Instead of concerning about utilities, Rawls was concerned about the distribution of basic goods. These basic goods include rights, liberties, opportunities, income, wealth, social bases of self respect. Each person should have an equal right over these basic goods.
2. Second principle: It supplements the first principle and demands efficiency and equality. Inequalities are condemned unless they work out to everyone's advantage.
3. Difference principle: This is leximin where utilities are replaced by the basket of basic goods.

(b) Sen's Critique

1. It succeeds in avoiding drawback of leximin which gives more goods to persons who are difficult to please.
2. Ignores the 'force' of one's claim or the capability disadvantage: The difference principle will not give the cripple any additional income. It will simply ignore the capability disadvantage.
3. Concerned only with the provision of basic goods and ignores what the goods do to the person:

Basic Capabilities Equality as a Social Welfare Function

1. In the cripple case, utilitarianism would give him less income than to the physically fit. The Difference Principle will just ignore his capability disadvantage. Leximin gives him more income but that was because he derived less utility from a given income and not because he suffered from a capability disadvantage. But now suppose that he is no worse off than others in utility terms despite his physical handicap because of certain other utility features. This could be because he has a jolly disposition. Or because he has a low aspiration level and his heart leaps up whenever he sees a rainbow in the sky. Or because he is religious and feels that he will be rewarded in after-life, or cheerfully accepts what he takes to be just penalty for misdeeds in a past incarnation. The important point is that despite his marginal utility disadvantage, he has no longer a total utility deprivation. Now not even leximin — or any other notion of equality focussing on total utility - will do much for him.
2. If we still think that he has needs as a cripple that should be catered to, then the basis of that claim clearly rests neither in high marginal utility, nor in low total utility, nor- of course - in deprivation in terms of primary goods but in terms of deprivation of basic capabilities. He should be able to do certain basic things.
3. Difference principle suffers from the handicap in being concerned solely with goods and not with what these good things do to human beings. Utility, on the other hand, is concerned with what these things do to human beings, but uses a metric that focusses not on the person's capabilities but on his mental reaction.
4. If it is argued that resources should be devoted to remove or substantially reduce the handicap of the cripple despite there being no marginal utility argument (because it is expensive), despite there being no total utility argument (because he is so contented), and despite there being no primary goods deprivation (because he has the goods that others have), the case must rest on something else. Thus what is at issue is the interpretation of needs in the form of basic capabilities.

Pareto

1. Pareto was the first economist to part from the utilitarian swf. He rejected the notion of cardinal utility and its additive nature and he also detached welfare economics from interpersonal comparison of utilities.

Utility Maximization in Consumption

1. In a 2 commodity world, let $U = f(x,y)$ where U is the total utility function. Each consumer is rational, so he will maximize his utility. Thus $\partial U = (\partial U/\partial x) \cdot \Delta x + (\partial U/\partial y) \cdot \Delta y$. Now $\partial U/\partial x = MU_x$ and $\partial U/\partial y = MU_y$. At maximum utility, $\partial U = 0$. So we can write, $MU_x \cdot \Delta x + MU_y \cdot \Delta y = 0$ is the utility maximizing condition. In other words @ maximum utility, $-(\Delta y/\Delta x) = (MU_x/MU_y)$.
2. It can also be argued a person will consume additional unit of x and sacrifice y until the total addition in utility due to additional consumption of x is ≥ total loss in utility due to the additional sacrifice of y. Total addition to utility in additional consumption of $x = MU_x \cdot \Delta x$ and loss in utility due to sacrifice of $y = MU_y \cdot \Delta y$. Thus $MU_x \cdot \Delta x + MU_y \cdot \Delta y = 0$ is the utility maximizing condition.
3. Marginal rate of substitution ($MRS_{x,y}$): This signifies the amount of y sacrificed for consumption of 1 additional unit of x. Thus $MRS_{x,y} = -(\Delta y/\Delta x)$. But from above discussion, we see that @ maximum utility, $-(\Delta y/\Delta x) = MU_x/MU_y$. Thus $MRS_{x,y} = -(\Delta y/\Delta y) = MU_x/MU_y$.
4. Indifference curve approach: We know slope of the indifference curve is $-(\Delta y/\Delta x)$ and it denotes the amount of y sacrificed (Δy) for additional consumption of x (Δx) keeping the overall utility same (thus $\Delta U = 0$). So it is the maximum utility condition and thus the slope of indifference curve $-(\Delta y/\Delta x) = MU_x/MU_y = MRS_{x,y}$.
5. Price line: The slope of the price line = P_x/P_y. @ maximum utility subject to the budget constraint equilibrium, this has to be equal to the slope of the indifference curve. Thus @ equilibrium, $MRS_{x,y} = MU_x/MU_y = P_x/P_y$. Alternatively, the consumers would like to maximize the difference between the utility they derive and the money they have to pay. Thus, our objective function is: U - p.q where U is the total utility, p is the price per unit and q is the quantity of the good consumed. Maximizing condition will be, $\partial U/\partial q - p = 0$. But $\partial U/\partial q = MU_x$ thus the utility maximizing consumer will equate the marginal utility he derives from a product with its price.

Convex functions

1. A function is said to be a convex function if @ all points, $\partial y/\partial x$ is negative and $\partial^2 y/\partial x^2$ is positive.

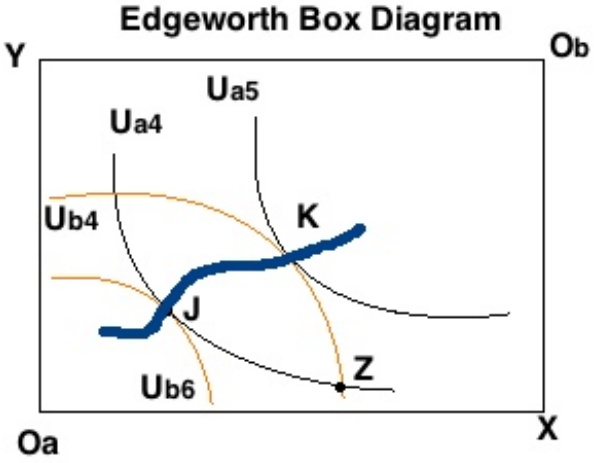
Elasticity of Substitution in Production

1. Elasticity of substitution of capital for labor $\sigma_{L,K}$ = % change in the capital - labor ratio (K/L) given a unit % change in the wage - rent ratio (w/r). Thus $\sigma_{L,K}$ = {∂(K/L) / (K/L)} / {∂(w/r) / (w/r)}.
2. Profit maximizing condition: Firms are π maximizers. Let Y = f(L,K). @ maxima condition, ΔY = ∂Y/∂L . ΔL + ∂Y/∂K . ΔK = 0 But ∂Y/∂L = MPP_L and ∂Y/∂K = MPP_K. Thus for profit maximization, MPP_L . ΔL + MPP_K . ΔK = 0 has to be satisfied or -(ΔK/ΔL) = MPP_L/MPP_K is the profit maximizing condition. Similarly it can also be argued that a firm will hire more labor and sacrifice capital until gain in production from hiring new labor (MPP_L . ΔL) is ≥ loss in production from sacrificing capital (MPP_K . ΔK). Thus MPP_L . ΔL + MPP_K . ΔK = 0 is the profit maximizing position.
3. Marginal rate of technical substitution ($MRTS_{L,K}$): This is the amount of K sacrificed to hire 1 additional unit of L. Thus $MRTS_{L,K}$ = -(ΔK/ΔL). But from the discussion above, -(ΔK/ΔL = MPP_L/MPP_K at profit maximization. So we get, $MRTS_{L,K}$ = MPP_L/MPP_K.
4. Isoquant curve approach: We know the slope of the isoquant curve is -(ΔK/ΔL) and it denotes the amount of capital sacrificed (ΔK) for additional marginal hiring of labor (ΔL) keeping the output unchanged. So this is the profit maximizing condition and thus the slope of the isoquant -(ΔK/ΔL) = MPP_L/MPP_K = $MRTS_{L,K}$.
5. Cost line: The slope of the cost line is (w/r). @ maximum profit subject to the cost constraint equilibrium, this has to be equal to the slope of the isoquant line. Thus @ equilibrium, $MRTS_{L,K}$ = MPP_L/MPP_K = (w/r).
6. Using this result back in equation in 1, $\sigma_{L,K}$ = {∂(K/L) / (K/L)} / {∂($MRTS_{L,K}$) / $MRTS_{L,K}$}

Marginal Conditions Necessary for Achieving Pareto Optimality

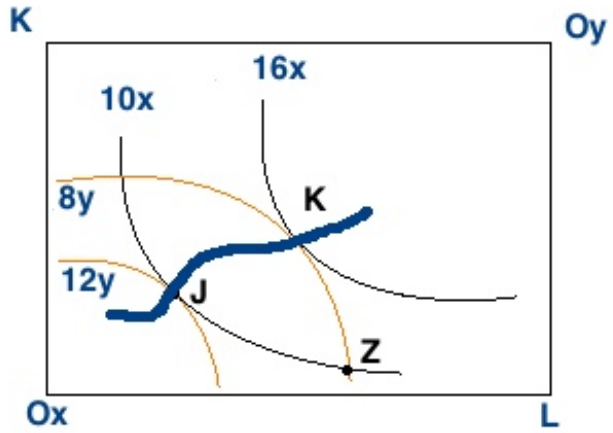
1. It is a condition when no improvement in anybody's condition is possible without worsening off the other.

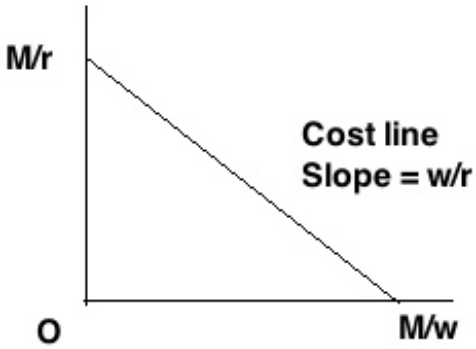
Pareto Optimality in Consumption



1. Assumptions are there are only 2 consumers (A, B) and 2 commodities (X, Y). Consumers are rational.
2. In the edgeworth box diagram above, point Z is not pareto optimal but point K is pareto optimal. (U curve denote the indifference curves for an individual.) Thus all points of tangency of the utility curves are pareto optimal. Consumer A would want to consume @ K, consumer B would want to consume @ J. Where the equilibrium prevails depends upon the resources available with each and their bargaining power. But points J and K both are pareto optimal.
3. Contract curve: It is the loci of the pareto optimal points in an edgeworth box diagram. An optimal equilibrium will lie on the curve only. Further, given an initial distribution (Z) we can specify the part of the curve (J,K) where the equilibrium will lie.
4. Pareto optimality condition: Any pareto optimal solution will have to satisfy $(MRS_{x,y})_A$ = $(MRS_{x,y})_B$ = P_x/P_y. This is because we have seen that for utility maximization for consumer A, $(MRS_{x,y})_A$ = MU_x/MU_y = P_x/P_y and similarly for B, $(MRS_{x,y})_B$ = MU_x/MU_y = P_x/P_y. But market prices are one and the same for both consumers, so $(MRS_{x,y})_A$ = $(MRS_{x,y})_B$ = P_x/P_y.

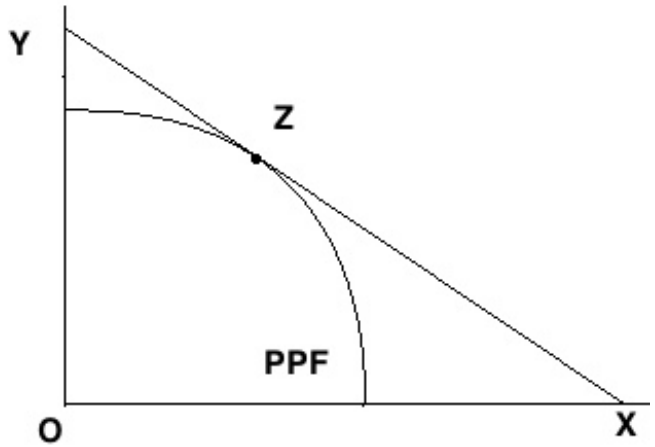
Pareto Optimality in Production





1. Assumptions are there are only 2 firms (1, 2), only 2 commodities (X, Y), firm 1 produces only X and firm 2 produces only Y. There are only 2 inputs (K, L). Perfect competition in both input and output markets. Both firms are profit maximizers. The fulfillment of this condition ensures that it is not possible to increase overall output by a mere redistribution of factors.
2. Isoquant lines: An iso-cost curve denotes the combinations of L and K used for production of same output for a given technology. Each firm would like to operate on the highest possible isoquant. So firm 1 would like to operate @ K while firm 2 will like to operate @ J. The equilibrium will lie on the contract curve and will be determined by the relative bargaining powers and resources available with each firm. (Note: While isoquants are cardinal and can be measured, indifference curves are ordinal.)
3. Let the isoquant be given as $P = f(L, K)$. Since a firm likes to maximize the production (isoquant), $\partial P = 0$. This means $\partial P/\partial L \cdot \Delta L + \partial P/\partial K \cdot \Delta K = 0$. But $\partial P/\partial L = MPP_L$ and $\partial P/\partial K = MPP_K$. This means $MPP_L \cdot \Delta L + MPP_K \cdot \Delta K = 0$. Because an isoquant already represents the maximum technologically feasible production for a given set of inputs, slope of the isoquant = $-(\Delta K/\Delta L) = (MPP_L/MPP_K)$.
4. Marginal rate of technical substitution: $MRTS_{L,K}$ = marginal rate of technical substitution of K for L i.e. amount of K sacrificed to employ 1 additional unit of L and keeping the output constant. Clearly $MRTS_{L,K}$ is the slope of the isoquant. So $MRTS_{L,K} = -(\Delta K/\Delta L) = (MPP_L/MPP_K)$.
5. Introduction of prices: A firm would like to attain maximum production subject to the cost constraints. Slope of the cost line = w/r. So for maximization, cost lines and isoquant have to be tangent i.e. their slopes have to be equal. So @ point of equilibrium for a firm, $MRTS_{L,K} = -(\Delta K/\Delta L) = (MPP_L/MPP_K) = (w/r)$.
6. Since both firms 1 and 2 face same w and r conditions, the equilibrium of the system will be when $(MPP_L / MPP_K)x = (MPP_L / MPP_K)y = (w/r)$.
7. Elasticity of substitution: $\sigma_{L,K}$ = elasticity of substitution of capital for labor i.e. %change in K/L given a unit % change in w/r. In other words, $\sigma_{L,K} = = \{\partial(K/L) / (K/L)\} / \{\partial(w/r) / (w/r)\}$. Since $MRTS_{L,K} = (w/r)$, we can also write the above as: $\sigma_{L,K} = = \{\partial(K/L) / (K/L)\} / \{\partial MRTS_{L,K} / MRTS_{L,K}\}$.

Pareto Optimality in Product Mix

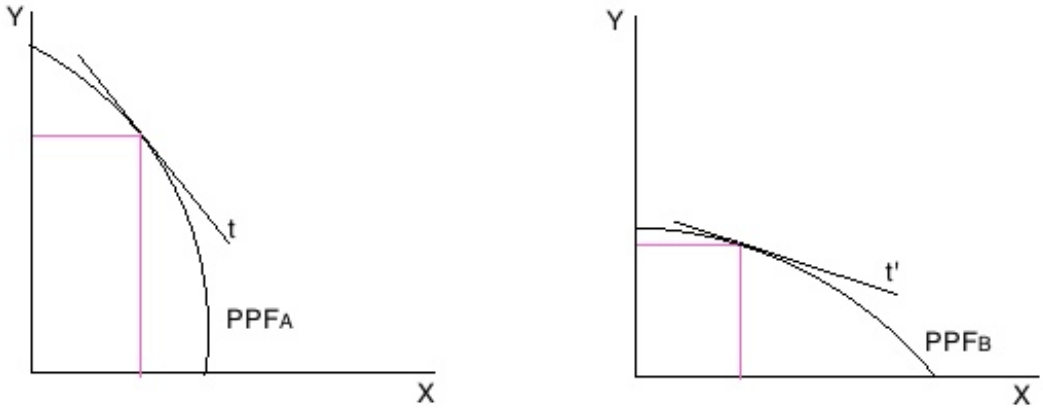


1. Pareto optimality in production can guarantee efficiency but not welfare maximization. Because if lets say firms can

produce 10x and 20y efficiently but the market demands 15x and 15y clearly the consumer demand is not fulfilled and hence welfare not maximized. This is where the price signals come in. The fulfillment of this condition is necessary for determining the optimum quantities of the goods to be produced.

2. Production possibility frontier: This is the projection of the contract curve in the production edgeworth box. Each point on the contract curve in the production edgeworth box corresponds to a unique combination of X and Y and hence a unique point on PPF here. Slope of PPF: $\Delta y/\Delta x = MRPT_{x,y}$ where $MRPT_{x,y}$ is the marginal rate of product transformation. Also Px = MCx and Py = MCy (perfect competition assumption).
3. @ equilibrium, $(Px/Py) = (MCx/MCy) = -(\Delta y/\Delta x) = MRPT_{x,y} = (MUx/MUy)_A = (MUx/MUy)_B$. This is the condition of pareto optimality in the product mix. But still social welfare may not be maximized.

The Optimum Degree of Specialization

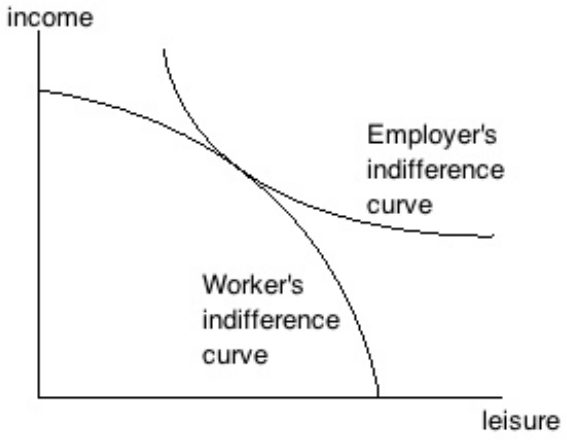


1. This is the condition necessary to determine the optimum level of output of each product by each firm. If a firm produces 2 goods, it has to decide the proportion of the resources to be used for the production of two goods. If the pareto optimality is to be attained then the marginal rate of transformation between the two products should be the same for any two firms which produce both.
2. To prove it, suppose $(MRT_{x,y})_A = 3$ and $(MRT_{x,y})_B = 2$ which means that A can produce 3 units of Y by sacrificing 1 unit of X and B can produce 2 units of Y by sacrificing 1 unit of X. Naturally in this case, we can increase the overall production if A sacrifices 1 unit of X to produce 3 units of Y and B sacrifices 2 units of Y to produce 1 unit of X so that we are still left with 1 additional unit of Y. In the figure above it can b en that the slope of tangent of A ? slope of tangent of B. So overall production will increase if A moves up the curve and B moves down the curve so that their final tangents have same slope.
3. It can be shown that PC leads to satisfaction of this condition. To maximize profit, a firm producing both X and Y will chose a product mix such that $MRT_{x,y} = P_x/P_y$. This is because in PC, P = MC, so $P_x/P_y = (MC_x/MC_y)_A = (MC_x/MC_y)_B$ (because prices are same for both firms. But MC_x/MC_y is nothing but $MRT_{x,y}$. Hence proved.

The Optimum Factor - Product Relationship

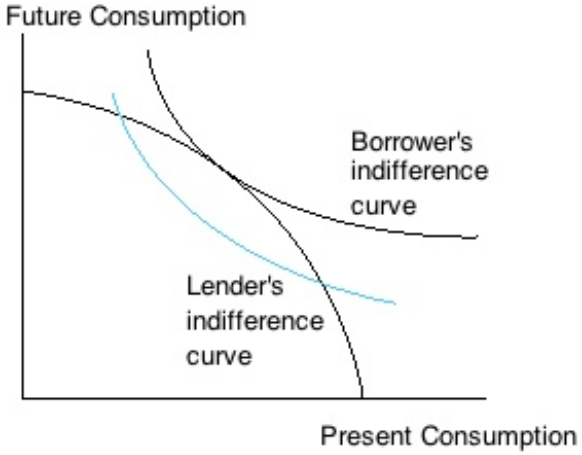
1. It tells us that the marginal rate of transformation between any factor and any product (marginal product of the factor) must be the same for any pair of firms using the factor and producing the product i.e. $(MPP_L)_A = (MPP_L)_B$.
2. If say this is not satisfied and the marginal product of labor in firm A > marginal product of labor in firm B. Then it pays to shift the labor from B to A so that more output can be produced. Explain this by drawing the marginal product graphs.
3. It can be shown that PC leads to satisfaction of thus condition. This is because in PC, $VMP_L = w = MPP_L * P$. But w and P are same in both firms, so we get MPP_L must be same.

The Optimum Allocation of a Factor's Time



1. This condition says that the marginal rate of substitution between leisure and income (measured in terms of the final output) should be equal to marginal rate of transformation between the labor's time and product.
2. To prove it if say MRS leisure, income > MRT labor's time, product then satisfaction of the individual can be increased by transferring his time from work to leisure as the employer would be willing to pay him more for doing more work (more work means more output hence the willingness to pay more).

Inter Temporal Optimum Allocation of Money Assets



1. It states that the marginal rate of substitution between money funds at any pair of times (say t_1 and t_2) must be the same for every pair of individuals. In other words the rate of interest at which the lender is willing to lend should be equal to its marginal productivity rate for the borrower.
2. To prove it if say an individual is willing to lend Rs. 100 @ t_1 in return for Rs. 120 @ t_2 but the Rs. 100 @ t_1 has higher productivity for B and increases his income to Rs. 125 in t_2, then the social welfare can be increased by A lending to B.

The Second Order and Total Conditions

1. The marginal conditions mentioned above are themselves not sufficient but just necessary for pareto optimality. For social welfare maximization, additional second order conditions that - (a) all indifference curves must be convex to origin, and (b) all transformation curves must be concave to the origin - have to be satisfied.
2. But even the satisfaction of above may not necessarily lead to social welfare maximization. We need to satisfy the total condition as well which according to Hicks is that for welfare maximization, it must be impossible to increase welfare by producing a product not produced earlier or by using a factor not used earlier. Thus we need a satisfaction of marginal, second order as well as total conditions for welfare maximization and even though there will not be any unique solution.

Critique of Pareto Criterion

1. It is argued that pareto criteria itself is a value judgement. Accepting it means increase in inequality which may not

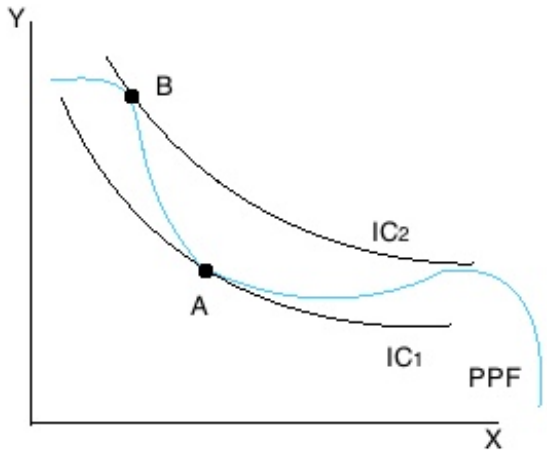
be accepted by all and a value judgement is being passed here by Pareto.
2. It is indeterminate and is not comprehensive. Pareto optimum doesn't lead to social optimum or the bliss point.
3. It accepts the prevailing income distribution and makes no attempt to find an optimal distribution of income. Thus it favors status quo which may not be social optimum in any case.

Sen's Critique of Pareto

1. A state can be pareto optimal with some people in extreme misery and others rolling in luxury and increasing their riches.
2. It identifies well being with utility and the criticisms which apply to a utilitarian approach also apply to it as utility doesn't always reflect well being. Consider the case of a cripple.
3. A redistribution which gives everyone more income and leisure may not improve the social welfare if it at the same time limits some individual freedoms or requires abandonment of cherished cultural traditions.

First Theorem / Invisible Hands Theorem: Do Perfect Markets Necessarily Lead to Pareto Optimum?

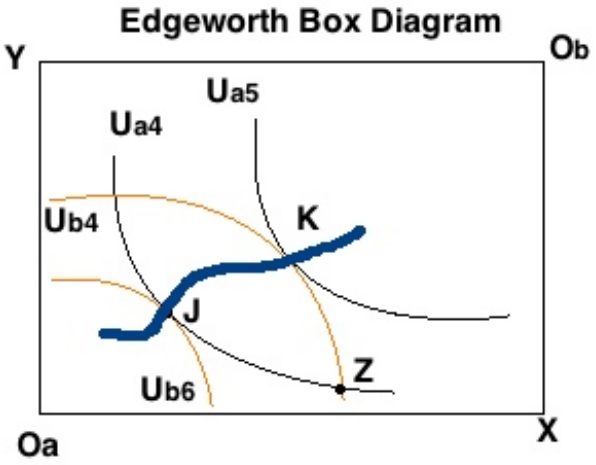
1. It is argued that perfect markets satisfy all the marginal conditions of pareto optimality (shown above individually) and hence the equilibrium reached in perfect markets is necessarily a pareto optimum condition i.e. a general competitive equilibrium is pareto optimal.
2. But it can be seen that the above assertion has certain limitations. Thus for it to be true, a general equilibrium solution must exist. If even one market is in disequilibrium for any reason, we can't rely on markets to restore pareto optimality.



1. Then the second order conditions must be fulfilled as well and PC doesn't guarantee in any way that this will happen. Thus in the above case, marginal condition (of product mix) is satisfied both @ A and B. But clearly A is not an efficient allocation of resources since B is superior. Also naturally if full employment is not prevailing (but is it possible that in PC full employment doesn't prevail?) pareto optimality will not be reached.
2. Finally perfect markets will fail in the presence of externalities.

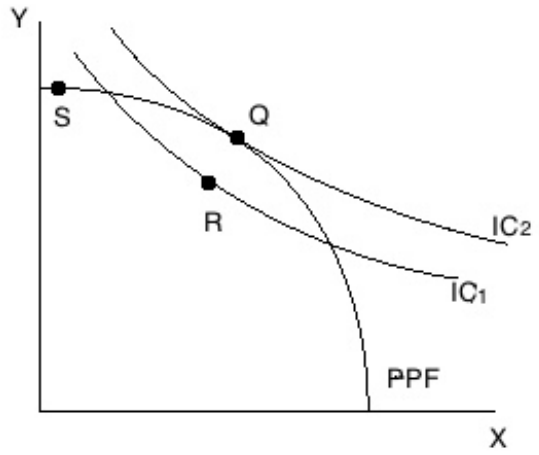
Second Theorem of Welfare Economics

1. It states that for every pareto optimal solution, there exists a competitive equilibrium, given the initial income distribution or factor endowment.



1. Take for instance the optimality condition in exchange. It can be seen from above that every pareto optimal point (on the contract curve) is also a general competitive equilibrium solution for some given income distribution.

Theory of Second Best

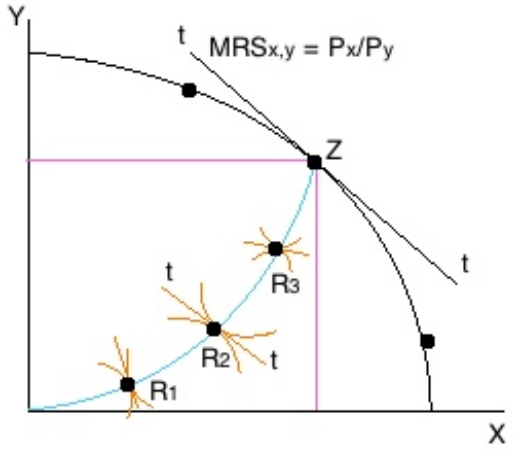


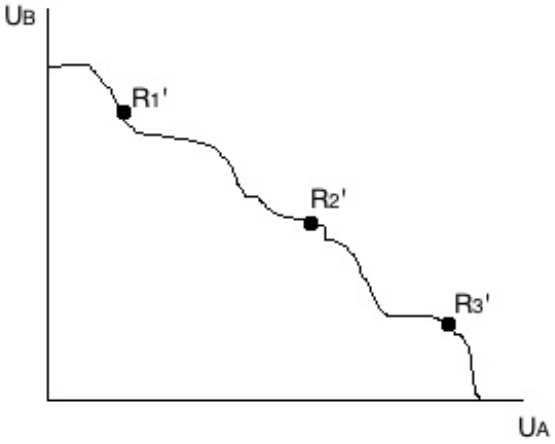
1. This asks the question that if all the conditions necessary for pareto optimality can't be satisfied then of course the maximum social welfare is impossible to attain. But should efforts be made to achieve the second best position by satisfying the remaining conditions for pareto optimality? Or will there be a point of higher social welfare which doesn't satisfy even the remaining conditions of optimality than a point which satisfies the remaining conditions of optimality? The theory says it will not lead to increase in welfare.
2. Thus for example if a monopoly exists in 2 different markets and the government tries to break the monopoly in one market (and replace it by PC) then it would appear that this should increase the social welfare (as more pareto optimality conditions are being satisfied). But the answer is in negative. The second best solution may not always be desirable.
3. In the above figure obviously if the pareto optimal condition of product mix is satisfied, point Q represents the best possible outcome. But say because of some reasons it is not possible to satisfy it and we still remain @ S which may satisfy pareto optimality in production. But it can be seen that a point R inside the PPF is an improvement over S. Thus second best solution is not desirable.

How Monopoly defeats Pareto Optimality

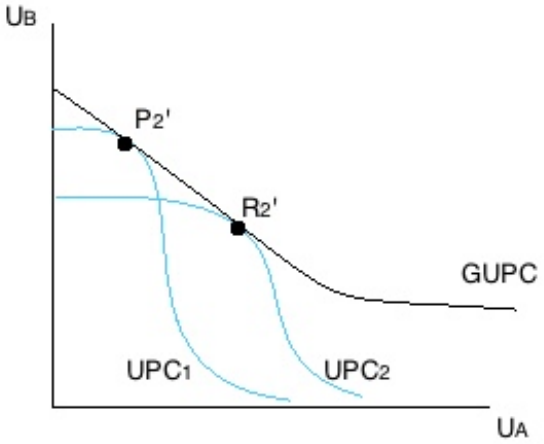
1. A crucial condition for pareto optimality is equality of $MRPT_{x,y}$ with $MRS_{x,y}$. The way perfect competition ensures this is by P = MC. But if we deviate form PC, this equality is not guaranteed hence there is no guarantee that the marginal rate of product transformation = marginal rate of substitution. Thus in the 2 commodity case if we take X to be under monopoly and Y to be under PC, then $MRPT_{x,y} < MRS_{x,y}$ and thus while consumers would be demanding more of X markets will be producing more of Y.

Utility Possibility Curves and the GUPC

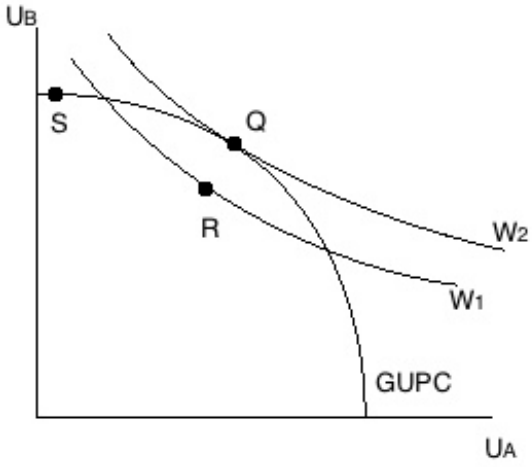




1. Pareto optimality in product mix decides @ which point economy will produce. Let it produce @ Z and x and y quantities of X and Y be produced. Since whatever is produced is consumed, so this (x,y) is distributed among the consumers A and B. This distribution can again have multiple possibilities and can be shown in a edgeworth box diagram (thus one entire set of distributions for each equilibrium point on PPF).
2. Now each point on the contract curve of the diagram represents a unique combination of utilities of A and B, so we can draw a utility possibility curve. Thus for each point on the contract curve of pareto optimality of production, there will be one corresponding UPC. However, out of the infinite number of points on the UPC, equilibrium will occur only at one point where the $MRPT_{x,y} = MRS_{x,y}$. This can be seen in the edgeworth box diagram above where out of multiple possible points, only one distribution (R_2) will be the equilibrium point for a given relative prices of the goods (P_x/P_y). On the UPC curve, its corresponding point is R_2'.



1. This way we can draw different UPCs for each different set of production on the PPF curve. For each UPC there will be only one equilibrium point (where marginal rate of product transformation is equal to marginal rate of substitution). By joining such equilibrium points on all UPCs we can get a GUPC. Now if we superimpose the swf on it, we will get the point of bliss at the point of tangency.



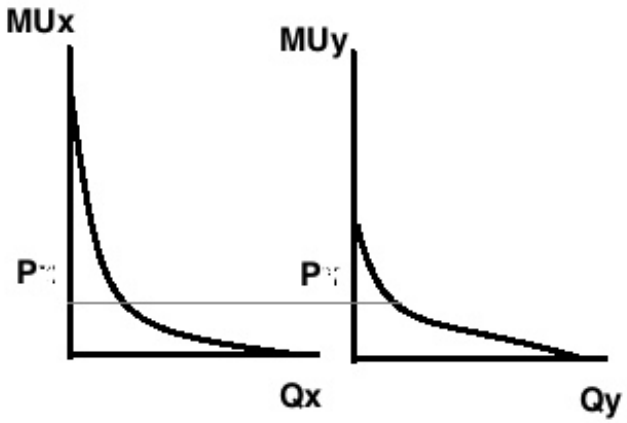
1. It may be noted that a pareto optimal position may be inferior to a non optimal (pareto) position when measured as per social indifference map. It can be seen above that R is superior to S in terms of social welfare even though S is pareto optimal while R is not.

Social Welfare Function Curve
Assumptions

1. They are convex, can't intersect, can be zig zag. But in reality swfs can intersect as income redistributes.
2. Consumption, production and product mix are all pareto optimal.

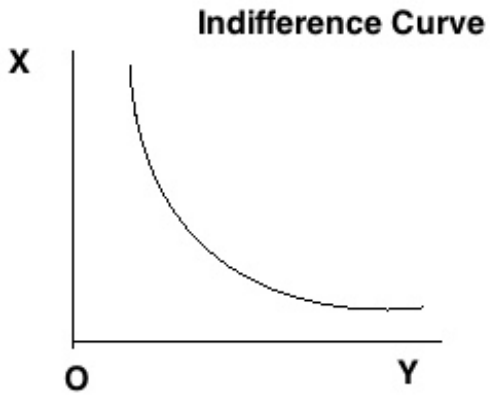
Q. State and explain the law of equi-marginal utility and also state clearly the limitations of the law. (2010, I, 20)

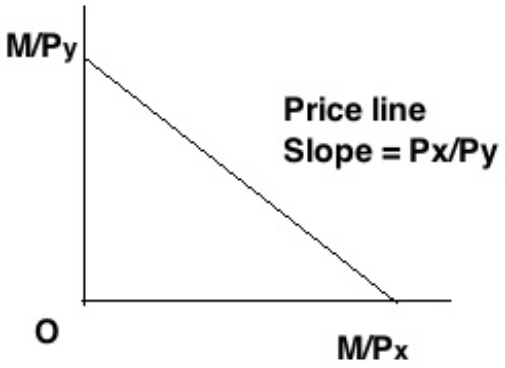
Ans.
Law of Equi-Marginal Utility
One Commodity, Two Consumers Case



1. Any rational consumer is utility maximizer. To maximize his utility, he will consume an additional unit of the product until the marginal utility he so gains is higher than or equal to the price he has to pay. So in equilibrium, MUx/Px = 1.
2. If there are 2 consumers X and Y, in equilibrium, MUx / Px = MUy / Py = 1.

Two Commodity, One Consumer Case





1. In the indifference curve above, let the utility function be: $U = f(x,y)$. Now the consumer is a utility maximizer. So $\partial U = 0$. Taking partial derivatives, $\partial U/\partial x \cdot \Delta x + \partial U/\partial y \cdot \Delta y = 0$. But $\partial U/\partial x = MUx$ and $\partial U/\partial y = MUy$. This means $MUx.\Delta x + MUy.\Delta y = 0$. But indifference curves show us the highest utility achieved for a particular combination of x and y. So the utility maximizing condition gives us: slope of the indifference curve $-(\Delta y/\Delta x) = (MUx/MUy)$.
2. Marginal rate of substitution: $MRSx,y$ = marginal rate of substitution of y for x i.e. amount of y sacrificed to consume 1 additional unit of x. Clearly $MRSx,y = (\Delta y/\Delta x)$. But from (1) we get, @ utility maximizing point, $MRSx,y = -(\Delta y/\Delta x) = (MUx/MUy)$.
3. Introduction of prices: A person would like to be on the highest possible indifference curve subject to the price constraints. Slope of price line = Px/Py. So @ utility maximization condition dictates slope of price line = slope of indifference curve (point of tangency). So $MRSx,y = -(\Delta y/\Delta x) = (MUx/MUy) = (Px/Py)$.

Two Commodity, Two Consumers Case

1. From the above discussion, in equilibrium, $(MUx / MUy)_A = (MUx / MUy)_B = (Px/Py)$.
2. Pareto optimality is possible only at the condition of equilibrium.

Assumptions / Limitations

1. It assumes rational consumers i.e. a consumer will always try to maximize his utility.
2. It assumes marginal utility derived from the consumption of a unit can be measured.
3. It assumes that the consumer is price taker and additional consumption doesn't impact the price of the product. It assumes perfect competition.

Q. "Welfare economics is a branch of economic theory which provides a theoretical framework for optimum use of resources."
In the light of the above statement, examine the main areas of welfare economics. (2007, I, 60)

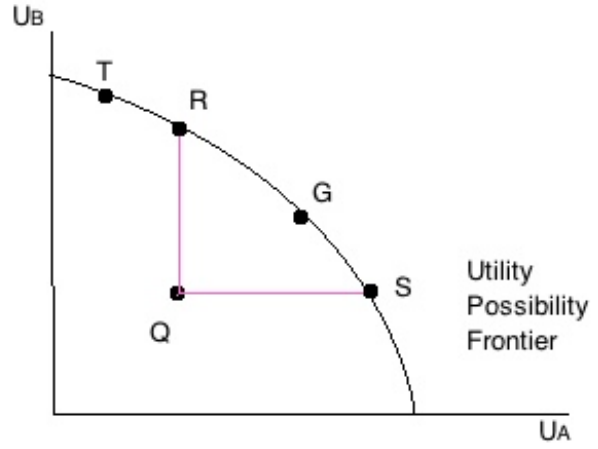
Hicks / Kaldor / Schitovsky
Hicks and Kaldor Welfare Criteria: The Compensation Principle
Statement

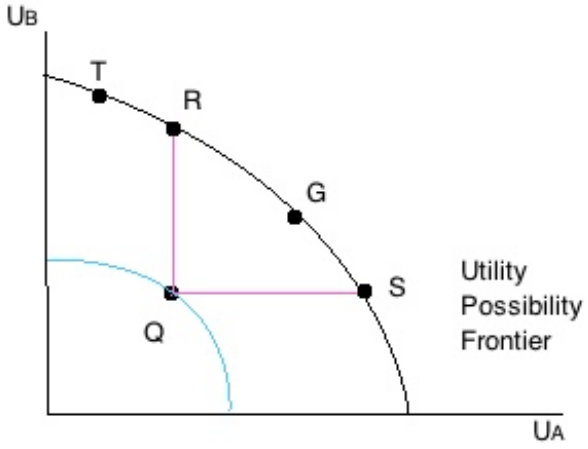
1. If a change makes some people better off and others worse off, then that change will increase social welfare if those who fain from the change could compensate the losers and still be better off. In other words, a change is an improvement if the losers (of the post change situation) can't bribe the winners (of the post change situation) not to bring the change.

Assumptions

1. The satisfaction of an individual is independent of the others and he is the best judge of his welfare.
2. There exist no externalities in either production or consumption or both.
3. The tastes of individuals remain constant.
4. The issue of distribution is ignored i.e. a change in distribution doesn't affect social welfare.
5. Utilities can be measured ordinally for a person and interpersonal comparisons of utilities are not possible.

Model





1. In the above left panel, let initial stage be Q. Now if a change is proposed to say R, utility of B will increase while that of A will remain unchanged. So Q --> R is a pareto improvement. Thus it can be seen that a movement to any point between R and S is a pareto improvement.
2. Now say a change is proposed form Q to T. In this case, the utility of B will increase while that of A will decrease. So it is not pareto improvement. But if in this change, B is able to compensate A and still be better off, we would call it a Kaldor improvement. Now this is a utility possibility curve, so by a mere redistribution of income, it is possible for A and B to move from point T to point R. @ R it would be a pareto improvement and thus it becomes possible in this case for B to bribe off A and still be better off. So any movement on UPC from inside the UPC is a Kaldor improvement. Alternatively any policy which shifts the UPC outwards is a Kaldor improvement (see top right panel).
3. Note here that Kaldor improvement doesn't require B to actually compensate A (in which case it would reduce to a mere Pareto improvement). It suffices to show that it is possible for B to compensate A. This is how Kaldor and Hicks isolate themselves from the question of distribution.

Policy	Xa	Xb	Ya	Yb
1	10	10	10	10
2	9	13	13	9
3	9	13	9	13

Let utility functions be given by: $U_i = X_i * Y_i$. $U = \sum U_i$.

Thus the utility matrix of the society would look like

Policy	Ua	Ub	U
1	100	100	200
2	117	117	234
3	81	169	250

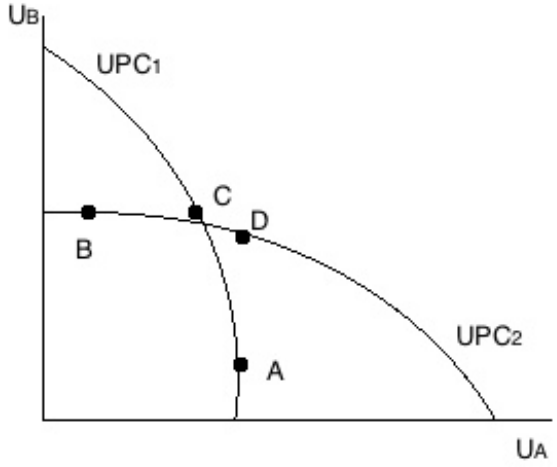
1. Lets say current policy is 2 and a policy change to 3 is proposed. But A will lose in the change and thus B needs to compensate A. In this case B can compensate A fully to restore him to the unchanged state and still be better off. Such kind of an improvement is called Kaldor improvement.

Criticism of the Compensation Principle

1. Net net it merely says an overall increase in production leads to an improvement.
2. It is not free from value judgements since compensation is merely hypothetical and it will label a change as an improvement even if it makes the poor poorer. If actual compensation is paid out then it reduces to pareto criterion.
3. It is not free from interpersonal comparisons as well a compensation of a small amount can bring about a large change in utility of a poor (like the cripple argument).
4. Kaldor and Hicks claim that they have been able to separate production changes from distribution changes. But if say the output of X increases and that of Y decreases and individual A prefers X and B prefers Y, then the question

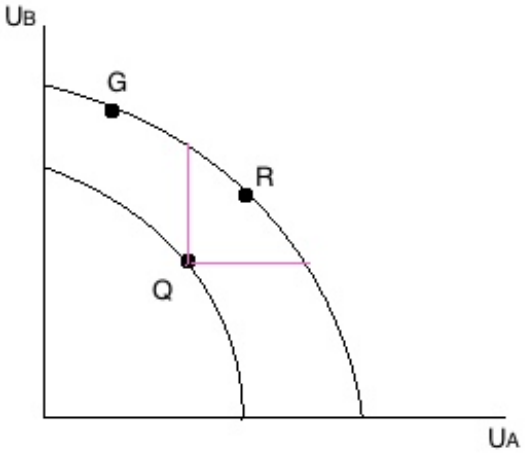
of production inherently becomes linked with that of distribution.

Schitovsky's Paradox



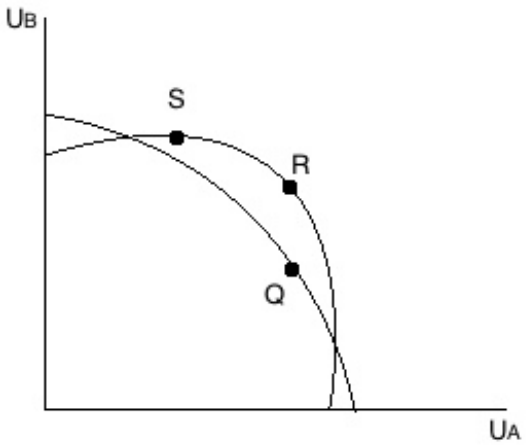
1. Schitovsky pointed out an important contradiction in Hicks - Kaldor criterion. He showed that in some cases a situation A can be shown as a Kaldor improvement over B and at the same time B can be shown as a Kaldor improvement over A. Consider the above case, point C is a clear improvement over point B (since U_B remains unchanged while U_A increases). But it is possible to move from C to A by a mere redistribution of income and thus A is a Kaldor improvement over B. But it can also be shown that D is a pareto improvement over A and by a mere redistribution of income, it is possible to reach B and thus B is a Kaldor improvement over A. This is called Schitovsky's paradox and it will arise whenever the UPCs intersect.

Schitovsky's Double Criterion of Improvement



1. He says that a change is an improvement if the winners (of the post change situation) are able to bribe off the losers (of the post change situation) to accept the change and at the same time the losers are not able to bribe off the winners to accept the change. In the above figure it can be seen that G is a Kaldor improvement over Q but not vice versa.

Samuelson's Criticism of Schitovsky



1. It can be seen that in above situation, S is a Kaldor improvement over Q and also satisfies Schitovsky's double criteria. But he argues that a complete test of improvement in welfare requires that the new UPC should not lie inside the old UPC at any point and at least somewhere outside it.

Q. What is Schitovsky's paradox? How far has Schitovsky been successful in removing the contradictions in Kaldor-Hicks compensation criteria for welfare? (2009, I, 20)

Arrow's Impossibility Theorem

1. The basic engagement of social choice with which Arrow was concerned involved evaluating and choosing from the set of available social states (x,y, ...), with each x, y, etc, describing what is happening to the individuals and the society in the respective states of affairs. Arrow was concerned with arriving at an aggregate "social ranking" R defined over the set of potentially available social states x, y, etc. With his democratic commitment, the basis of the social ranking R is taken to be the collection of individual rankings $\{R_i\}$, with any R_i standing for person i's preference ranking over the alternative social states open for social choice. It is this functional relation that Kenneth Arrow calls the "social welfare function." Given any set of individual preferences, the social welfare function determines a particular aggregate social ranking R.

Axioms

1. U (unrestricted domain): For any logically possible set of individual preferences, there is a social ordering R. An ordering is a ranking that is reflexive, transitive and complete.
2. I (Independence of irrelevant alternatives): The social ranking of any pair {x,y} will depend only on the individual rankings of x and y.
3. P (Pareto principle): If everyone prefers any x to any y, then x is socially preferred to y.
4. D (Non-dictatorship): There is no person i such that whenever this person prefers any x to any y, then socially x is preferred to y, no matter what others prefer.

The General Possible Theorem

1. If there are at least three distinct social states and a finite number of individuals, then no social welfare function can satisfy U, I, D and P.

Proof

1. A set of individuals, G, being "decisive." This could be "local" in the sense of applying over some particular pair of alternatives {x, y}, when x must be invariably socially preferred to y, whenever all individuals in G prefer x to y. Much more demandingly, G is globally "decisive," if it is locally decisive over every pair.
2. Spread of Decisiveness: If G is decisive over any pair {x,y}, then G is [globally] decisive. Proof: Take any other pair {a,b}, different from {x,y}, and assume that everyone in G prefer a to x, that to y, and that to

b. Let all others (not in G) prefer a to x, and y to b (we do not impose any condition on the rest of their preferences). By the Pareto principle, a is socially preferred to x, and y is socially preferred to b. By the decisiveness of G over {x,y}, x is socially preferred to y. Putting them together (that is, a preferred to x, that to y, and that to b), we have, by transitivity of strict preference, the result that a is socially preferred to b. By the Independence of Irrelevant Alternatives I, this must be related only to individual preferences over {a,b}. But only the preferences of individuals in G have been specified. So G is decisive over {a,b}. Similarly for all other pairs. So G is indeed globally decisive.

3. Contraction of Decisive Sets: If a set G of individuals is decisive (and if it has more than one individual), then some reduced part (a "proper subset") of G is decisive as well. Proof: Partition G into two subsets G_1 and G_2. Let everyone in G_1 prefer x to y, and x to z, with the ranking of y and z unspecified, and let everyone in G_2 prefer x to y, and z to y. Others not in G can have any set of preferences. By the decisiveness of G, we have x socially preferred to y. If, now, z is taken to be socially at least as good as x for some configuration of individual preferences over {z,x}, then we must have z socially preferred to y (since x is socially preferred to y) for that configuration of preferences over {z,x}. Since no one's preference over {z,y} other than those in G has been specified, and those in G prefer z to y, G is decisive over {z,y}, and thus, by the Spread of Decisiveness, G_2 must be [globally] decisive. Since that shows that some reduced part of G is indeed decisive, then we have got what we want to show, for that particular case. To avoid this possibility, we must assume that our initial presupposition that z is at least as good as x must be eschewed. But then x must be preferred to z. However, since no one's preference over {x,z} has been specified for this, other than those in G_1 who prefer x to z, clearly G_1 is decisive over {x,z}. Thus by the Spread of Decisiveness, G_1 is [globally] decisive. So either G_1 or G_2 must be decisive, which establishes the Contraction of Decisive Sets.
4. Arrow's impossibility result: By the Pareto Principle the set of all individuals is decisive. By the Contraction of Decisive Sets, some proper subset of all individuals must also be decisive. Take that smaller decisive set, but some proper subset of that smaller set must also be decisive. And so on. Since the set of individuals is finite, we shall arrive, sooner or later, at one individual who is decisive. But that violates the Non-dictatorship condition. Hence the impossibility.

Sen's Critique of Arrow

1. He asserts that Arrow's theorem doesn't show the impossibility of a rational (democratic) choice but it shows the impossibility that arises when we try to base the choice on a limited set of information. Even though the basic axioms for the Arrow theorem concentrate on individual preferences over the set of alternative social states, nowhere do they restrict us from including other available information in the decision making as well (for example, the nature of the alternatives and their relations to the persons involved in arriving at the social ranking R). This narrowness of the information base leads to impossibility.
2. Consider a nasty proposal to take some of the income of the poorest person and to divide it over several others. In a society of selfish persons, this will be a majority improvement. So the problem here is not the lack of consistency of majority rule, or any other voting rule. Decision rules on information base consisting solely of preference ranking of the persons without any notice being taken of who is poorer than whom or who gains or loses from the redistribution of income are quite inadequate for any rational choice. SWFs which are fully confined within the voting rules suffer from this drawback (in fact this is a general drawback of majority rule). Arrow's theorem first establishes that the permitted social welfare functions must be voting rules (that is the big intermediate result), and then generalizes the Condorcet paradox. Thus the way to tackle the Arrow theorem in the context of welfare economics certainly includes making use of interpersonal comparisons in our judgments. Indeed, all public policy tends to bring in interpersonal comparisons in one way or another.
3. Even for political processes, one problem remains that does not involve interpersonal comparisons, but for which the Arrovian axioms are inadequate. And that is the problem of liberty and rights. If we follow John Stuart Mill in standing up for the rights of minorities and of individuals in their personal domain, then we must not be too impressed by how many people oppose the minorities' being able to choose their own life styles, or how many try to eliminate the exercise personal liberties by individuals.

AK Sen's Critique of Impossibility of Satisfying Pareto Optimality in a Liberal Society

Another critical essay to Paretian optimum was provided by Indian Nobel laureate Amartya Sen, who demonstrated with a paradox the impossibility of Paretian liberal, in 1970. The logic scheme is based on Arrow's impossibility theorem. Sen considers two individuals, A and B, and three possible actions for each individual:

1) A reads a book
2) B reads a book
3) nobody reads a book.

A prefers action 3) over action 1) and action 2) (3>1>2), while B prefers action 1) over action 2) and action 3) (1>2>3). Therefore, the Paretian optimum solution is action 1) prevailing over action 2) (1>2). However, a liberal society shares two relevant values:

- not to force A to read a book, hence action 3) wins over action 1)
- allow B to read, hence action 2) prevails over action 3).

As a consequence, the Liberal optimum solution is action 2) prevailing over action 1) (2>1), nevertheless that is in contrast with the Paretian optimum solution.

Q. What, according to Arrow, are the axioms required for translating individual preference into social preferences? Why is it impossible to construct social preferences satisfying these axioms? (2009, I, 20)

AK Sen's Social Welfare Function

Basic Concepts Used

Gini coefficient: This is the ratio of the area between the Lorenz curve and the diagonal to the area below the diagonal.

Lorenz dominance: If one lorenz curve (L1) lies above another (L2) in at least some portion and no where it lies below the other then L1 dominates L2 and this is called lorenz dominance.

Atkinson's theorem: Given constant income, same preferences, 'strict concavity' of individual utility functions, if a lorenz curve L1 dominates another lorenz curve L2 then L1 represents a higher social welfare state.

Generalized Lorenz curve: A lorenz curve expresses (diagrammatically) the relation between proportion of population and proportion of total income. By Atkinson's theorem we can only compare welfare state of 2 societies which have equal income. To compare the welfare state of societies with different incomes, we multiply the y axis by μ where μ is the per capita income in the society. The resulting curve we get is called a generalized lorenz curve.

Generalized Lorenz dominance: If one generalized lorenz curve (GL1) lies above another (GL2) in at least some portion and no where it lies below the other then GL1 dominates GL2 and this is called generalized lorenz dominance.

Shorrock's theorem: Given same preferences and strict concavity of individual utility functions, if a generalized lorenz curve GL1 dominates another generalized lorenz curve GL2 then GL1 represents a higher social welfare state.

Proof

To prove: If W1 = μ1 * (1 - G1) and W2 = μ2 * (1 - G2) and if W1 > W2 then W1 represents a higher social welfare state.

Proof: We know G (gini coefficient) is the ratio of area between the diagonal and the lorenz curve to the area below the diagonal. So 1 - G = ratio of the area below the lorenz curve to the are below the diagonal. (minor algebra).

Consider a generalized lorenz curve. area below the diagonal in such a curve = 0.5 * base * height = 0.5 * μ (since base = 1 and height = μ). So μ * (1 - G) = 2 * area below a generalized lorenz curve (again minor algebra).

This means that every swf W = μ * (1 - G) can be represented as a generalized lorenz curve (where W = 2 * area below that lorenz curve). So if W1 > W2 it means that area below the generalized lorenz curve of W1 (GL1) > area below the generalized lorenz curve of W2 (GL2). Now it will always be possible to construct at least one set of generalized lorenz curve in a way that GL1 will dominate GL2 (i.e. we need to create a curve such that it never lies below the other and the only constraint is that area below it should be more than the other which would be easy to satisfy). Now invoking Shorrock's result we can see that GL1 represents a higher state of welfare than GL2 and thus W1 represents higher welfare than W2.

If μ1 < μ2 then too appropriate algebraic adjustments can be made to define an equivalent μe = μ2. In such a case G1 < G2 and we can apply Shorrocks.

Q. "An economist should know how to distinguish between a policy change which is an improvement and one which makes things worse."
In the light of the above statement, outline the important criteria for welfare judgement. (2006, I, 60)

Theory of Distribution

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Q. State and explain the theory of distribution in which the exhaustion of the total product is taken care of without leaving any residual claimant and also state clearly the assumptions necessary for the success of the theory. (2010, I, 20)

Q. "While analyzing the supply side of the general theory of distribution, one has to confront various types of supply curves." Elaborate the statement with the help of suitable diagrams. (2006, I, 20)

Ricardian Theory of Distribution

1. Ricardo was not interested in the theory of distribution due to its importance per se but wanted it so as to build a general model for economics.
2. His model predicted that as economy grows, the share of wages will increase, profits will fall and rent will increase. But empirical evidences till WW2 have shown shares have remained fairly constant.

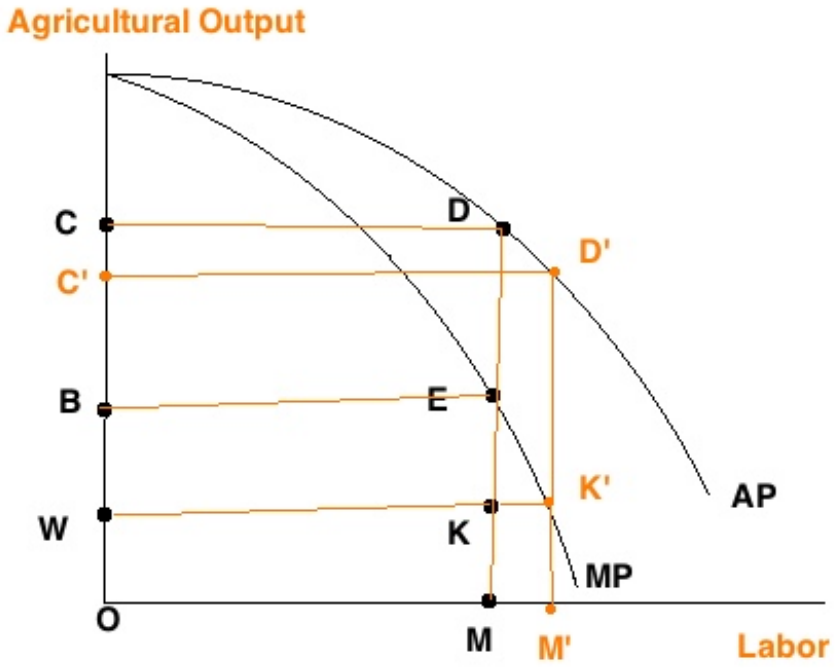
Assumptions

1. Law of diminishing returns operates in agriculture i.e. as more labor is employed, the average (AP) and marginal products (MP) decline.
2. He assumes Malthusian law of population to hold good i.e. if wage rates rise above the subsistence level population will increase and if it falls below the subsistence level, population will decrease so that in the long run wage rates (w) will be equal to subsistence wage rates (w_s).
3. He assumes profits (π) are a necessary incentive for capital accumulation and capital accumulation is necessary for economic growth.
4. Static technology.
5. Full intersectoral capital and labor mobility.

Model

1. He assumes only a 2 sector economy i.e. agriculture and industry. Output of agriculture is corn and all the wages in agriculture are also corn. Output of industry are money goods (industrial goods) while the wages in industry are corn.

Agriculture



1. He discusses the distribution of national output (Y) in three shares - rents (R), profits (π) and wages (w). He uses the 'marginal principle' and the 'surplus principle' to work out the relative shares. Marginal principle is invoked to determine the share of rent while surplus principle is invoked to determine the share of profits. Let initially OM amount of labor be engaged in agriculture production.
2. Marginal principle: Ricardo considers the rent of the land to be equal to the difference between what it produces and what it costs to cultivate on the marginal piece of land (i.e. land where the produce = cost of cultivation). If we aggregate over all the land under economy, we see that the aggregate produce of the land will be (OMDC) average produce of all agricultural labor (MD = OC) * total labor employed in cultivation (OM). Now the marginal cost to cultivate it is OMEB. Thus rent in the economy is the rectangle BEDC.
3. Surplus principle: After deducting land, leftover (OMEB) from the income is left for profits and wages. Here we use the Malthusian principle that labor will always be paid the subsistence wage rate independent of their productivity. Let that be OW. So wages paid are OMKW and the residual i.e. WKEB is the share of profits.
4. Capital accumulation: Now the question arises what determines the level of employment? In the model, the amount of labor employed is not determined by their marginal product but by the level of capital accumulation in the economy. Ricardo says that as more capital is accumulated, more labor will be employed. Thus the level of employment in agriculture will be determined by the capital stock.

Industry - Agriculture Linkage

1. Since wages represent the total input and profits represent the return, the ratio (profits/wages) represents the rate

of profit. Now under full mobility conditions, rate of profit under agriculture equals rate of profit in industry.
2. But in agriculture both the input and the output are measured in corn only. So any change in monetary conditions will not impact the rate of profit in agriculture. On the other hand in the industry, input is corn while the output is industrial goods which is measured in money. Input (corn) is fixed determined by the subsistence wage. Output is also fixed given static technology. Thus the money rate of profit in industry can't change as a result of variation in corn wage or output per worker but the only way left to change the money rate of profit in industry is to adjust the relative money prices of industry goods.
3. Thus the money rate of profit in industry must become equal to the corn rate of profit in agriculture and not the other way round i.e. industry is dependent on agriculture and not vice versa.

Impact of Capital Accumulation

1. Impact on rent: With capital accumulation in agriculture, employment increases. But as more labor is employed the average and marginal products of labor decline and also the gap between them increases. Thus rent increases and less of surplus is left.
2. Impact on profits: Also with increasing production, the unit cost of product also increase (since more labor have to be employed to produce same quantity and their wages are constant). This leads to an increase in the price of corn. In agriculture the corn rate of profit remains unchanged since both output and input are determined in corn. But in industry, only the input is in corn, so the input costs increase as workers have to be paid higher money wages.
3. Stationary state: Since wages to be paid are constant in corn terms, the residual i.e. the profits fall in agriculture and eventually may become zero. Also since industry profits are dependent on agriculture profits, they too fall. Eventually a stage is reached where the profits fall below the minimum required by the capitalists to incentivize investment and all economic growth and capital accumulation stops. Ricardo opined that the basic cause for this is diminishing returns and even technology can't prevent the ultimate disappearance of profits.

Criticism

1. Empirical evidence: Ricardo had predicted a declining share or profits. But actual events have been contrary. Share of profits, wages and rents has remained largely stable. No tendency towards declining share of profits has been found. Economic growth has not shown any signs of tapering off.
2. Diminishing returns hypothesis: Ricardo said diminishing returns can't be offset by technological progress but evidence has been contrary.
3. Malthusian hypothesis: This has clearly not shown to work. Rise in incomes has been associated with decline in population growth rate instead of increase as assumed.

Kaldor's Theory of Distribution

Assumptions

1. Keynesian assumption: 2 sector model and I is autonomous.
2. Full employment exists so that total output is given.
3. He also assumes that mps remains constant (both for wages and profits). Also mps (wages) < mps (profits).

Model

1. Kaldor also divides the national income into 2 parts - profits and wages where profits are defined as the incomes of the property owning class and thus includes ordinary profits, rent and interest. Wages on the other hand include salaries as well.
2. Let Y = W + P where W = total wages and P = total profits. Now in (full employment assumption) equilibrium position, the planned savings (or ex ante savings) = planned investment or I = S. Total savings in the society (S) = Total savings out of wages (s_w*W) + total savings out of profits (s_p*P). This means I = s_w*W + s_p*P or I = s_w*(Y-P)+s_p*P or I = (s_p-s_w) * P + s_w.Y. If we divide both sides by Y we get, I/Y = (s_p-s_w) * P/Y + s_w. By some more algebra, we get the share of profits in national income (P/Y) = (1/s_p-s_w) * I/Y - s_w / (s_p-s_w).
3. Thus given the marginal propensities of labor and capitalists to save, share of profits is determined by share of investment in GDP i.e. higher the I, higher the share of profits (note the importance of assuming I as exogenous here). 1/(s_p - s_w) is the coefficient of the sensitivity of income distribution or the income distribution multiplier. This model will thus work only if s_w < s_p, in which case multiplier will be > 0.
4. If s_p < s_w, the system will be unstable. In the condition of full employment, any increase in demand (due to increase in I) will only lead to increase in prices (relative to wages) and increase in profits because in Keynesian framework the wages lag behind prices. If s_p > s_w, it would mean falling consumption and higher savings. So prices will stabilize. Similarly if demand falls, in such a situation consumption will rise. If s_p < s_w, then a rise in prices will raise

consumption and hence further rise in prices. So $s_p > s_w$ is a necessary condition for the system to be in equilibrium.

5. Note that the condition ($s_p > s_w$) is not only essential for the stability of the system but also for the increase in the share of profits as the investment (as a proportion of Y) increases. Given a constant Y, the only way an increase in I (which leads to increase in prices and hence profits) can bring about an increase in S (which is the necessary condition for full employment equilibrium) is if - (a) the marginal propensities to save also increase with higher investment but this is ruled out due to constant savings rate assumption, or (b) the mps (profits) > mps (wages) since the income has redistributed from labor to capital.
6. When $s_w = 0$, $P = (1/s_p)*I$. Profit = capitalists' savings + capitalists' consumption. This case is opposite to Ricardo where profits were residual. Here wages are residue, profits are determined by capitalists' propensity to consume and invest. All taxes fall on wages. If I/Y and s_p remain constant over the years, then share of wages in GDP also remains constant and with increase in output wages also increase proportionately every year. If $s_w \neq 0$, then total profits will be reduced by the amount of workers' savings ($s_p.P + s_w.W = I$) but the sensitivity of profits to ΔI will increase due to consequential change in workers' savings as well.

Kaldor's Constraints

1. Kaldor places 4 constraints for the model to yield economically meaningful results. They are (a) $w > w_{min}$ where w_{min} is the subsistence wage level. Beyond this a rise in prices will also increase nominal wages and thus the share of profits can't increase. Thus $P/Y \leq (Y - w_{min}.L) / Y$. Violation of this leads to Ricardian economics. (b) $P/Y > m$ where m is the minimum profit margin required by the entrepreneurs regardless of the demand conditions. Beyond this the entrepreneurs will not reduce prices any more. Fulfillment of this condition means that in depression situations, entrepreneurs will be willing to reduce prices and take a cut in their profits (and thus equilibrium will be restored). If they don't do so, equilibrium can't be re-established. (c) Share of profits can't fall below minimum rate (r) needed to induce capitalists to undertake risk. So $P/(vY) \geq r$ is a constraint and violation of this leads to a violation of the full employment constraint where v is the ICOR. (d) v itself should not be influenced by P/(vY) or the rate of profit. If it were G_n*v will depend on rate of profit.

Criticism

1. Kaldor assumes that until the minimum wage condition is breached a reduction in wages (via increase in prices) will be frictionless. This is clearly not true. But if money wages rise, then prices will have to rise as well (to protect profits) and this will further increase money wages. Thus a wage - inflation spiral may set in.
2. Kaldor ignores technical progress and a consequent rise in workers' productivity which implies a rise in their real wages. Thus workers' real wages may rise even in the case of rising prices which will lead to a failure of the model. Technical progress may also cause unit costs to fall more than their prices where again the model will fail. Likewise he also ignores the human capital factor.
3. Kaldor again assumes that reduction in profit margins till the critical level will be frictionless. This is again not true. Generally rather than reducing prices, entrepreneurs prefer to reduce quantity specially as the monopoly power gets higher.

Kalecki's Theory of Distribution

Statement

1. The relative share of profits and wages in the national output depends upon the degree of monopoly in the economy. The degree of monopoly is measured by him according to Lerner's measure: (p - mc) / p where p is the price and mc is the marginal cost. The average degree of monopoly in the economy can be calculated by estimating first the degree of monopoly of each single firm.
2. It must be noted that in Kalecki, the marginal cost (mc) includes the cost of raw materials as well as cost of labor. In the cost of labor, he only considers wages and he lumps the salaries (of white collared jobs) and other overhead costs together in profits.

Assumptions

Vertically Integrated Industry

1. Industry under considerations is fully vertically integrated so that only costs are the labor costs. Further all workers are directly productive labor (no overheads).
2. Costs are constant as output rises for labor such that MC = AC (at least until the full employment level is reached).

Non-Vertically Integrated Industry

1. Only labor costs are those of directly productive workers and no other overheads.
2. Costs are constant as output rises for both the labor as well as raw materials such that MC = AC (at least until the full employment level is reached).

Model

Vertically Integrated Industry

1. Gross profit of the industry = TR - TC. In this case, TC is exclusively wage costs. Income distribution in such an industry depends entirely on ability of firms to charge a markup on their product. Higher the monopoly power (P/AC), higher the share of profits.

Non-Vertically Integrated Industry (Firms can now buy raw materials from other firms)

1. Kalecki's degree of monopoly of one firm in this case (μ) = (p - mc) / p or because mc = ac, we can write $p.\mu$ = p - ac. Now p - ac is the difference between the price of the product and its average cost (inclusive of all labor and raw materials). Thus it represents the profits (and other overheads) or the gross capitalist income per unit of output. If x is the total production of the firm, we have $x.p.\mu$ = x * (p - ac) or the total profit (i.e. the capitalist income) of a firm. The total value of the output of a firm is simply x.p.
2. If we integrate over the whole economy to get the total profit (i.e. the capitalist income) in the economy, we get total profit = $\sum x.p.\mu$ = $\sum$x * (p - ac). Now total output in the economy (not equal to national income because here we also include the value of intermediate products whereas in national income we include the value of only the final products) T= $\sum x.p$.
3. Now if we divide both sides of the above equation by T, we get, $\sum x.p.\mu$ / $\sum x.p$ = $\sum$x * (p - ac) / T. Now LHS ($\sum x.p.\mu$ / $\sum x.p$) is nothing but the weighed average of all the micro degrees of monopoly (μ) and thus gives us the macro degree of monopoly (μ^o). Thus we can say μ^o = $\sum$x * (p - ac) / T i.e. macro degree of monopoly is the gross profit (or capitalist income) in the economy divided by the total turnover in the economy. Thus it follows from the above that the relative share of profits in the economy is approximately equal to the average degree of monopoly in the economy. From the above equation, it also follows that given a cost of raw materials, if the degree of monopoly increases in the economy, the share of profits in aggregate output will increase @ the cost of the share of labor.
4. Now if the total national income is given by NI and the total wage bill in the economy is given by W, then NI - W gives us the total profit (or the capitalist income) in the economy. But the total profit in the economy = $\sum$x * (p - ac). Thus we can write, μ^o = (NI - W) / T and if we multiply both sides by T/W we get $\mu^o.(T/W)$ = (NI - W) / W. A little algebra and we get the share of wages in national income (W / NI) = 1 / (1 + μ^o * T/W). Thus it is clear that if the monopoly power of firms in the economy increases, the share of wages in national income falls. This is not only because of a rise in μ^o but also because T/W will increase in such a case. On the other hand if say only the prices of raw materials increases (wages and monopoly power remain constant), then also T/W will increase and the share of wages in national income will fall. Note that in case of vertically integrated industries, share of raw materials in ac is zero.

Kalecki and Constant Share of Wages in the Economy

1. As can be seen Ricardian theory predicted that as an economy develops the share of wages in the national income increases and that of profits falls. But empirical data suggested that the share of wages remained constant until the WW2. Kalecki explained it by arguing that while in isolation development in the economy would have put pressure on the natural resources and increased their price (and thus reduced the share of wages), in reality this pressure on natural resources could never materialize because of colonial expansion. The cheap raw materials from colonies ensured that their price didn't fall and hence the share of wages remained constant (thus it can be said that the labor in the developed countries also benefited from colonialism). Thus the cheap supply of raw materials was sufficient to counter the increasing monopoly power of the firms in developed countries.
2. Empirical observations also suggest that even during a business cycle the share of wages remains constant. He argues that in recessions, cartels are created to protect profits and also there is a reluctance on the part of the firm to reduce prices (as others will also do so and a price competition will ensue). But this increased degree of monopoly is offset by a fall in the prices of raw materials. In boom conditions, the reverse happens.

Kalecki on Price Determination

1. Kalecki believed prices of raw materials are demand driven. But that of manufactured goods are cost driven. Lets say the only factors which affect firm's price are firm's own cost and industry market price. So the firm tries to make sure its price is not too high relative to the industry market price as well as this industry market price is sufficient to cover its costs plus some profits. So p = m.ac + nß where p average unit price charged by the firm, ac

= its average unit cost, ß is the industry weighted average price. If we sum up over all firms of the industry, ß = avg (k * ac) where k = degree of monopoly = m / (1 - n).
2. He argued that firms don't have complete information to follow marginal economics. They use what they have and what they have is knowledge of their average cost, industry price and how would a change in their price affect average industry price. So his economics is not based on maximization of an objective function.

Classical Economics vs Kalecki

1. Classical economics argues that if wages fall, π rise and hence the output. This is true for a firm but can it be true for the entire economy? Kalecki rejected the view that it would be true @ macro level as well.
2. He assumed that capitalists' real expenditure on investment and consumption are constant in the short run. Further the average unit costs are also assumed to be constant in short run. Now if money wages decrease (say because of higher unemployment), 2 things can happen. One could be that prices are flexible and they too decline in same proportion to wages. Thus real wages and real π both remain unchanged (real wages = money wages / prices and real π = capitalist' real expenditure on investment and consumption which is assumed to be constant). Second possibility is that decrease in wages is not transferred completely to the prices because of monopoly power of the firms. (This is because ΔMR = Δwages but ΔP < ΔMR due to slope differences.) Fall in wages leads to rise in μ^o and T/W in Kalecki's model, so share of wages falls.
3. In the second case, real wages have declined. So purchasing power of workers and hence the demand for wage goods also declines. Fall in demand in wage goods sector leads to a further reduction in employment (and not a rise in employment as predicted by classical economics).

Kalecki's Critique

1. Jan Pen criticizes Kalecki to focus excessively on the monopoly element. He argues that at macro level, aggregating the individual monopoly power may give us wrong interpretations. Suppose in an industry a firm is efficient and has a lower cost curve than its peers. Kalecki will treat the difference between its price and average cost as solely due to monopoly even though it is due to efficiency (weak argument?).
2. Kalecki also ignores the monopoly power exercised by the unions which tend to reduce the monopoly power of the firms (again a weak criticism?). By collective bargaining, unions may succeed in increasing their wages and hence final prices.
3. Kalecki also overestimates the probability of formation of cartels. In real life cartels are seldom formed and oligopolies show fierce competition.
4. Another criticism by Kaldor is that the measure of monopoly power assumed by Kalecki implies an inverse relation of the monopoly power and hence the price set with the price elasticity of demand i.e. an assumption that the firms are setting their prices based on the price elasticity of their demand curves. But in real world firms don't use price elasticity of demand to set price and rely on their own cost and industry prices.

Q. Elucidate how does Kalecki's theory of distribution share the value of output between labor and capital. (2011, I, 20)

Theory of Markets

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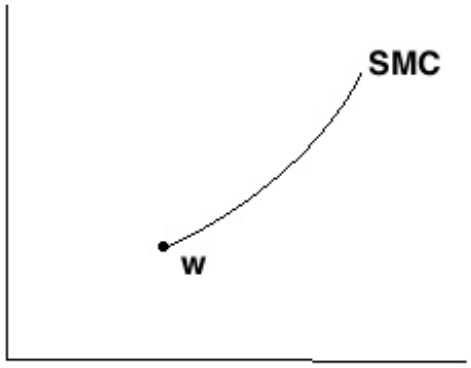
Perfect Competition vs Monopoly

Comparison	Parameter	Perfect Competition	Monopoly
1. Long Run	Output	Higher because full capacity utilization and price is low.	Lower because he earns supernormal profits.
	Price	Lower because production is at min(LAC) and he earns only normal profits.	Higher because he earns supernormal profit.
	Profit	Only normal profits.	Abnormal profits in LR possible.
	Capacity Utilization	Full capacity utilized.	He may have excess capacity, use full capacity or over-produce depending upon the market demand.

2. Shift in Market Demand		In SR, output and price will be higher. In LR,output will be higher but price may be same (constant costs industry), higher (increasing cost industry) or lower (decreasing cost industry).	There is no distinction between SR and LR. Output will be higher but the price may be higher or same depending upon the extent of shift and price elasticity of demand.
3. Shift in costs	Fixed costs	No impact in SR. In LR, SS curve shifts left as firms exit (being unable to recover normal profits).	No impact in SR. In LR, no impact if monopolist continues to earn supernormal profit. If can't earn even that, he closes down.
	Variable Costs	It pushes MC higher, hence SS left. Thus price increases, output decreases.	Pushes MC higher, price increases, output decreases. But the change in price and output is < perfect competition.
4. Imposition of tax	Lump sum tax	Same as ΔFC.	Same as ΔFC.
	Profits tax	Same as ΔFC.	Same as ΔFC.
	Specific sales tax	Same as ΔMC. The degree to which tax can be passed on to consumers depends on elasticity of supply curve given market demand.	Even if MC is perfectly elastic, monopolist will have to bear the partial burden of the Δtax.

Perfect Competition

Supply Curve



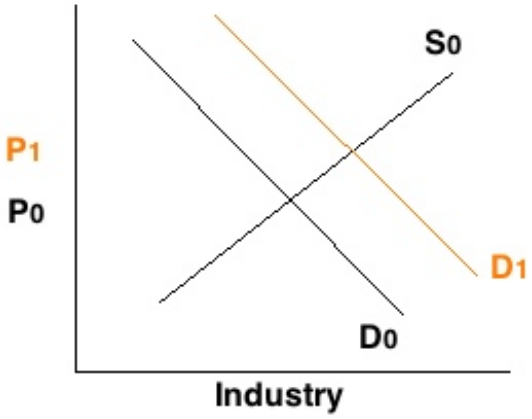
1. Above is the short run supply curve in a perfect competition. w is the shutdown point so the supply curve starts from here.

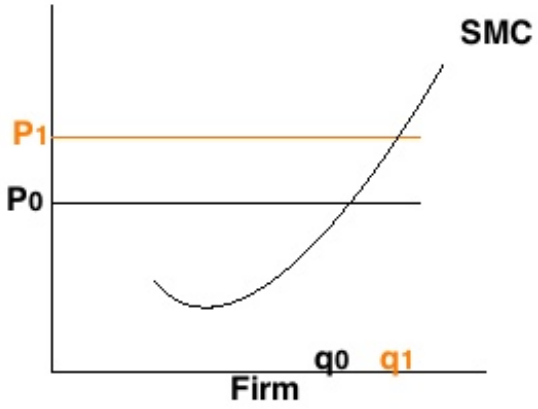
Firm's Long Run Equilibrium

1. Firms produce at the minima of LAC which is the price as well. All firms in the industry have the same minima of LAC. But this doesn't mean they have the same size or efficiency. They can employ different technologies or different factors of production but the more productive the hired factors are, the more they have to be paid. Thus the firms which are more efficient i.e. use less resources to achieve same output have to pay out higher factor costs and hence their LAC is higher as well. So in the industry LAC is same for all firms.

Shift in market demand

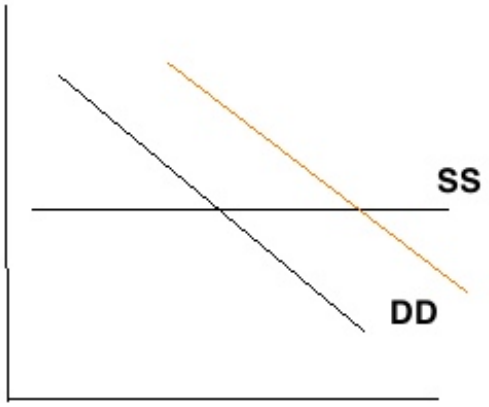
Short Run





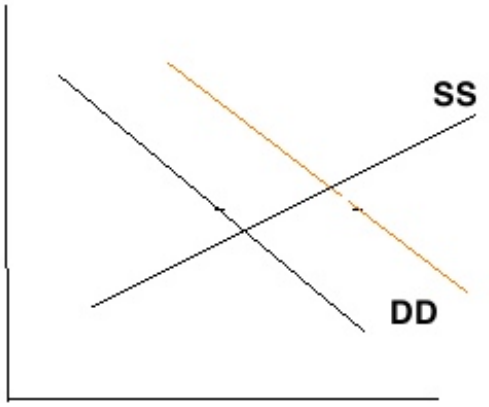
1. As the demand shifts from D_0 to D_1, a movement occurs along the industry supply curve (S_0). Thus the price rises from P_0 to P_1. For an individual firm, the demand curve goes up, it overworks its resources, SMC increases and the output increases as well (from q_0 to q_1). Firms earn supernormal profits at this stage.

Long Run
(a) Constant Cost Industry



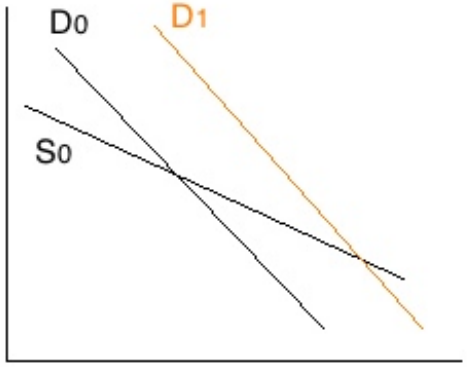
1. In such a case we assume that when there is an increased demand for the factors of production, their prices don't go up. So new firms which enter the industry due to the existence of supernormal profits and the old ones which expand their capacity can pay the same factor prices for the additional hired factors.
2. The LAC curve remains unchanged, firms continue to operate at the initial LAC minima points and the supply curve of the industry is flat. The prices come back to original level.

(b) Increasing Cost Industry



1. Here we assume that as the demand for the factors of production increases, their prices also increase. This would mean that for the existing firms, their LACs would shift up and the new firms too would have higher LACs. But the market price has also gone up which sustains the new higher LAC.
2. Supply curve of the industry is upward sloping. The new equilibrium prices are higher.

(c) Decreasing Cost Industry

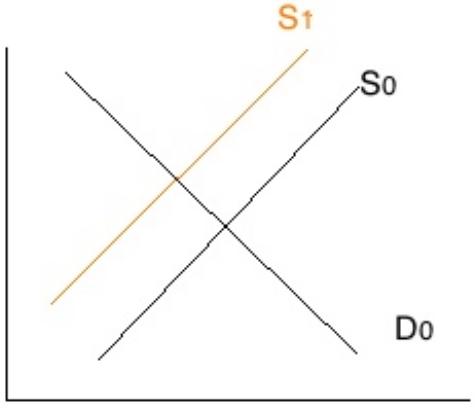


1. Here we assume that as the demand for factors increases, the suppliers of factors innovate and the new unit prices are lower. Thus there is a downward shift in the LACs of the firms and hence the supply curve becomes downward sloping and the new equilibrium price is lower.

Increase in Fixed Costs / Imposition of Lump Sum Tax / Imposition of Income Tax (% of net profits)
Short Run

1. No impact since the SMC remains unchanged. Just that the firms now earn supernormal losses.

Long Run



1. As loss making firms exit, the normal profit situation is restored. This is achieved as due to the exit of firms, the supply curve of the industry shifts to left, there is an increase in the prices due to short supply.

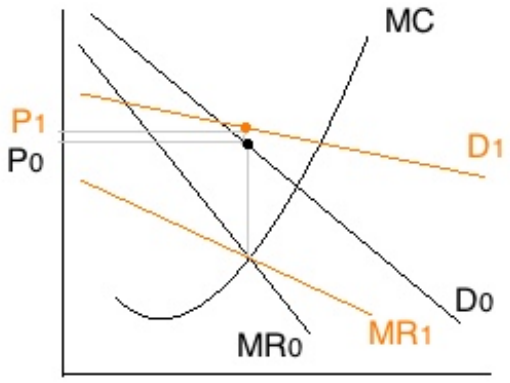
Increase in Variable Costs / Imposition of Sales Tax

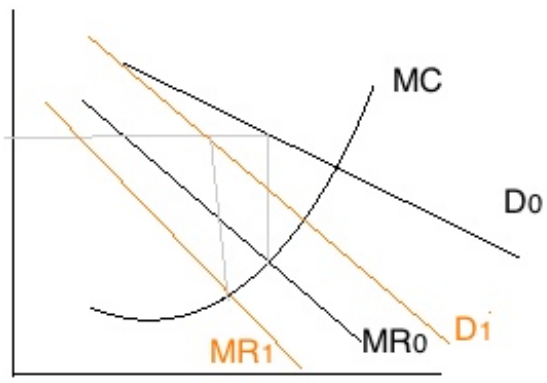
1. Both in short run as well as long run, the marginal cost curve shifts left and there is a reduction in output by each firm. As a result of reduction in output, the industry supply curve shifts left and the price increases and a new price is set at equilibrium.

Monopoly
Q. A supply curve is not used to determine the equilibrium price and quantity in a market under monopoly because

(a) a supply curve derived by using relevant cost curves in a market under monopoly may give more than one price for one

quantity and also more than one quantity for the same price (2010, I, 10)

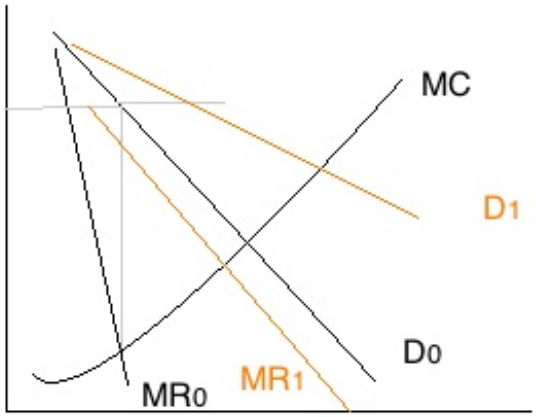




(b) for determining profit maximizing price and quantity of the monopolist, supply curve is not necessary. (2010, I, 10). Explain above using graphical illustrations.

1. He only needs to equate MC with MR.

Shift in Market Demand



1. There is no distinction between SR and LR. Output will be higher but the price may be higher or same depending upon the extent of shift and price elasticity of demand. If it is not a parallel shift then as we can see in the above diagram, the price may remain changed even though the quantity produced is higher.

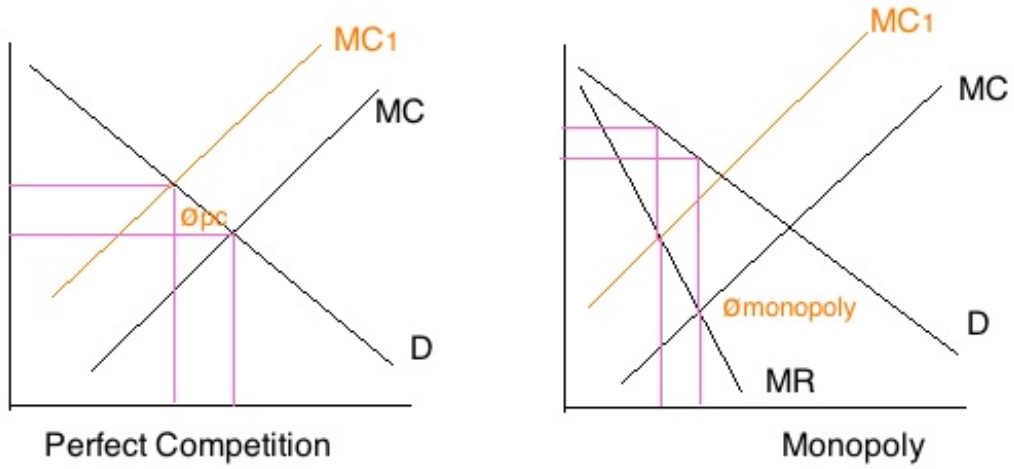
Increase in Fixed Costs/ Imposition of Lump Sum Tax / Imposition of Income Tax (% of net profits)
Short Run

1. There is no change in the MC curve. So no change in either price or output. But the profit of the monopolist will be lower.

Long Run

1. In the long run there is no change in the MC curve as well. But a monopolist will never earn losses. So if the fall in supernormal profits is so much that he can't even earn a normal profit, he will shut down and quit.

Increase in Variable Costs / Imposition of a Sales Tax



1. There is no distinction between short run and long run. In both cases, prices would rise and quantity produced will be less. However, a monopolist can not pass on the entire increase in cost (or tax) to the consumers. In fact his ability to pass on the increased cost (or tax) is generally less than that in perfect competition. Even the change in quantity is less than that in perfect competition.
2. This is because in a monopoly, equilibrium is where MC intersects MR. Because MR curve is steeper than the demand curve (D). Thus given same unit sales tax, the change in quantity (Δq) will be $\Delta tax \cdot \cot \phi$. Since $\phi_{monopoly} > \phi_{perfect\ competition}$, so $\Delta q_{monopoly} < \Delta q_{perfect\ competition}$. And because $\Delta q_{monopoly} < \Delta q_{perfect\ competition}$, on the same demand curve, $\Delta p_{monopoly} < \Delta p_{perfect\ competition}$.

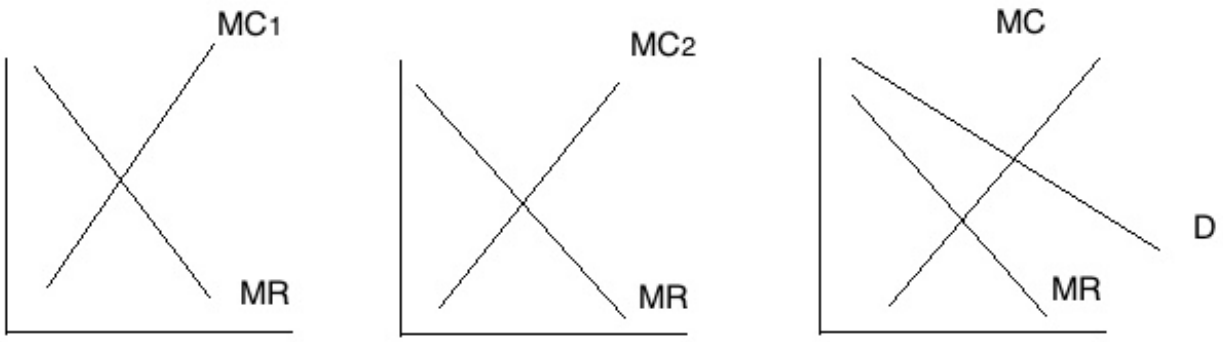
Multiplant Monopolist

Issues

1. How much to produce in total and at what price to maximize overall profit?
2. How to allocate the total produce among various plants?

π maximization rule

1. He equates the marginal cost in each plant with the marginal revenue.



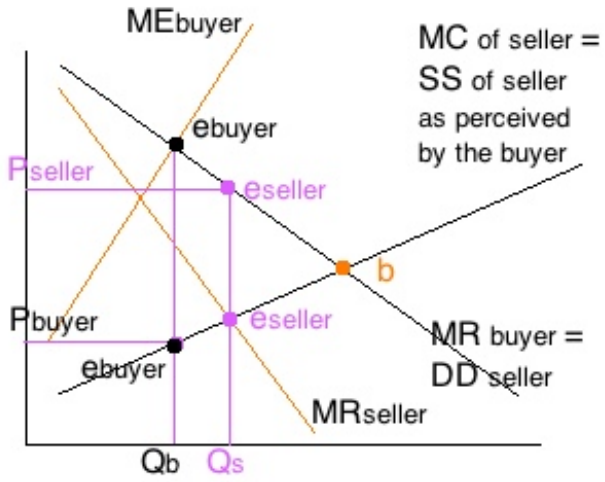
Proof

1. His aim is to maximize his overall profit. His overall profit = total revenues (TR) - total costs (TC). TR = p.q where $q = q_1 + q_2$ and $TC = TC_1 + TC_2$. Differentiating the total revenue function and solving for maxima condition we get, $\partial(TR)/\partial(q_1) - \partial(TC_1)/\partial(q_1) - \partial(TC_2)/\partial(q_1) = 0$ and $\partial(TR)/\partial(q_2) - \partial(TC_1)/\partial(q_2) - \partial(TC_2)/\partial(q_2) = 0$. Now $\partial(TR)/\partial(q_1) = \partial(TR)/\partial(q_2) = MR$ (because the product is homogenous). And $\partial(TC_1)/\partial(q_2) = 0$ and $\partial(TC_2)/\partial(q_1) = 0$ and $\partial(TC_1)/\partial(q_1) = MC_1$ and $\partial(TC_2)/\partial(q_2) = MC_2$.
2. Thus we can write the π max conditions above as: $MR = MC_1$ and $MR = MC_2$. Intuitively, if the production costs in 2 plants are independent of each other and if one of the plants (say plant 1) is operating below $MR = MC_1$ condition, then it will be profitable for the monopolist to produce in this plant.

Measurement of Monopoly Power

1. Hirschman-Herfindahl index (H): Let the market share of i^{th} firm in an industry be S_i. Then the index is given by ($H = \sum S_i^2$).
2. Lerner's index (L): L = It measures monopoly as the excess of price of a commodity over its marginal cost of production. Thus L = (P - MC) / P. It can also be return as $1/\eta_d$ because MR = P.(1 - $1/\eta_d$) and MC = MR.
3. Lerner's domestic monopoly index (L_d): $L_d = (P_{domestic} - P_{international}) / P_{domestic}$.

Bilateral Monopoly



1. The MR curve of the buyer will be the derived demand curve of the seller. Also the MC curve of the seller will be the supply curve of the seller as perceived by the buyer. Since it is upward sloping, so the marginal expense curve or the MC curve of the buyer will have even steeper slope. Thus the buyer will equate his MR and MC curves i.e. his equilibrium will be @ e_{buyer} where ME_{buyer} and MR_{buyer} intersect. He would make a projection on the MC curve of the seller (which is the seller's supply curve according to him) and pay P_{buyer} and buy Q_b.
2. On the other hand the seller takes MR curve of the buyer as his demand curve and draws his own MR curve. This he equates with his MC and the equilibrium is at e_{seller} where he would like to supply Q_s @ P_{seller} price.
3. If the buyer makes a vertical backward integration i.e. buys out the seller, the seller's MC cost curve will become his MC curve and he will be able to produce more @ b.

Monopolistic Competition

Chamberlin's Model

Assumptions

1. Product differentiation & non price competition: The products of sellers are differentiated yet close substitutes. The product differentiation gives downward sloping curves. Note that the product differentiation may be a result of the characteristic of the product itself or it may be a result of differentiation in the selling conditions. Firms incur a considerable expenditure on advertisements and other selling costs to promote product differentiation. Such expenditure may change the demand curve for its product and it also changes the cost curve. Like any other cost, a seller will spend only enough to maximize his profit.
2. Myopia: The long run consists of identical short runs and decisions in one period don't impact decisions in others. This leads to myopic vision of firms.
3. Heroic assumption (uniformity assumption): A difficulty in describing the group equilibrium is the difference in the cost and revenue conditions which exist among the members of the group. As a result of these differences there will be differences in prices (and outputs and profits) of different firms in the industry. So in order to define a 'group' equilibrium, Chamberlin assumes that both the demand curves and the cost curves for all differentiated products are uniform throughout the group. That this assumption is not in conflict with the concept of product differentiation can be explained by an interpretation that while each product may be differentiated, the consumer tastes for each are the same and the differences between the products are not enough so as to generate a difference in costs.
4. Heroic assumption (symmetry assumption): Due to the presence of large number of firms, it is expected that the decisions of a firm on changing its strategy will have negligible effect on each of the other firms so as not to induce any reaction from them. Thus a firm can plan its strategy drawing a demand curve independent of the reactions of other firms. This can give us the firm's planned demand curve (dd curve). But while a firm plans its actions on dd

curve assuming other firms won't react to its decisions, in reality other firms may also change their strategies (either the same factors which induce this firm to change also induced others to change in order to maximize their own π or some other factors). The market share demand curve (DD) gives the actual demand curve of the firm after incorporating the effects of the changes made by the other firms.

Monopolistic Competition vs Oligopoly

1. In Monopolistic competition, a firm's actions (due to close substitutability of products) wean away consumers from other firms but the loss to each firm is so small that it doesn't notice and doesn't care to respond. In Oligopoly, however, firms respond.

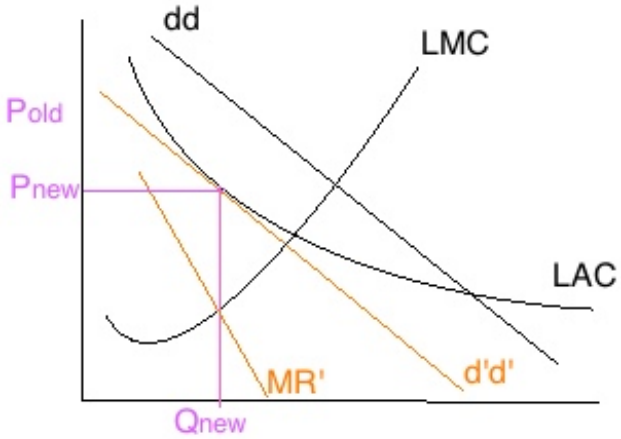
Product Differentiation & Demand Curve

1. Chamberlin suggested that demand curve is influenced by not just price and quantity, but also product itself and selling activities of the firm. Thus if there is a change in selling strategy of the firm, or consumer tastes, or price, selling strategies, products of other firms, then the demand curve of the firm may shift.
2. The impact of product differentiation is that the producer gets some monopoly power. However such a power is limited due to close substitutability.

Industry & Product Group

1. A product group includes products which are close economic (products of similar price and which can cover same wants) and technical substitutes (products which can cover same wants). Thus they have high cross elasticities.
2. Due to differentiated products, there will be no unique price in the group. But there will be a cluster of prices. This cluster of prices tend to change as demand or costs change.

Long Run Firm and Group Equilibrium under Monopolistic Competition



1. In the short run, each firm behaves like a monopolist in its own planned demand curve (dd). But it can't stay there forever because due to supernormal π, new firms will enter. These new firms cannot produce exactly the same product as the incumbent firm (product differentiation assumption) but can produce a close substitute and as a result the firm's planned demand curve (dd) will shift down (to d'd') until only normal profits are left. @ the final equilibrium, the firm's new planned demand curve (d'd') will be a tangent to the LAC curve and the firm will operate @ less than the full capacity. The tangency to LAC curve ensures no supernormal profits are left.
2. Note that even though in LR, the firm in monopolistic competition can make only normal profits, its price is higher and output lower when compared to PC. Thus it can be seen that existence of supernormal profits is not an indicator of monopoly power (as here firms have monopoly power but no supernormal profits).
3. Another important implication is that as more firms enter, in the LR the planned demand curve of the firm (dd) becomes flatter and flatter as the cross elasticity of substitutes increases. This is because if a firm is earning supernormal profit, the new firm will try to produce a closer substitute to its product i.e. the new firms entering the group will occupy positions in between the old firms. The overall effect thus will be a flattening of the dd curve.

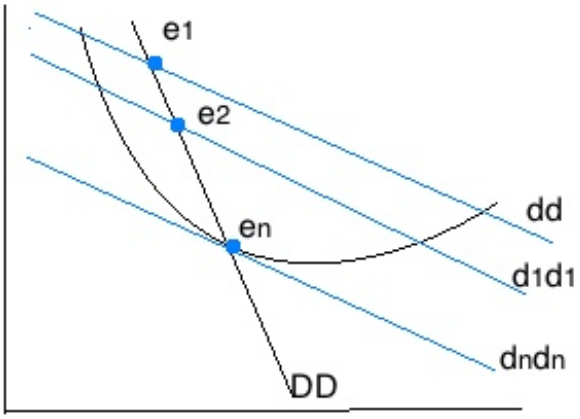
Excess Capacity / Economic Efficiency under Monopolistic Competition

1. In the model, firms never reach the min(LAC). The amount by which the actual LR output falls short of the socially ideal output (@ min (LAC)) is thus called the excess capacity. One reason for this is obviously the downward sloping

dd curve. Another reason (as put forward by Chamberlin) is the entry of large number of firms. The entire market gets split among these great number of firms and excess capacity results. In fact the number of firms in monopolistic competition will be larger than even under PC. This is because in monopolistic market, each firm produces less than the maximum capacity and thus more number of firms are needed to meet the market demand. It is also argued that in monopolistic competition firms spend on advertising and other selling costs which is a waste from social point of view.

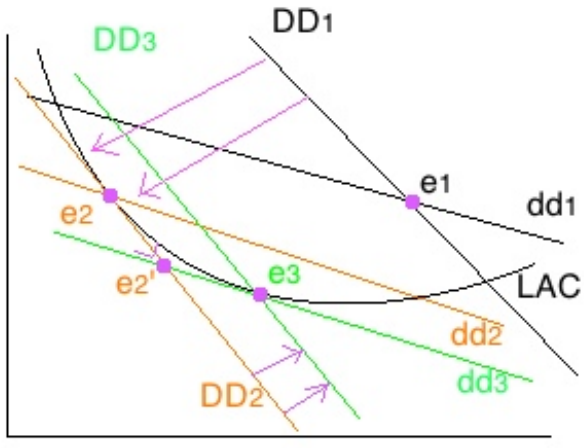
2. But Chamberlin argues that this is the social cost of providing differentiated goods to the consumer and adding to her choice basket. Hence this is not the real excess capacity. Real excess capacity will be if in the 3rd model (below), the firms abandon the price competition and instead begin to compete on non-price terms and more differentiation. In the absence of price competition, the firm's perceived demand curve (dd) becomes irrelevant. Hence in the absence of dd curve, @ e_2, the firm will not slide down the DD curve and e_2 will represent the equilibrium point. Thus DD curve is tangent to LAC in this case and not dd curve. The gap between these 2 points (e_2 and e_3) is Chamberlin's excess capacity. Thus according to Chamberlin, so long as there is price competition in monopolistic market, there can be no excess capacity.
3. Kaldor argues that the presence of institutional monopolies may break the excess capacity theory of Chamberlin. Institutional monopoly may be a cost advantage or additional loyalty of customers or a patent etc. i.e. something which can give a supernormal profit which can't be competed away. Thus it can work to reduce excess capacity. At the same time, it may also increase the degree of imperfectness and thus make the demand curve even steeper and generate more excess capacity. Thus its effect is ambiguous.
4. Kaldor also pointed out that by economies of scope (i.e. producing different products) one can reduce excess capacity. But switching production also has some costs which may prevent this.
5. Second way by which monopolistic competition doesn't lead to efficient market is because P = MC condition is not met. This is called the allocative inefficiency and causes more dead weight loss to the society.
6. Kaldor also pointed out that as a result of the new entry, the demand of the firm's output is reduced and hence it moves up the cost structure as well. This may actually increase the price of the product. The profits lost are not a gain to the consumer but go as a welfare loss to the society as the production becomes more inefficient.

Model 2 Price Competition among the incumbents allowed but entry not allowed



1. Let initially the firm be @ e1, but not @ equilibrium (i.e. it sells less than the profit maximization quantity). So to reach π max point, it thinks if it reduces the price (from P_1 to P_2), it will move to a higher quantity on the original dd curve. So it reduces prices.
2. But in reality, all the firms are thinking the same. So the movement doesn't happen on the dd curve but on the DD curve and the firm reaches e_2. In the next period (due to myopia assumption), firm hopes to cut its price and move on d_1d_1 curve but everyone cuts their price and actual movement is again on DD curve. This cycle goes on until the curve d_nd_n becomes a tangent to the LAC curve. At this point the firm has no incentive to cut its price further.

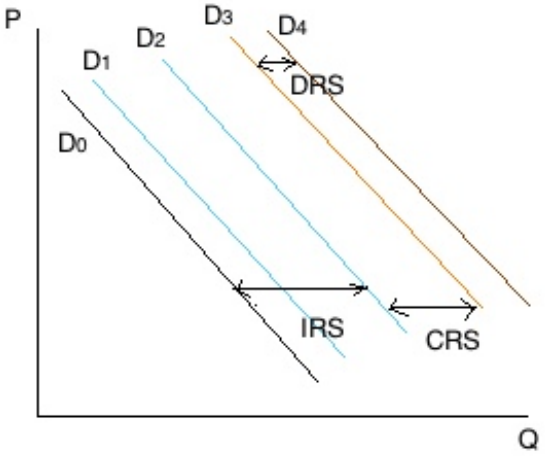
Model 3 Price Competition among the incumbents as well as free entry allowed



1. A movement along the DD curve indicates a price competition among the incumbent firms whereas a shift in DD curve indicates free entry / exit. Initially let the firm is @ e_1.
2. But it is earning supernormal profits. So new entrants will come and DD curve will shift to left (from DD_1 to DD_2) and the new equilibrium will be @ e_2. At this point the DD curve is a tangent to the LAC curve. So all supernormal profits vanish and we would expect this to be the equilibrium. But it is not.
3. The dd curve of the firm is not a tangent to the LAC curve but lies above it. So the firm would think if it reduces the price further, it would move on the dd_2 curve and earn supernormal profits. So it reduces the prices. But all firms think the same and all of them reduce the prices. So instead of moving on dd_2 curve the movement is on DD_2 curve. The firm moves to e_2' but at this point there is a loss. So firms would begin to exit and the DD curve will shift from DD_2 to DD_3 such that the new dd_3 curve is a tangent to the LAC curve. This is the point of equilibrium.

Selling Costs under Chamberlin

Q. What are the ways in which a perfectly competitive market may become imperfect? Examine whether an advertisement helps an imperfectly competitive market become a perfectly competitive one. (2010, I, 20)



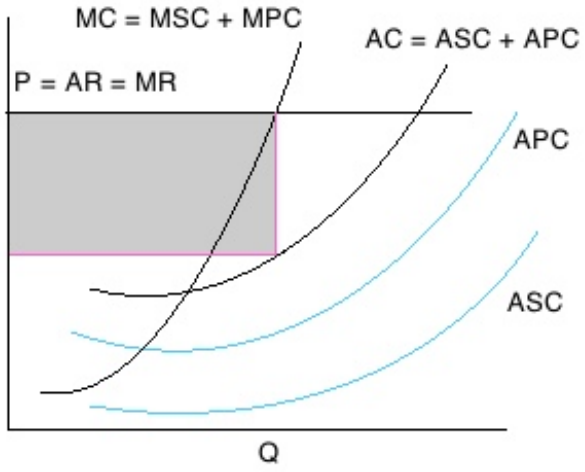
1. Selling costs are incurred to modify the demand curve of the product. However these costs are subject to variable returns i.e. increasing outlays of selling and advertising costs initially lead to increasing returns, then constant returns and finally diminishing returns in terms of its effect on the demand for the product. This can be seen in the above figure where the successive demand curve for the product are shown after unit increases in the selling costs. An increasing distance between successive curves shows IRS and so on. Thus the average selling cost curve is U shaped.
2. The eventual diminishing returns set in because potential buyers differ in their tastes, susceptibility to advertisements etc. Those which could be swayed easily have already been swayed and increasing efforts need to be made to sway the smaller number of more difficult to sway potential buyers. Moreover the existing consumers may not increase their demand any further as advertisements are increased.

Optimal Level of Advertising

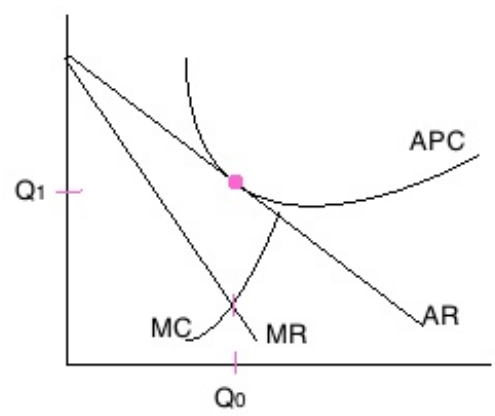
1. A firm will go in increasing its advertising expenditure if the marginal contribution to profit (MCP = MR - MC) from

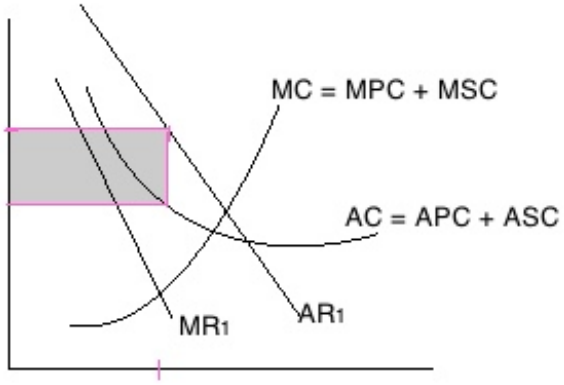
an additional unit of output is greater than the marginal increase in the advertising cost (MCA = (ΔA/ΔQ) where ΔA is the change in advertising cost) required to sell it. Thus @ optimum level of advertising expenditure, MCP = MCA.

2. Thus we have MR - MC = MCA or ∂TR/∂Q = ∂TC/∂Q + ∂A/∂Q is the advertising maximization condition. If we include the marginal advertising cost in MC, then we get the familiar MC = MR condition.

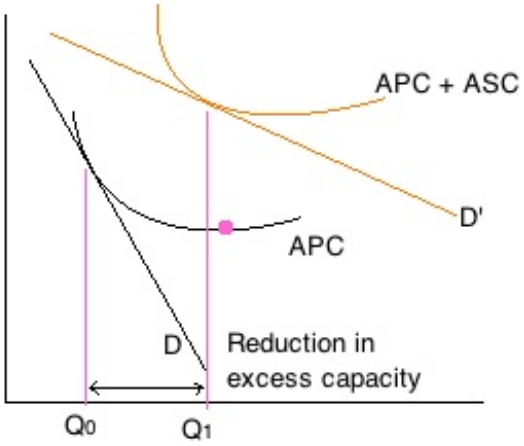


1. In the above case when the price of the product and production cost is constant, and only the advertising expenditure is allowed to change, we can see from above that the π-max point will be when MC (which includes both the production and the selling marginal costs) = P. The profit earned will be as shown in the shaded region.





1. In the above case (when price is allowed to vary i.e. demand curve is downward sloping) we follow a similar procedure i.e. to add the production and selling costs vertically to arrive at the new marginal and average costs and equating the new MC with the MR. It may be noted that the effect of advertising would be to push the demand curve outwards and to make it steeper. In the above figure we can also see how advertising has enabled the firm to earn profits. Advertising will also take firm closer to its capacity output and thus will reduce excess capacity and hence closer to perfect competition.



1. In the LR when entry of new firms happens (as a result of the supernormal profits now earned with the help of advertising), the incumbent firms will find that to keep selling the same output they will have to increase their selling costs. Also because the new products will be close substitutes and will tend to copy the selling strategy of the successful incumbent, the demand curve for the firm's product will also shift inwards. Thus the increase in selling costs and the inward shift in demand curve will tend to eliminate the profits. However it should also be noted that an increased advertising by all firms will also expand the market demand curve for the entire industry (to some extent). The net result may be expansion in a firm's output and reduction of excess capacity and thus taking the market close to perfect competition. However consumers don't benefit from this reduction of excess capacity (as Q increases, APC falls) as the fall in APC may more than be offset by the rise in ASC. The actual price of the product may in fact rise.
2. The actual impact on price will depend on whether the rise in demand and the consequent fall in APC is more than enough to offset the rise in ASC or not. If not, then prices will rise. Similarly analyze output.
3. Advertising also promotes perfect competition by disseminating more information to the consumers. It reduces various search costs.

Factors which can prevent a Price Competition (as per Chamberlin)

1. Firms may follow a policy of 'live and let live'. They may set prices with reference to their cost and not demand conditions.
2. They may enter into formal or informal agreements. It can also be a result of professional ethics (!). Another reason for such understandings could be a retaliation by other firms.
3. Instead of open price cuts, firms may make disguised cuts like giving certain freebies etc. or increase their selling costs.

Criticism

1. Uniformity assumption: Main criticism comes from Stigler. He argues that by taking the uniformity assumption, the products no longer remain differentiated but become homogenous. How is it possible for different products to have same price, same demand and same costs. Also by the assumptions of identical cost, price and demand curve, Chamberlin makes an implicit assumption that the consumers have perfect knowledge about the product. But if they have perfect knowledge and prices, cost and demand conditions are identical, why shouldn't the demand curves be horizontal?
2. Symmetry assumption: By making this assumption, Chamberlin was able to make the demand curve for a firm determinate. But assumption of close substitutability and independent actions by competitors run contradictory. In the group, not all products will be equidistant from each other. So the impact of the firm's action will be more on the near substitutes. Irrespective of the number of firms in the group, it can't be assumed that the effect of variation in price by a firm will spread itself evenly across the group.
3. Concept of 'group': In Chamberlin's theory, the 'group' plays an important role in distinguishing it from a simple monopoly theory. This is because its only because of the group that a firm also has to reach group equilibrium as against only the firm equilibrium in a monopoly. But Chamberlin's description implies a group is a collection of products where the cross elasticities are greater than a given threshold. Thus it is very vaguely defined and also the assumptions of uniformity and symmetry run in contrast with each other (uniformity tends to bring products closer, symmetry tends to push them apart).
4. Assumption of myopic behavior of firms is untenable.

5. It can also be seen that Chamberlin doesn't give any importance to MR and MC curve and instead assumes implicitly that where AR = AC, MR will also be equal to MC.
6. Entry of new firms: Product differentiation is contradictory with free entry since new firms will have to spend heavily on selling activities to create product differentiation. Also as the number of firms rises, demand curve (dd) will get flatter and eventually it will become so elastic so as to be horizontal like under PC. Kaldor also argues that a rational producer will not earn supernormal profits in the first stage itself. This is because he knows that doing so will invite new entry which will put him in a permanently worse off position. So the equilibrium may not be at the point of tangency.
7. Economies of scale: Kaldor tells us that an important reason for the existence of monopolistic competition is economies of scale. In the case when factors of production are perfectly divisible, we will only have CRS. In a CRS and a downward sloping demand curve situation such that the firm is making supernormal profits, any number of entry of new firms will not wipe out the supernormal profits. As new firms come, dd curve shifts left and becomes more elastic. As a result the demand for a firm's product decreases. Now so long as the dd curve is downward sloping (however little the slope be), since costs are constant it will always be possible for the firm to reduce the quantity of output without an increase in AC and thus supernormal profits will remain. New firms will keep on entering until the dd curve becomes flat and in that case the theory will reduce to that of a PC. So the only way for the maintenance of monopolistic competition (and the source) is IRS.
8. Although Chamberlin relaxes heroic assumptions in his later, he doesn't provide any determinate solution in that case. By lifting the symmetry assumption he merely says that the problem will reduce to that of an oligopoly and the only assertion he makes is that the prices will be higher than under PC. By lifting the uniformity assumption, he merely says that the tangency of the dd curve to the LAC can no longer be assured and monopoly profits may be earned by all the firms even in LR. But no determinate results are reached.

Downward sloping demand curve

1. Andrews criticizes it because he thinks such a curve is not possible if firm is selling to intermediaries who are π maximizers themselves. So demand curve should be horizontal. Even if the firm is selling directly to end consumers, in long run, demand curve has to be flat because they would have tried out cheaper substitutes and preferred them if they are rational.
2. But his argument assumes a particular form of rationality. A consumer is rational if he maximizes his utility and not by buying cheaper products.

Indeterminacy in Chamberlin's model

1. It is argued that factors like selling costs figure out both in the demand side and supply side in Chamberlin's model. Thus the model is indeterminate.
2. But a model is determinate so long as there are some factors not influencing each other.

Positives of Chamberlin

1. He introduced the concept of selling strategies and product differentiation - something observed in real world.
2. The concept of market share demand curve and planned demand curve led to the 'kink' demand curve.
3. It is a solution - may not be best, but is a solution.

Non-Collusive Oligopoly

1. There can be different approaches to study oligopoly. They can be - (a) ignoring the interdependence for instance Cournot and Bertrand. (b) predicting reaction patterns and including that in decision making for instance Stackelberg, Sweezy. (c) colluding to maximize joint profits for instance cartels, dominant firm leadership. (d) game theory approach where a firm doesn't 'guess' its rival's move but calculate the optimal move.

Q. Demand for light bulbs can be characterized by Q = 100 - P, where Q is millions of boxes of light sold and P is the price per box. There are 2 producers of lights having identical cost functions:
$C_i = 10Q_i + 0.5\ Q_i * Q_i\ (i = 1, 2)$
$Q = Q_1 + Q_2$

(a) Unable to recognize the potential for collusion, managers of the two firms act as short run perfect competitors. What are the equilibrium values of Q_1, Q_2 and P? What are each firm's profits? (2009, I, 15)

1. By differentiating the cost function, we get the marginal cost $MC_1 = 10 + Q_1$. Now in perfect competition, $P = MC_i$ for each firm and because both firms have identical cost functions, $MC_1 = MC_2$. Now $P = 100 - Q_1 - Q_2$. Since both firms

are identical, we can say $Q_1 = Q_2$ so $100 - 2Q_1 = 10 + Q_1$. Thus we get $Q_1 = Q_2 = 30$. P = 40. TC = 10 * 30 + 0.5 * 900 = 750. TR = 30 * 40 = 1200. Thus each firm's profit = 450.

(b) Manager of each firm independently recognizes the oligopolistic nature of light bulbs industry and plays Cournot. What are the equilibrium values of Q_1, Q_2 and P? What are each firm's profits? (2009, I, 15)

1. $\pi_1 = TR_1 - TC_1$. $TR_1 = P \cdot Q_1$ and $TC_1 = 10Q_1 + 0.5 * Q_1^2$. Thus $\pi_1 = (100 - Q_1 - Q_2) .Q_1 - 10 * Q_1 - 0.5 * Q_1^2$. Maximizing condition will be ($MC_1 = MR_1$) $100 - Q_2 = 10 + 3 * Q_1$. Similarly for the other firm maximizing condition will be $100 - Q_1 = 10 + 3 * Q_2$. Thus $3 * Q_1 + Q_2 = 90$ and $Q_1 + 3 * Q_2 = 90$. Because each firm takes into account the production of the other firm, so in steady state, we get, $Q_1 = Q_2 = 22.5$. P = 55. $\pi_1 = 761.875$.

(c) Suppose firm 1 guesses correctly that firm 2 has Cournot conjectural variation, so it plays Stackelberg. What are the equilibrium values of Q_1, Q_2 and P? What are each firm's profits? (2009, I, 15)

1. Reaction curve of firm 2 is $Q_2 = 30 - (Q_1/3)$. Substituting this in the profit equation of firm 1 we get, $\pi_1 = (100 - Q_1 - 30 + Q_1/3) .Q_1 - 10 * Q_1 - 0.5 * Q_1^2 = (70 - 0.67 * Q_1) .Q_1 - 10 * Q_1 - 0.5 * Q_1^2$ or $60 * Q_1 - 1.17 Q_1^2$. Differentiating and using maxima condition, we get $60 = 2.33 Q_1$ or $Q_1 = 25.71$. $Q_2 = 21.43$. P = 52.86. $\pi_1 = 771$.

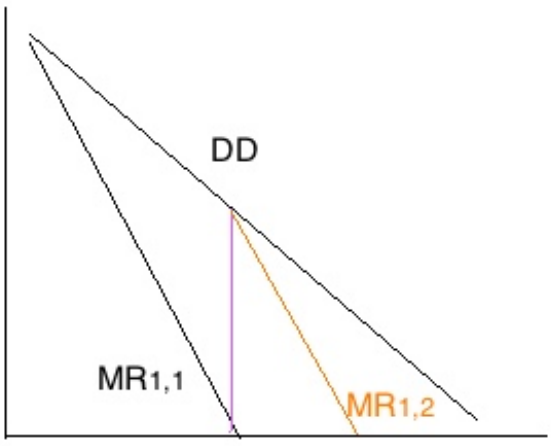
(d) If the managers of two firms collude, what are the equilibrium values of Q_1, Q_2 and P? What are each firm's profits? (2009, I, 15)

Cournot's Model

Assumptions

1. Naive Firms: Firms don't learn from past mistakes. Each period completely independent of others.
2. Let $MC_1 = MC_2 = 0$ (simplifying assumption).

Model



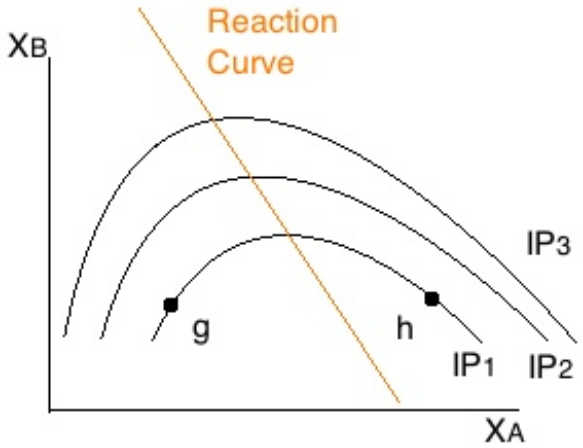
1. In round 1, lets assume firm 1 starts to produce first. It will take entire market to be its monopoly and take the market demand curve (DD) to be its firm demand curve. Thus it will produce (Q/2) on its own. The other firm will take the remaining market as its monopoly, draw its own MR curve ($MR_{1,2}$) and produces Q/4.
2. In round 2, firm 1 realizes that Q/4 is produced by firm 2. So it will take Q - Q4 = 3Q/4 to be its monopoly market and produce half of that. Firm 2 will take the balance (1 - 3Q/8) to be its monopoly market and produce half. This goes on and the steady state equilibrium is each firm will produce Q/3. In general, for n firms, each firm produces Q/(n + 1). But industry profits are not maximized at this level.
3. Let P = 30 - Q. $Q = Q_1 + Q_2$. $MC_1 = MC_2 = 0$. Each firm knows there is the other firm in the market as well. So it takes the other firm's behavior into account. For the firm 1, $TR_1 = P.Q_1 = 30Q_1 - Q_1^2 - Q_1 * Q_2$. $MR1 = \partial TR_1/\partial Q_1 = 30 - 2Q_1 - Q_2$. Now each firm is π maximizer. So MR1 = MC1. But $MC_1 = 0$. So $30 = 2Q_1 + Q_2$. Similarly solving for firm 2, we get $30 = 2Q_2 + Q_1$. The solution is $Q_1 = Q_2 = 10$, P = 10.

Criticism

1. Naive firms assumption is obviously unrealistic.

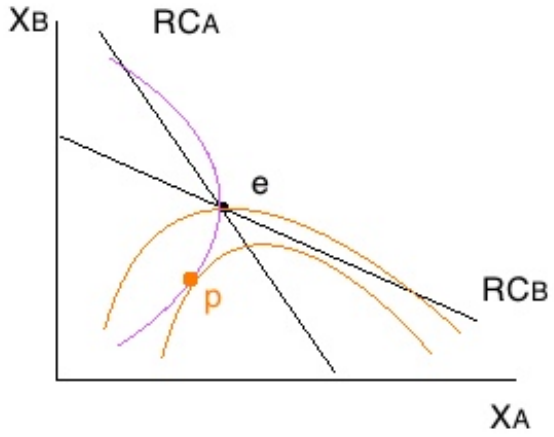
2. It is a closed model and new entry is not allowed.
3. It doesn't say how long the adjustment period will be.

Isoprofit lines and Reaction curves



1. Isoprofit lines: X axis shows the output of firm A and Y axis shows the output of firm B. Isoprofit lines are the locus of outputs of firm A for a given output of firm B which gives the same profit to firm A. It is clear that for a particular production from B, A will have 2 output choices which gives it same profits (higher output leads to fall in prices and hence lower per unit profits). Lets say B increases its production slightly. The isoprofit lines closer to the axis show higher profit and they are always concave to the axis.
2. Reaction curves: The locus of highest point on an isoprofit line or the point where the tangent is parallel to the corresponding axis is the reaction curve. This is because as B increases its output, there may be only 1 output choice left for A to keep its profit same. Reaction curves are always negatively sloped.
3. Lets assume for a given production by B, A can produce @ g or h to give same profit. If it produces @ h, and B increases its output slightly, then A will have to reduce its output. If A produces @ g and B increases its output, then A will have to increase his output. This can happen only till a point.

Model



1. Production on reaction curve: A firm will always produce on its reaction curve. This is because it wants to make the highest possible profit for any given production by the rival. We know that isoprofit lines closest to the axis gives the highest profit. So for any given production by B, A would like to chose an isoprofit line which just touches B i.e. for which B is the highest point. This is nothing but A's reaction curve so A will always produce on its reaction curve. Similar argument can be run for B.
2. Thus any equilibrium can be reached only where both reaction curves intersect i.e. point e. But @ e the industry profits are not maximized and pareto improvement is possible. Point p which is the point of tangency can be one pareto optimal point.

Numerical

1. Let P = 100 - 0.5 * Q. C1 = 5 * Q_1 and C_2 = 0.5 * Q_2^2.
2. Thus TR_1 = P. Q_1 = 100* Q_1 - 0.5 * Q_1^2 - 0.5 * Q_1.Q_2. Similarly TR_2 = P. Q_2 = 100* Q_2 - 0.5 * Q_2^2 - 0.5 * Q_1.Q_2. Thus MR_1 = 100 - Q_1 - 0.5 * Q_2 and MR_2 = 100 - Q_2 - 0.5 * Q_1. Similarly on the cost side, MC_1 = 5 and MC_2 = Q_2.
3. Equating MR1 with MC1 we get, 100 - Q_1 - 0.5 * Q_2 = 5 or Q_1 + 0.5 * Q_2 = 95. Similarly equating MR_2 with MC_2 we get 100 - Q_2 - 0.5 * Q_1 = Q_2 or 0.5 * Q_1 + 2 * Q_2 = 100. These are the reaction functions of A and B respectively and Cournot equilibrium is at their intersection. So solve both simultaneously.

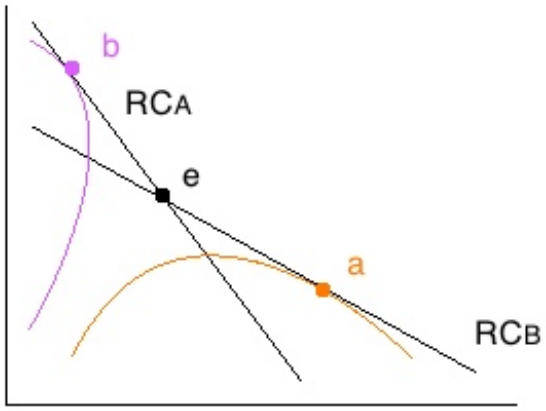
Q. With the help of suitable diagrams, elaborate Cournot model. What is the significance of reaction curves in this model? (2007, I, 20)

Stackelberg's Model

Assumptions

1. One duopolist is sufficiently sophisticated to recognize that his competitor acts on the Cournot assumption. This recognition allows the duopolist to recognize the reaction curve of its competitor, incorporate it in his own profit function and then proceed to maximize his profit like a monopolist.

Model



1. Let A be the sophisticated duopolist. It will realize that B will always produce on its reaction curve. So it will seek to maximize his own profit. Maximum profit will be on the isoprofit line which is tangent to the reaction curve of B. Let such a point of tangency be a. So a will be the point of equilibrium. A gains in this since by sophistication he has managed to move on a lower isoprofit line and B has lost. Note that the cournot equilibrium would be @ e. Similarly if B were the sophisticated duopolist, he would produce @ b and force A to produce @ B only.
2. Thus if only one firm is sophisticated, it becomes the market leader and gains. But the model fails to give any stable equilibrium when both firms are sophisticated (a case called Stackelberg's disequilibrium). If none of the firms are sophisticated, the model will reduce to the Cournot model.
3. Please note that point a is still not pareto optimal and a pareto optimal point can be reached only by colluding.

Numerical

1. Let P = 100 - 0.5 * Q. C1 = 5 * Q_1 and C_2 = 0.5 * Q_2^2.
2. Thus TR_1 = P. Q_1 = 100* Q_1 - 0.5 * Q_1^2 - 0.5 * Q_1.Q_2. Similarly TR_2 = P. Q_2 = 100* Q_2 - 0.5 * Q_2^2 - 0.5 * Q_1.Q_2. Thus MR_1 = 100 - Q_1 - 0.5 * Q_2 and MR_2 = 100 - Q_2 - 0.5 * Q_1. Similarly on the cost side, MC_1 = 5 and MC_2 = Q_2. Equating MR1 with MC1 we get, 100 - Q_1 - 0.5 * Q_2 = 5 or Q_1 + 0.5 * Q_2 = 95. Similarly equating MR_2 with MC_2 we get 100 - Q_2 - 0.5 * Q_1 = Q_2 or 0.5 * Q_1 + 2 * Q_2 = 100. These are the reaction functions.
3. Now firm A (the sophisticated firm) will substitute B's reaction function in its profit equation [100* Q_1 - 0.5 * Q_1^2 - 0.5 * Q_1.Q_2 - 5 * Q_1]. According to B's reaction function, Q_2 = 50 - 0.25 * Q_1. Thus π_1 = 95 * Q_1 - 0.5 * Q_1^2 - 0.5 * Q_1 * (50 - 0.25 * Q_1). Thus π1 = 70 Q_1 - 0.375 * Q_1^2. Maximizing this we get, 70 = 0.75 * Q_1 or Q_1 = 93.33.

Bertrand's Model

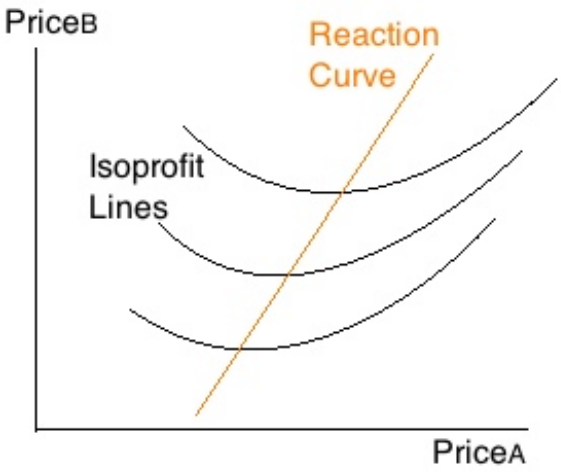
Assumptions

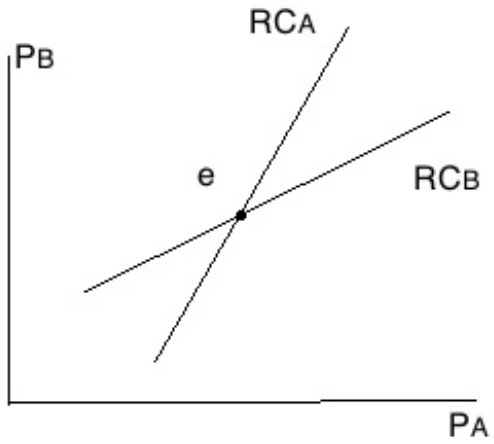
1. 2 π maximizing firms only and they face same demand and cost curves. Product is absolutely homogenous. Entry is restricted. MC = AC = constant.
2. Both firms have large number of small buyers.

3. There is no capacity constraint and any firm can meet the entire market demand at any price level.
4. No state interference and no externalities.
5. At the beginning of each period, each firm will assume that the other firm will keep its price same as that in last period.

Model

1. It is clear there will be a price war (since by undercutting the price of the rival under the assumption that it will not change its price) any firm can capture the whole market. The price war will continue until the price becomes equal to the unit cost of production below which no firm will have the incentive to cut.
2. If at such a situation a firm raises the price to the monopoly price level again, it will face the risk of losing its entire market share and selling zero. This is because the firms are assumed to have infinite capacity and the product is supposed to be homogenous. So it will not raise its prices and the Bertrand equilibrium is when no firm earns a supernormal profit where price = average cost and there is no incentive to either cut the price or raise it.



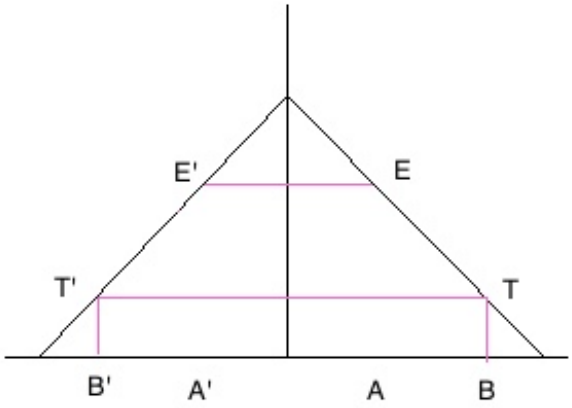


1. <u>Isoprofit lines and reaction curves:</u> They are drawn with prices on the axes instead of quantity as in Cournot model. So reaction curves are positively sloping. Further away the isoprofit line from the axis, higher the profit. The intersection of the 2 reaction curves gives us the Bertrand equilibrium.
2. They will adopt the competitive rule P = MC and find the industry equilibrium output Qc and will each produce 0.5 * Qc and thus leave half the market for the other firm.

Bertrand vs Cournot

1. Cournot assumes that each firm assumes the rival will keep his quantity same as in the previous period. Bertrand assumes that each firm assumes the rival will keep his price same as in the previous period.
2. Bertrand is more realistic since in real life firms tend to be more focused on prices. Cournot had assumed that firms will fix their output and sell it at whatever price it can. Bertrand assumes that firms will fix a price and then sell whatever they can.
3. In Bertrand it is not important that each firm must know the correct market demand curve or should have identical view of the market demand. It is enough if each firm thinks it can capture the whole market by undercutting its rival.
4. This model is the symmetric model. Each firm tries to lower price and capture entire market share until P = MC. Thus a price war ensues and prices tend to MC i.e. same as in perfect competition.

Edgeworth Model



1. The only difference from Bertrand is that he assumes that firm capacities are not infinite but limited. This makes his model indeterminate. This is because as the firms reach the price where each of them sells its maximum possible output, one of them may realize that since the other is already selling its maximum, it can't serve any more customers. So that firm will try to behave like a monopolist in the other half of the market and will raise the price. This will keep the cycle going forever.

Chamberlin's Small Group Model

Naive Firm Assumption

1. As against Bertrand, he suggests that a monopoly price solution can be reached in an oligopoly instead of the perfect competition solution.
2. He accepts that if firms don't recognize their interdependence, the industry will reach either Cournot equilibrium if firms assumes rival will keep their quantity unchanged or Bertrand equilibrium if firms assume rival will keep their price unchanged.
3. He rejects the naive firm assumption. Firms while taking decisions take into account their mutual dependence and this will lead them to move towards a joint profit maximization solution (or a monopoly solution).

Model

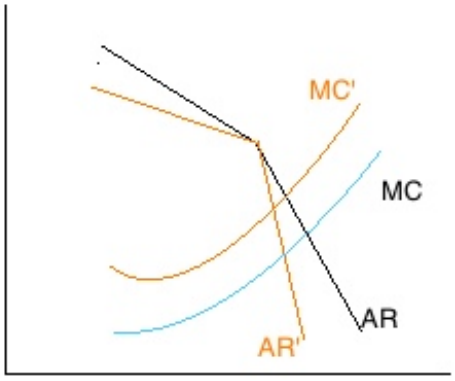
1. The first round is same as Cournot case. Firm A produces Q/2 and Firm B (taking residual market as its demand curve) produces Q/4. Total industry output is 3Q/4.
2. In next round, Firm A is not naive. It realizes that its rival reacts to its actions, so to maximize industry profit and eventually its own, it produces Q/4. Rival also produces Q/4. Industry π as well as individual firm π is maximized. Monopoly solution is reached.

Limitations

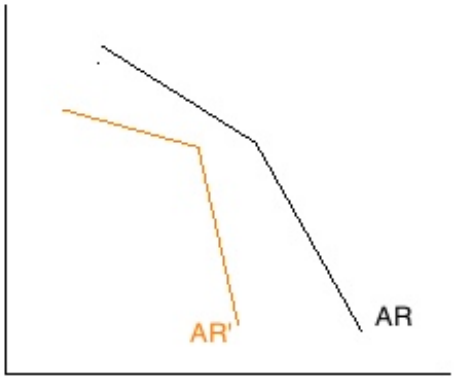
1. It assumes full knowledge of market demand curves and cost curves of its rivals as well.
2. It creates incentives for firms to cheat just like in a cartel situation.
3. It disallows entry of new firms. In case of entry, such a stable monopoly situation can never occur.

Sweezy's Kinked Demand Curve Model

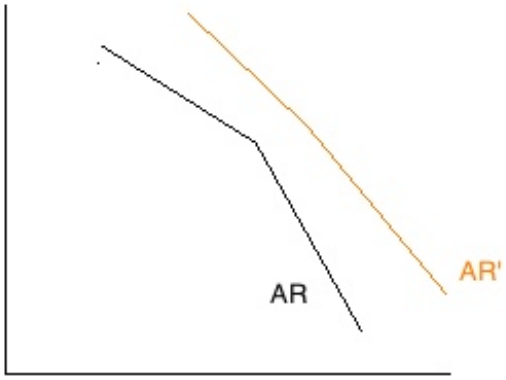
1. Unlike other oligopoly models where the product is assumed to be homogenous, kinked demand curve model is applied for explaining the price and output when there is product differentiation. This is because in an oligopoly when a firm raises its price it is unlikely that all customers would leave it. Some would choose to stick around due to brand loyalty. So the firm demand curve is not perfectly elastic.
2. The 'kink' is formed at the prevailing price level always. This kink explains price rigidity in oligopoly as well (broken MR graph).
3. The kink will work when there is an increase in cost for a firm. But when there is an increase in cost for the entire industry, the prices are likely to go up and the kink will not work because the firm will know that other firms are also likely to raise their prices and thus it can safely raise it too.



1. When there is a decrease in the cost of the entire industry, prices are likely to remain stable and the kink will work. This is because as the costs decline for the whole industry, the firm can be more certain that if it raises price the other firms will not follow suit. So the portion above the kink becomes flatter. And if it decreases the price, other firms are now more certain to decrease their price as well. So the portion of the demand curve below the kink becomes steeper. Hence prices will be more stable.



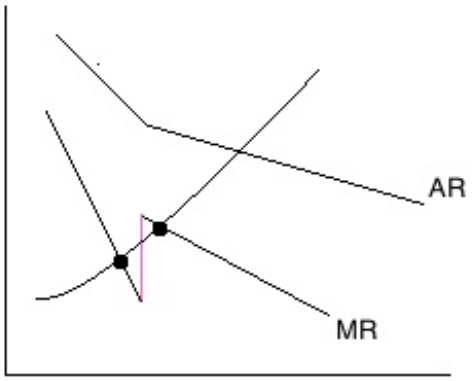
1. If there is a decline in demand for the whole industry, prices are likely to remain stable and the kink will work. This is because as the demand decreases, if a firm tries to increase the price, other firms will only be too happy not to increase their price and thus capture a larger market share. So the portion of the demand curve above the kink becomes flatter. Similarly if the firm reduces price, other firms are more likely to reduce their price as well because their market has already reduced. So the bottom portion will become steeper.



1. As can be seen above and has been reasoned earlier, a rise in market demand will lead to change in prices and the kink will not work.

Criticism

1. It only explains that once the output and price under oligopoly has been determined it will remain stable. It doesn't explain how this was determined in the first place. It also doesn't apply to price leadership and cartel cases.



1. Another criticism is that this theory will not apply in boom conditions when the AR curve will actually be a reverse kink (see figure above). The reverse kink will be due to the fact that a firm will be more certain in boom conditions that if it raises the prices, others will follow suit and if it lowers, others won't mind (since the demand conditions are good). But this leads to unstable price conditions as can be seen in the figure above.

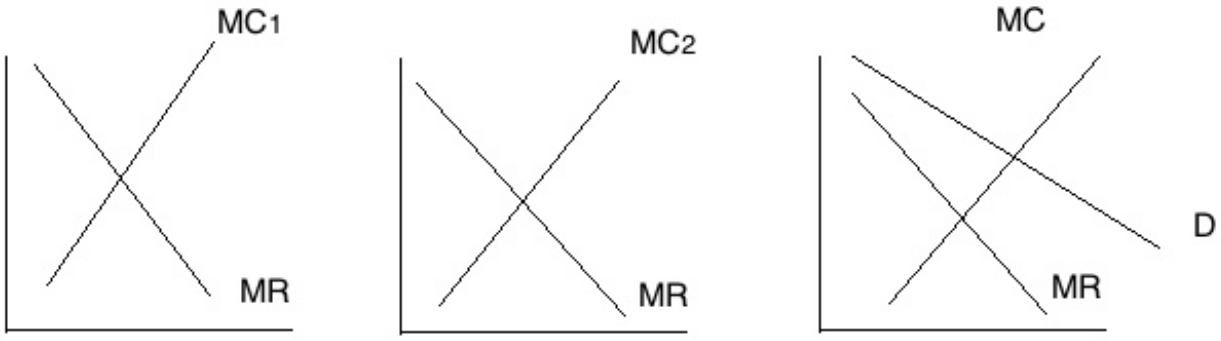
Advantages

1. It explains price stickiness. For a large variation in costs, MC will not rise past or fall below the MR break. Hence price will remain unchanged.
2. The equilibrium of the firm is defined by the point of kink because @ any point to the left of kink, MC < MR while to the right of kink, MC > MR.

Collusive Oligopoly

Cartels

Profit Maximizing Cartels



1. As can be seen here this case is quite the same as that of a multi-plant monopolist.

Market Sharing Cartels

(a) Market sharing by non price competition

1. Here the firms may agree that they will set a common price but are free to vary their output, advertising costs etc.

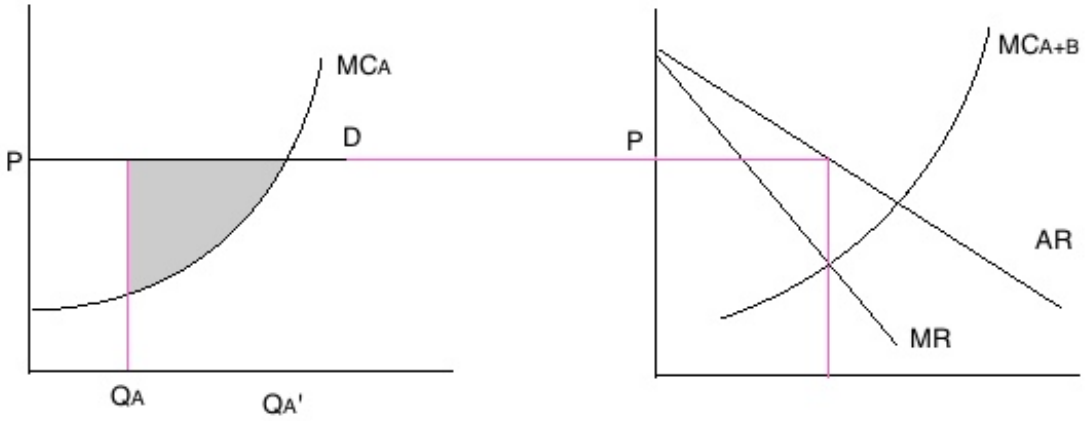
If the cost curves of all firms are identical, then this case is same as that of a π-max cartel. But in general the costs curves will be different and the price will be set so as to give some π to even the highest cost producer.

2. But it can be seen in such a case there will be incentive for the low cost producers to break away from the cartel and establish a monopoly of their own. This may be done initially by hidden price cuts but as they grow larger they would be discovered and open price wars may commence.

(b) Market sharing by output quota

1. Similarly cartels can be formed which fix the output of a firm. In fixing the output, relative bargaining power is the most important determinant factor.

Instability of a cartel

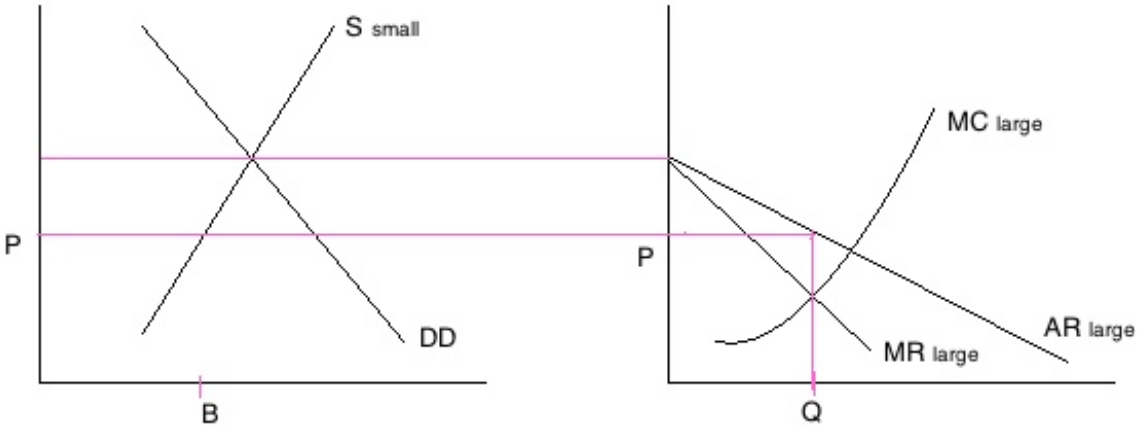


1. Thus we can see that the individual firm will have an incentive to cheat (increase its output from Q_A to Q_A') because it has a horizontal demand curve and by producing extra it can increase its π.

Q. A dominant firm acts as a price leader and other firms adjust their outputs accordingly. Comment. (2009, I, 20)

Price Leadership Models

Dominant Firm Price Leadership

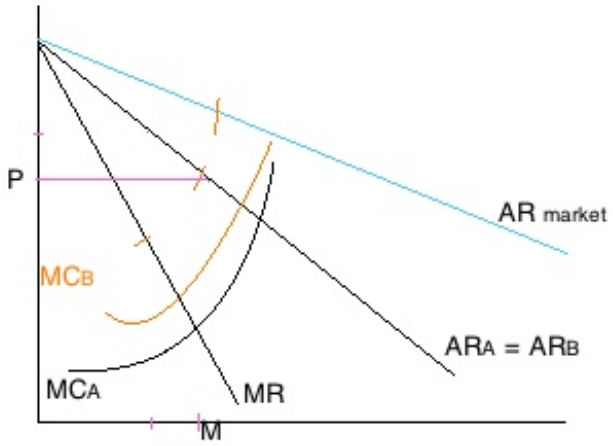


1. It is assumed here that the dominant firm knows the total market demand curve (DD) and also the MC curves of the small firms so that it can arrive at the supply curve of the small firms (S small). From deducting the supply curve of the small firms from the market demand curve, it gets it own demand curve (AR large) and behaves as a monopolist in its own space. The smaller firms produce OB while the larger firm produces OQ. But he needs the smaller firms to produce the desired quantity.

Low Cost Price Leadership

1. To maximize its own π the lowest cost firm sets a lower price than the π-max price of the high cost firms. Since the high cost firms will not be able to sell their produce @ higher price, they are forced to accept such price. But the

low cost firm needs the high cost firms to produce exactly the desired amount and must therefore ensure that even the high cost firms make some π.



1. In the figure above let the market demand curve be AR market. Now let there be 2 firms with A having lower costs than B but both firms having equal market share. In such a case, the demand curve of a firm will be half the demand curve of the market ($AR_A = AR_B$). So we draw the MR curve as well. Next we see that the low cost firm (A) will maximize its profit by equating MR with MC_A. This way it will set a price (P) and produce a quantity (M). The other firm has no option but to follow this price.
2. It can be seen that the (P,M) point is not a π-max position for the firm B. Its π-max price is higher than P. But since the product is homogenous, it can't charge a higher price than P. So there is no way it can maximize its profit. If it tries to undercut A in price, a price war will ensue and A will win due to its cost advantage. Thus it will have to follow A in terms of price. So it will produce @ P and quantity M only and its π will be smaller than A.

Barometric Price Leadership Model

1. The price setting is done by a firm which has a good reputation in the market for being able to read demand and cost conditions. It may neither be cost or market share leader. Its advantage is that it brings price certainty to firms.

Criticisms

1. Although 2 models have been developed one for cost leadership and other for market share leadership, in practice both low costs and market share are essential for a firm to be leader. If the market leader lets say loses his cost advantage, over a period of time his share will decrease. A low share low cost firm can be eliminated by predatory pricing in the short run itself.
2. Both the models are myopic. The leader merely maximizes his short run profit by following MC=MR. But the supernormal profits so generated will lead to entry of new firms and erosion of his profits. So in practice firms price their products so as to limit new entry. Also the new entrant may be a cost leader himself.
3. It ignores non price and hidden price competition.

Game Theory

2 Person Zero Sum Game

Assumptions

1. The goal is zero sum i.e. market share. Gain of one firm leads to equal loss of second. There is no expansion of market.
2. Payoff matrix is given.
3. Each firm is rational. It will assume the rival will want to choose worst option for it and hence would choose a strategy so as to maximize the minima i.e. max-min strategy.

Model

A's Payoff Matrix

	B1	**B2**	**B3**	**B4**	**B5**
A1	**10%**	20%	15%	30%	25%

A2	40%	**30%**	50%	55%	45%
A3	35%	25%	**20%**	40%	50%
A4	25%	**15%**	35%	60%	20%

B's Payoff Matrix

	B1	**B2**	**B3**	**B4**	**B5**
A1	90%	80%	85%	70%	75%
A2	60%	**70%**	**50%**	45%	55%
A3	**65%**	75%	80%	60%	**50%**
A4	75%	85%	65%	**40%**	80%

1. A tries to identify minimum payoff in each row and choses the strategy which maximizes such minima. A2 is dominant strategy of firm A.
2. B tries to identify minimum payoff in each row and choses the strategy which maximizes such minima. B2 is dominant strategy of firm B.
3. In this example, both come to a solution. A2-B2.

Uncertain 2 Person Zero Sum Game
Assumptions

1. Both firms assign same probability to an event. This means they have same information and judgement criteria.
2. Firms maximize their expected payoff. The solution reached is optimal.

2 Person Non-Zero Sum Game or Prisoner's Dilemma
Model

A's Payoff Matrix

	B1	**B2**
A1	90	**50**
A2	150	**80**

B's Payoff Matrix

	B1	**B2**
A1	110	120
A2	**60**	**100**

1. Thus A's dominant strategy is A2 and B's dominant strategy is B2. So there is a unique solution.
2. But this unique solution is not optimal. Through collusion, both A and B could have been better off by following A1 and B1.

Prisoner's Dilemma

	B Confesses	B doesn't Confess
A Confesses	(5, 5)	(1, 10)
A doesn't Confess	(10, 1)	(2, 2)

1. It is clear that if both collude and don't confess, both will be better off (only 2 years in jail). But for B individually the better strategy is to confess and similarly for A individually the better strategy is to confess. So both will confess.

Instability of Cartel

	B Cheats	B Cooperates
A Cheats	(5, 5)	(25, 2)
A Cooperates	(2, 25)	(15, 15)

1. Clearly both have an incentive to cheat. This is similar to prisoner's dilemma. But this can be avoided if both firms are assured of severe retribution by the other and the game runs for infinite cycles.

Factors leading to deviation from max-min strategy

1. Over a period of time, both firms learn to predict each other's moves and learn to avoid moves which have proved to be disadvantageous to all parties. Thus a tacit collusion develops.
2. For avoiding max-min, a stability of tastes and processes is required because only when firms are assured things will remain same, they will avoid strategies leading to losses for all. Firms are more likely to follow max-min if consumer tastes or technologies changes rapidly.
3. If the rivals lack information, they will be conservative and follow max-min strategies.
4. If a reaction can be made quickly, firms will follow max-min because any aggressive behavior will be quickly punished by the rival. If reaction process has considerable lag, firms will choose best position for themselves because rivals can't react quickly and not follow max-min.

Theory of Demand and Production

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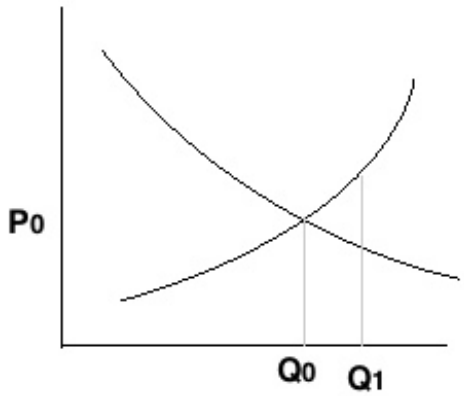
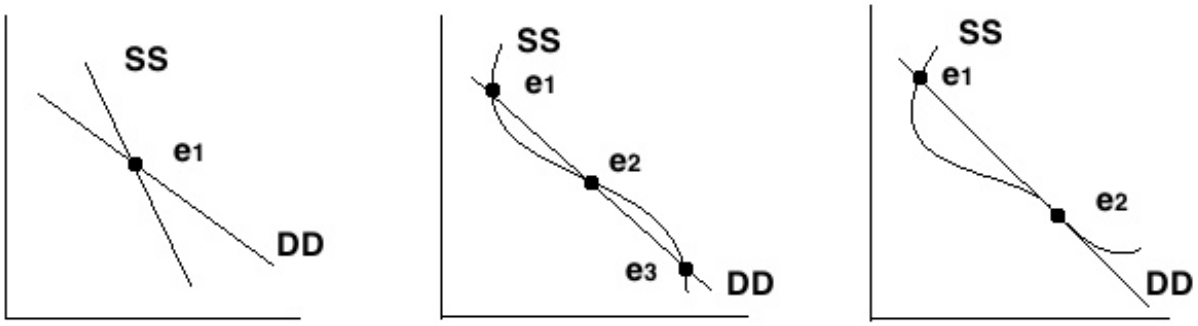
Marshallian Approach to Price Determination
Q. What are backward raising input supply curves? Illustrate with the help of suitable examples. (2007, I, 20)

1. Marshall prices are determined in a static framework keeping other things constant.
2. Marshall asked "what determines the price" and answered that Qd and Qs determine the price. Thus he uses supply and demand curves for price determination and assumes perfect competition.

Marshal Stability of an Equilibrium



1. We can arrive at Marshal stability of an equilibrium by disturbing the quantity. Let initial equilibrium be (P_0, Q_0). Let us disturb it to produce Q_1. But at Q_1, the price offered by consumers is much less than the price demanded by suppliers. Suppliers are disappointed and they produce less in the next cycle such that the price demanded is same as price offered in the last cycle. Hence it is Marshal stable.

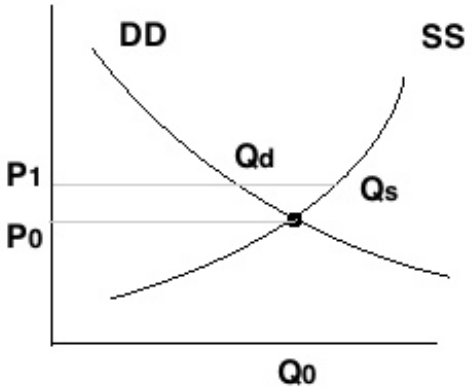


1. In figure 1, e_1 is Marshal unstable. In figure 2, e_1 is Marshal unstable, e_2 is Marshal stable and e_3 is Marshal unstable. In figure 3, e1 is Marshal unstable and e2 is @ equilibrium @ $P < P_2$ and Marshal stable for $P > P_2$.

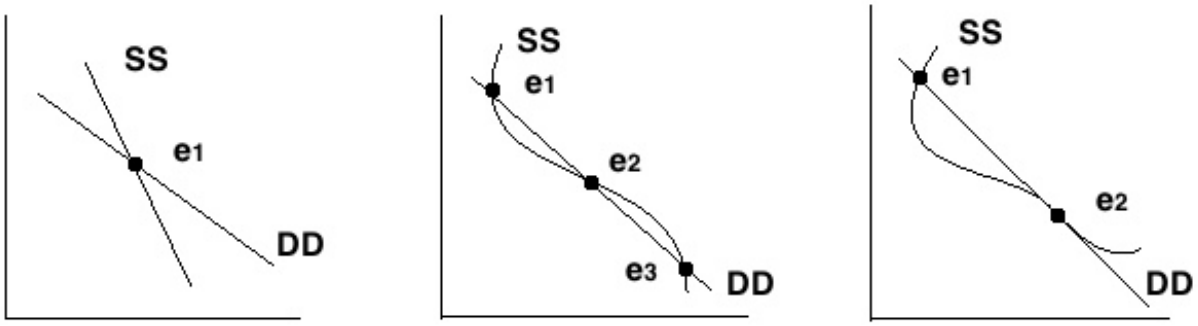
Walrasian Approach to Price Determination

1. He determines the entire price vector i.e. all prices together in a general equilibrium framework. Walras asked "what determines the quantity demanded" and his answer was relative price. This can be inferred from law of equi-marginal utilities i.e. a person consumes till (MUx/MUy) = (Px/Py). He assumes all markets to be perfectly competitive.

Walras Stability of an Equilibrium



1. We can arrive at Walras stability of an equilibrium by disturbing price. Let the price go from P_0 to P_1. At the new price suppliers will produce more than what buyers demand. So to clear out the market price shall fall (to even below P_0). At lower prevailing prices, in the next cycle suppliers will produce less, but the buyers demand the enhanced quantity. So prices go up. Hence it is Walras stable.



1. In figure 1, e_1 is Walras stable. In figure 2, e_1 is Walras stable, e_2 is Walras unstable and e_3 is Walras stable. In figure 3, e_1 is Walras stable, e_2 is Walras unstable for $P > P_2$ and is at equilibrium for $P < P_2$.

Assumptions for solution of the general equilibrium model

1. All markets are perfectly competitive. All factors are completely mobile. All inputs and outputs are perfectly divisible. All production functions and demand functions are continuous and twice differentiable.
2. There are no externalities. Closed economy.
3. There are constant returns to scale.

Industry

1. Criteria generally used are substitutability of products or similarity of technical processes. But the debate is how close should the substitutes or processes be? Substitutability may be further broken down into technical substitutability and economic substitutability.
2. There is no general answer to the question and it depends on the purpose of the study. Some require broad classification and some narrower.
3. In perfect competition, all products are perfect substitute and industry definition is easy. In monopoly, firm is the industry. Problem arises in monopolistic competition where there is varying degree of product differentiation.
4. Scholars like Kaldor have argued that products should be grouped together on a scale based on their substitutability - closer ones are closer substitutes and accordingly defined into industry.
5. Triffin argues that all firms and products compete against each other in an economy - to varying degrees. So there is no need for a concept of industry. However, many other scholars have criticized this view.

The Theory of Demand

Cardinal Utility Theory

Assumptions

1. Rationality: Utility maximizer consumer.
2. Cardinal Utility: Utility can be measured in monetary units.
3. Constant Marginal Utility of Money: This is to make sure measuring scale doesn't change.
4. Diminishing Marginal Utility: Used in deriving demand curve.
5. Additive Utility: $U(a, b, c) = U(a) + U(b) + U(c)$.

Critique

1. Cardinal Utility: This is extremely doubtful.
2. Constant Marginal Utility of Money: Money is a good like others, so its marginal utility can't be same.
3. Diminishing Marginal Utility: This has been established from 'introspection' or psychology.

Ordinal Utility Theory

Assumptions

1. Completeness: Consumer can rank all items.
2. Transitivity: If $U(x) > U(y)$ and $U(y) > U(z) \Rightarrow U(x) > U(z)$.

3. Non Satiation: The more a good, the better.
4. Continuity: All goods can be divided into infinitely small units.
5. Strict Convexity: MRSx,y and MRSy,x should both decline throughout the indifference curve.
6. Differentiability: Twice differentiable.

Advantages over Cardinal Utility Theory

1. Assumption of cardinality dropped.
2. Assumption of constant marginal utility of money dropped.
3. It breaks down the price effect into substitution effect and income effect. Thus gives a better understanding of substitutability of goods. Hicks said that goods are substitute if after adjusting for the change in real income, a decrease in Px leads to decrease in quantity demanded for y.

Critique

1. Assumption of existence and convexity of ICs.
2. It is also doubtful if the consumer can order his preferences as precisely as the theory assumes. His orderings also keep on changing, so at best, any ordering can be for a very short run.
3. The concept of Marginal Utility is still implicit in MRTSx,y.

Demand Curve and Distribution Channels

1. Final Consumers: Some argue that in the long run demand curve should be flat as demand would be infinitely elastic and consumers will buy only on basis of price. But this ignores the product differentiation. A consumer buying an identical product from a trendy store is not irrational.
2. Other manufacturing firms: If the product is an investment good i.e. machine then it involves substantial sum and brand awareness. So demand curve will be downward sloping. For intermediate goods, flat curve.
3. Wholesalers: It is argued he will only buy products where his profit margin is highest or he is price sensitive. But this overemphasizes his ability to control the final demand and he may buy a low margin product if total profit is maximized. Hence again demand curve downward sloping.
4. Retailers: If retailers buy for their own brand, then more price conscious and flat curve. If for end consumers, then downward sloping curve.

The Theory of Production

Marginal Revenue and Price Elasticity

To prove: $MR = p.(1 - 1/\eta_d)$

Proof

1. We know total revenue (TR) = price (P) * quantity (q). Thus TR = p.q. Now differentiating it to get MR, MR = p + q.($\partial p/\partial q$). We can write $\partial p/\partial q$ as $[(\partial p/p) / (\partial q/q)] . (p/q)$. But $1/\eta_d = - (\partial p/p) / (\partial q/q)$ so we can rewrite, $MR = p - 1/\eta_d . p$ or $MR = p.(1 - 1/\eta_d)$.

Production Function

1. Production function differs from technology in the sense that it already states the maximum possible output obtainable for every possible input combination.
2. It is cardinal and twice differentiable. @ (x,y) = (0,0), output is 0 as well. Output can't be negative as neither can x or y be.
3. Iso-costs produced are convex i.e. $MRTS_{L,K}$ & $MRTS_{K,L}$ are both declining functions. MPP_L and MPP_K can't both simultaneously be negative.

Homogeneous production function

1. A production function is homogenous when if each input is multiplied by &, then & can be factored out of the function. The power of & thus factored out is the degree of homogeneity. Thus $Q = A.(K^{\circ}å) . (L\hat{}ß)$ is a homogenous function of degree (å+ß). If degree of homogeneity is 1 it implies CRS prevails. 1% change in both K & L together leads to 1% jump in output.
2. If a f is homogenous of degree å then its marginal productivity function will be homogenous of degree (å-1). This means for CRS functions, MPP_L and MPP_K don't change with changing input values i.e. in CRS, MPP_L and MPP_K are constant.
3. Homogenous functions of degree 1 satisfy Euler's theorem i.e. $Q = L . MPP_L + K . MPP_K$. This ensures that (a) Each

input is paid the value of its marginal product. (b) Total output is just exhausted. $L.(p.MPP_L) + K.(p.MPP_K) = p.q$. But $p.MPP_L = w$ and $p.MPP_K = r$, this means $L.w + K.r = TR$. This means in long run, TR = TC or a firm can only earn normal profits in such a case.

Productivity Curves

1. Given a constant K, variation of output as a function of L. $Q = f(L)|K_0$. Such a curve should demonstrate law of diminishing marginal productivity.
2. Also higher the level of K employed, lower the level of L needed for a given output.

Iso-quants & Iso-costs
$MRTS_{L,K}$ = -(Slope of Iso-quant) = MPP_L / MPP_K. At equilibrium, $MRTS_{L,K} = w/r$.
Assumption: Perfect factor markets.

1. If MPP_L is -ve => slope of iso-quant is positive. At such a point, reduction in both L and K will lead to increase in production. No one would operate on such a point. This defines the rational zone i.e. a zone where both the marginal products are positive.
2. The profit maximizing behavior dictates: $\pi = p.Q - C$ should me maximized. $Q = f(L,K)$ and $C = a + w.L + r.K$. This means $\partial\pi/\partial L = 0$ and $\partial\pi/\partial K = 0$. This means $p.MPP_L = w$ and $p.MPP_K = r$ are 2 conditions. This actually represents the point where his MR = MC.

Long Run Cost Curves

1. To get the LR total cost curve, @ every output level q, draw the SR total cost curves for every K level. Choose the minimum cost point. Repeat this process for all levels of q and get the LR total cost curve. LTC curve can also be seen as the envelope of STC curves.
2. To get the LR average cost curve, just divide the total cost curve by q. LAC curve can also be seen as the envelope of SAC curves.
3. for LMC curve, take the partial derivative of LTC wrt q.

Approaches to Employment, Income and Interest Rate Determination

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Classical Economics
Basic Pillars
Say's Law
(a) Proposition

1. It says that greater production leads to a greater money income which creates the market for the greater flow of goods produced. Thus deficiency in demand cannot be a problem and the process of capital accumulation and expansion can continue till full employment state is reached. There is no reason why full employment can fail to prevail.
2. Of course there may be lapses from full employment but these will at best be temporary lapses and a free market economy will have the tendency to come back to full employment.

(b) Assumptions

1. Even when the deficiency of AD rises, prices, wages and interest rates will adjust quickly to restore full employment.

(c) Explanation

1. Additional goods generate additional incomes. Additional income will either be spent in consumption or saved. Though savings is a leakage but these savings are spent on investment goods. Thus savings = investment, entire income is spent and all leakage will come back. Thus there is no net leakage.
2. Now how is this equality of savings and investment guaranteed? When savings rise, rate of interest declines. As a

result demand for investment rises and thus it becomes equal to the increased savings. Thus the interest rate change ensures equality of S and I.

Q. "It is production which creates market for goods." - Say
In the light of the above statement outline the classical theory of full employment. (2006, I, 20)

Wage Price Flexibility
(a) Proposition

1. Despite a decline in AD or I, Y and employment will not fall from the full employment level.

(b) Assumption

1. Wage, price are fully flexible and adjust quickly.

(c) Explanation

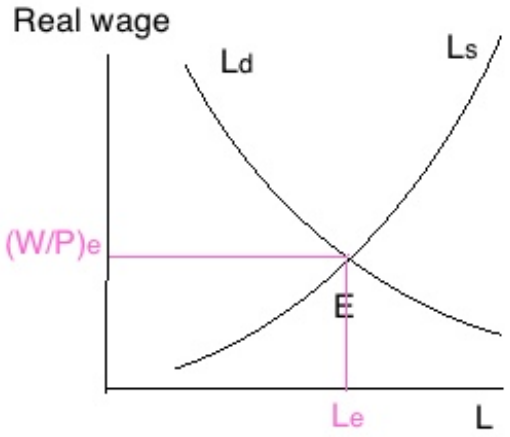
1. The amount of products firms are willing to supply doesn't only demand on AD but also the price levels. When AD falls due to a fall in I, product prices fall quickly so that the quantity demanded comes back to full employment level.
2. Now to what extent will the producers tolerate a fall in prices and not stop production? They will not stop production because as their product prices fall, the wages will also fall so that the overall costs fall. Thus product demand will increase due to fall in product prices and labor demand will increase due to fall in wages.

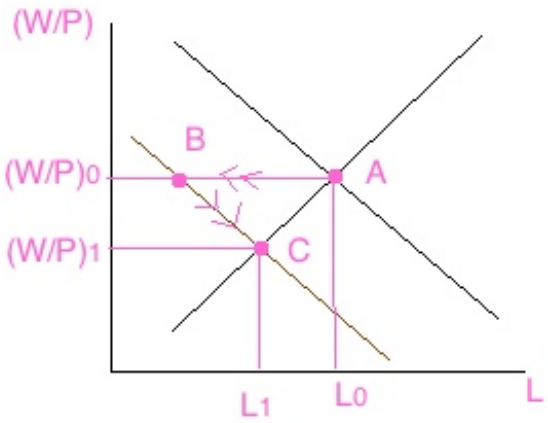
Short Run Determination of Employment and Income - With Zero Savings and Investment, Constant Prices
Assumptions

1. Production function: Let $Y = f(L, K, T)$ where L = labor, K = capital and T = technology. But in short run we can take technology and capital to be fixed. Thus $Y = f(L, K^o, T^o)$ or $Y = f(L) \mid K^o, T^o$ is our production function. A change in any of the fixed variables (K^o and T^o) will cause the production function to shift. In the short run production can only increase (or decrease) with increase (or decrease) in labor employment.
2. Diminishing marginal returns: With a fixed capital stock and given technology, MPP_L would show diminishing returns.
3. Perfect competition: It prevails in all markets in the economy.
4. π maximizing firms, utility maximizing consumers.
5. Factor endowment doesn't vary.

Labor Market Equilibrium

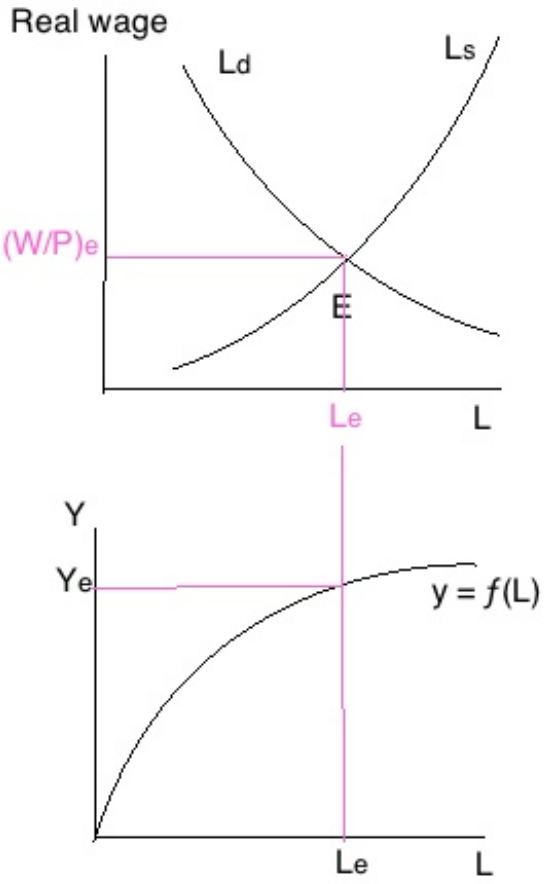
1. Demand curve for labor: π maximizing firms in a perfect competition will employ labor until MPP_L = real wage rate (w/P). At a lower real wage rate, more labor will be demanded and vice versa. Thus the demand curve of labor is the MPP_L curve and is downward sloping. Thus $L_d = f(w/P)$.
2. Supply curve for labor: It depends on the pattern of preference between income and leisure. As real wages rise, the marginal utility to be derived from leisure against the increased income also rises, hence amount of leisure falls and hence more labor is supplied. This is the substitution effect. But also since the income rises, individuals will be relatively richer than before and this induces them to consume more of all commodities (including leisure). This is the income effect but classical economists believe that substitution effect is larger than the income effect. Thus supply curve is positively sloped. $L_s = g(w/P)$.





1. Equilibrium, involuntary unemployment and wage flexibility: Where the positively sloping supply curve and the negatively sloping demand curve meet, labor market clears. Thus at equilibrium, there is no involuntary unemployment. Further it is wage flexibility which restores equilibrium once it is disturbed.

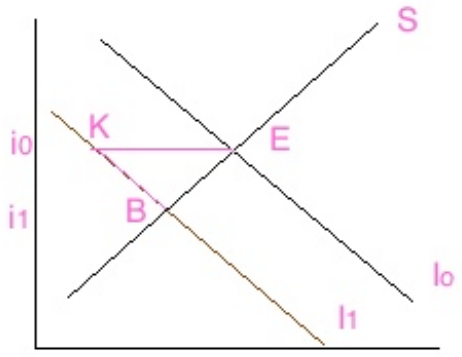
Determination of Income



1. Full employment output: It is the amount of goods and services that can be produced for given capital and technology when all the workers who want to work at the going wage rate are fully employed. Thus there is no involuntary unemployment although there may exist voluntary unemployment (even in a "full" employment situation).
2. Say's law: In zero savings situation, Say's law means that all income is spent on the goods so produced. In perfect competition the product is exhausted, thus all income will be equal to all production. This is ensure by a quick adjustment in real wage rates.

Short Run Determination of Employment and Income - With Savings and Investment, Constant Prices

Capital Market Equilibrium

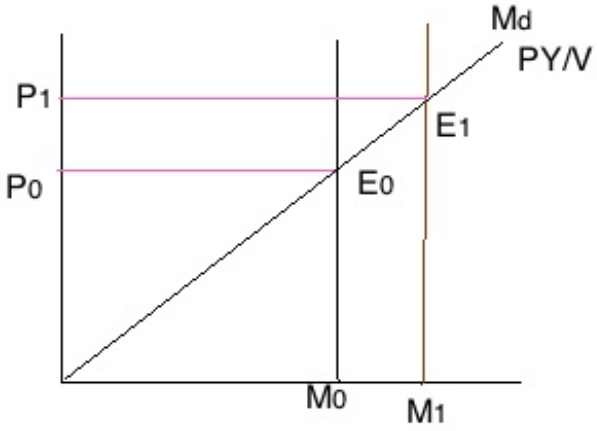


1. It is the changes in interest rate that brings about equality between savings and investment. During depression due to fall in π expectations, I decreases. This leads to excess of S over I for the given interest rate. This leads to a fall in interest rate and a consequent rise in I and a fall in S. But the fall in S will be a rise in consumption, thus there will be no leakage.

Introduction of Money

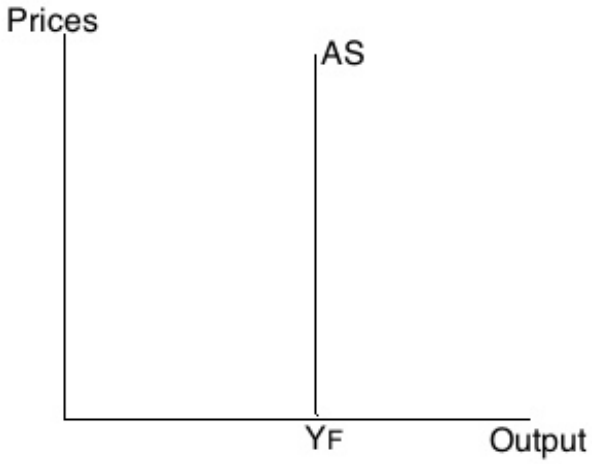
1. Introduction of money doesn't affect the classical theory and they believe that the quantity of money determines only the price level of output and in no way affects real savings, real investment and real output.
2. Change in quantity of money affects real wage rates (w/P) but the money wages and price levels quickly change so as to restore labor market equilibrium.

Monetary equilibrium



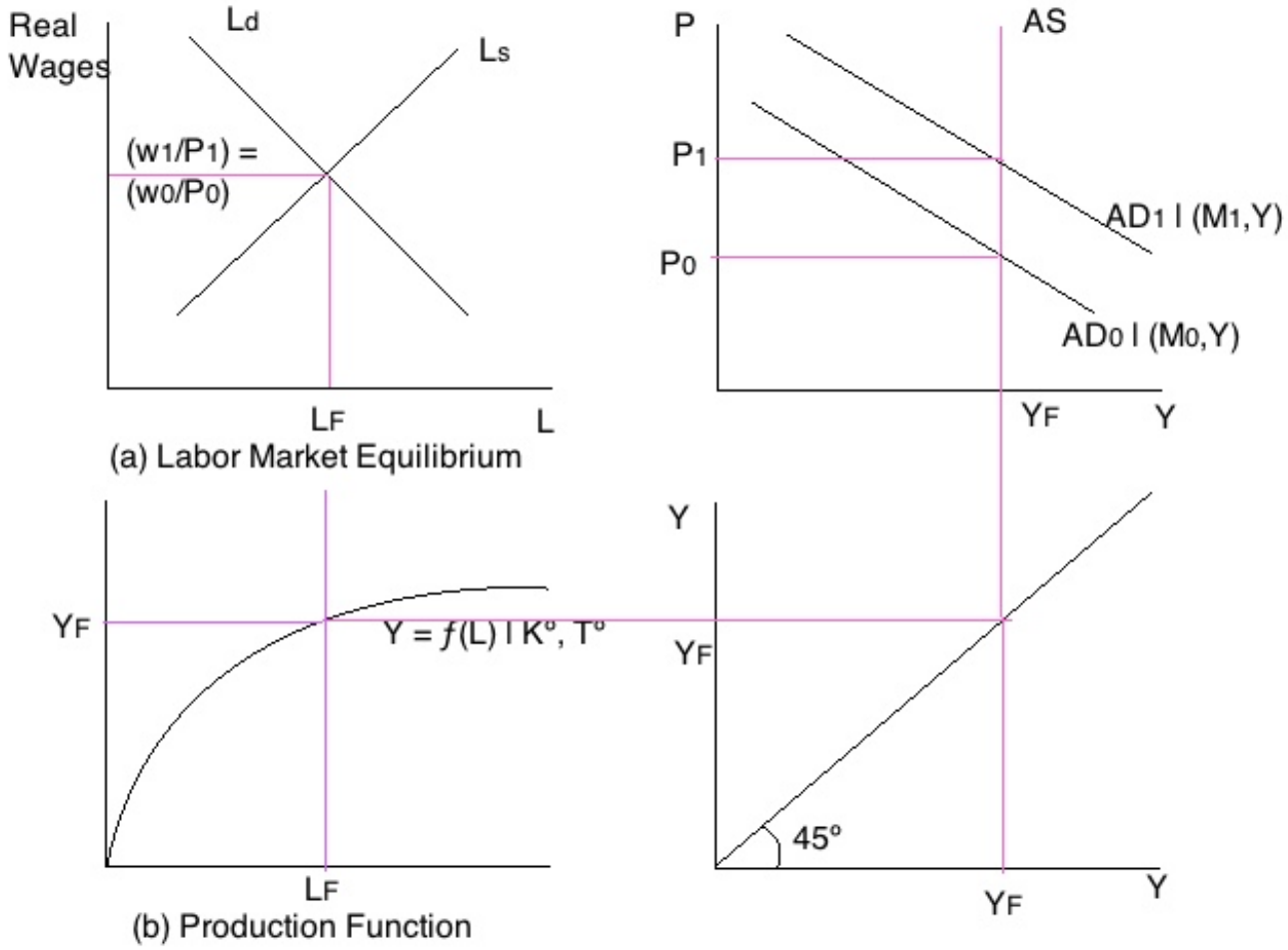
1. If money supply increases (M_0 to M_1) then at the initial price level people will be holding more money than they demand. So they would want to reduce their money holding and will spend their additional money. Thus spending will increase. As spending increases @ constant supply, prices will rise and demand for money (M_d) will rise as well until it equates the new money supply (M_1).
2. Classical dichotomy: Thus none of the real variables are affected by money. The real variables and nominal variables are determined by 2 different sets of factors and are independent of each other. This is called classical dichotomy.
3. Interest rate & money: Money functions only as a medium of exchange and hence is demanded only for transactional purposes. Thus demand and supply for money doesn't determine the real interest rate.

Classical AS Curve



1. The output Y_F is determined by the equilibrium level of employment (L_F) given the production function ($Y = f(L) \mid K^o, T^o$). The labor market equilibrium depended on demand and supply of labor which depended on real wage rates.
2. Changes in price level cause equal proportionate changes in money wages so as to keep real wages constant and thus labor market equilibrium (and hence the equilibrium output) doesn't get affected. So AS doesn't depend on prices.

Complete Classical Model of Output and Employment



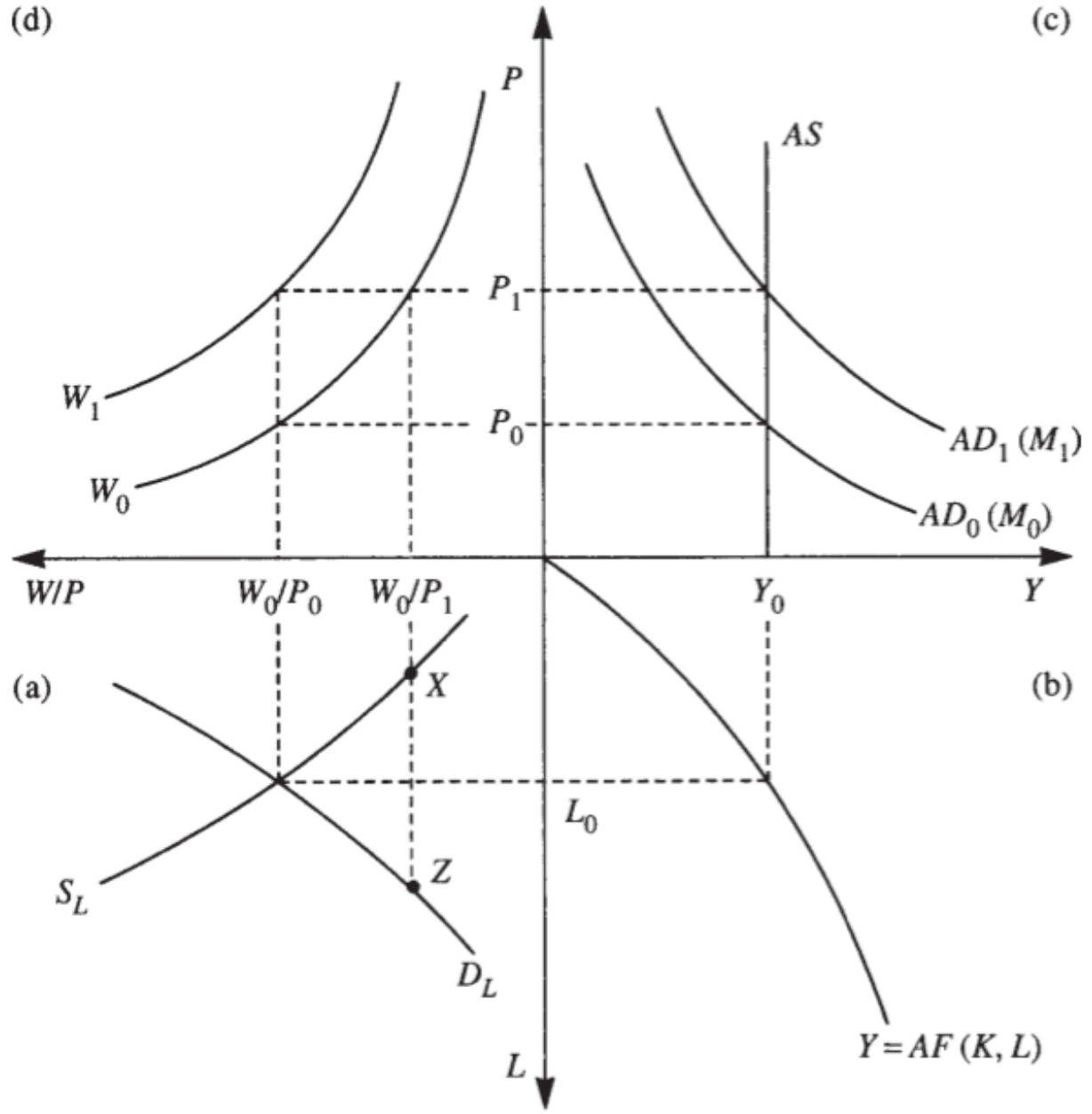
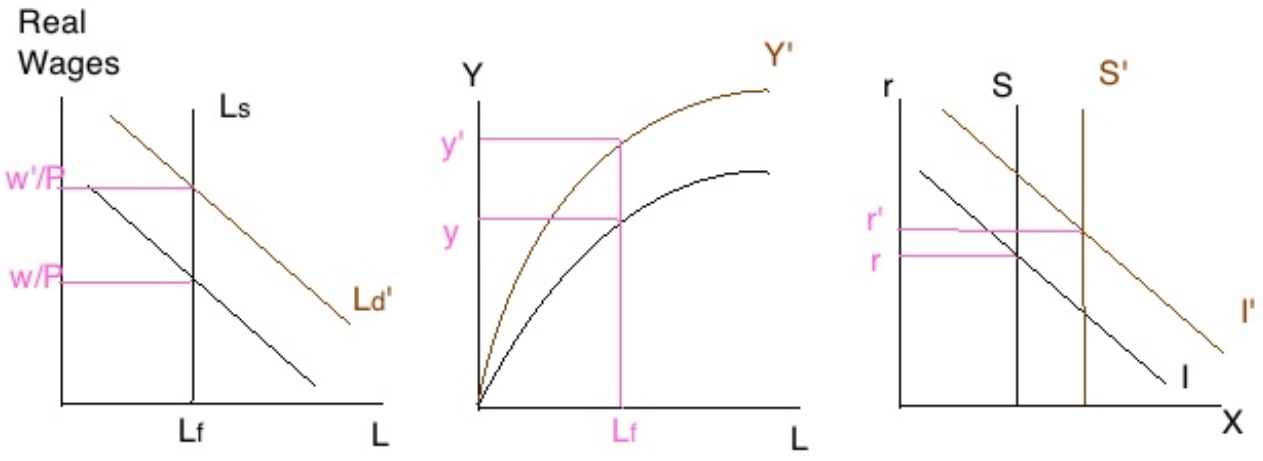


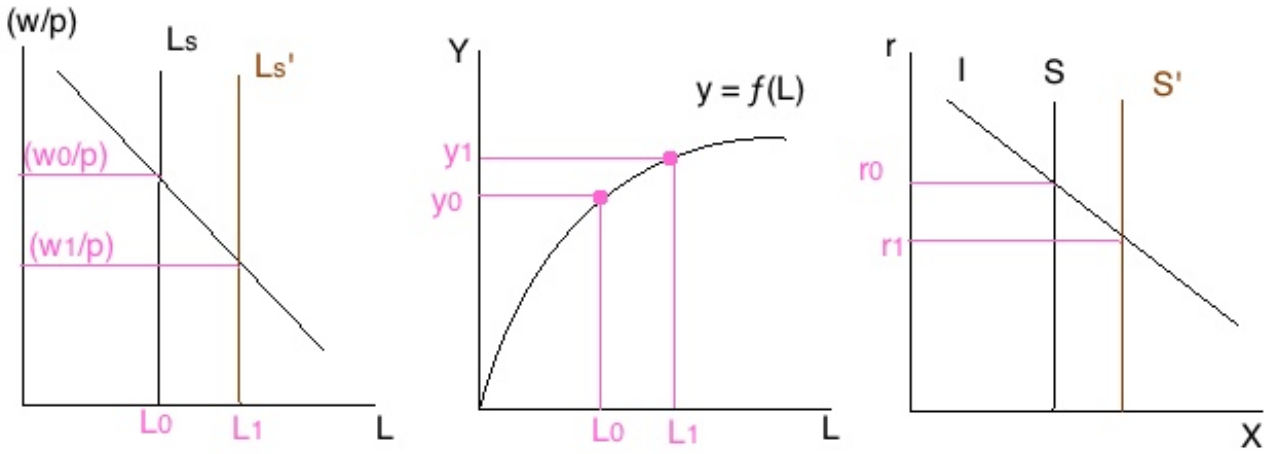
Figure 2.4 The determination of the price level in the classical model

Impact of Technology Change



1. Real wages: The new technology makes workers more productive and hence increases their MPP. This leads to increase in quantity demanded of workers at each wage level reflected in a rightward shift in labor demand curve (L_d to L_d') but since total workers are fixed (simplified version of full employment argument), real wages increase.
2. Output: The production function changes and hence more output is produced.
3. Interest rates: Introduction of new technology will lead to increase in profitable opportunities in future and hence an increased demand for investment at each interest rate (thus a rightward shift from I to I'). Besides an increase in income will also cause increase in savings (the extent depends on the marginal propensity to save). Hence savings curve also shifts to right. The new interest rate may depend on the extent of shifts and may be higher, same or lower, but definitely investment would be higher.

Impact of Growth in Population



1. Real wages: Additional workers lead to an increase in labor supply. Since demand is same, it leads to fall in real wage rates and employment of more labor.
2. Output: It increases from y_0 to y_1 as more labor is hired.
3. Interest rates: Savings increases as consumption increases. Thus savings curve shifts to right (S to S') and we see a fall in interest rate.

Keynesian Economics

Q. Do you agree with the view that Keynes' general theory is a special case of the classical thoery obtained by imposing certain restrictive assumptions upon the latter? Elaborate (2006, I, 60)

Keynes and Short Run

1. Output and employment: Keynes' theory is for short run only. In this he assumes that the amount of capital, size of labor force, technology, efficiency of labor, tastes etc. all remain constant and it is only the amount of labor employed which changes. Thus output is directly a function of employment.
2. Prices and wages: In short run, prices and wages are not able to adjust to the changes in supply and demand and are thus constant.

Determination of Employment

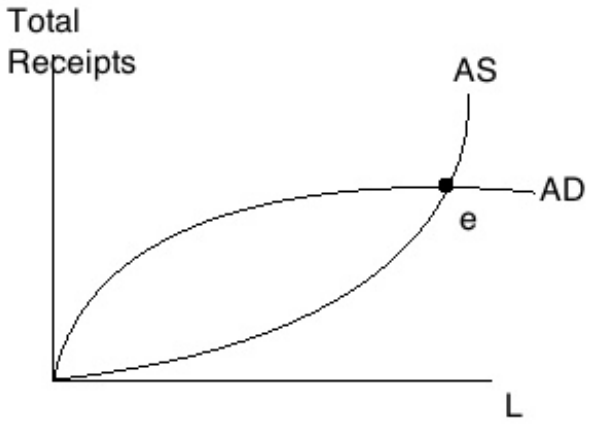
Aggregate Supply Function

1. Aggregate supply price: At any given level of employment, the total amount of money which all entrepreneurs in the economy must expect to receive from the sale of the output produced is the aggregate supply price. Thus it is the total cost of production incurred in employing a given number of labor.
2. Aggregate supply: As the number of hired labor increases, the total cost also increases. Thus the locus of aggregate supply prices is upward sloping and is the aggregate supply curve. Beyond the full employment level, AS becomes a vertical straight line.
3. AS function depends ultimately on the technology and capital stock but given these are constant in the short run, it depends only on the labor employed. Unless there are heavy increasing returns to scale in the economy AS curve will be upward sloping. If CRS exist in the economy, AS curve will be a straight line. Under DRS the slope of AS will continue to increase.

Aggregate Demand Function

1. Aggregate demand price: It is the amount of money which the entrepreneurs actually expect to receive for a given level of employment.
2. Aggregate demand: It is the locus of aggregate demand price. It comprises of (a) consumption demand and (b) investment demand. Now investment demand depends on the MEC and hence is considered autonomous while consumption demand increases as more workers are hired and hence more income is generated in the short run. So overall AD curve is also upward sloping.

Effective Demand



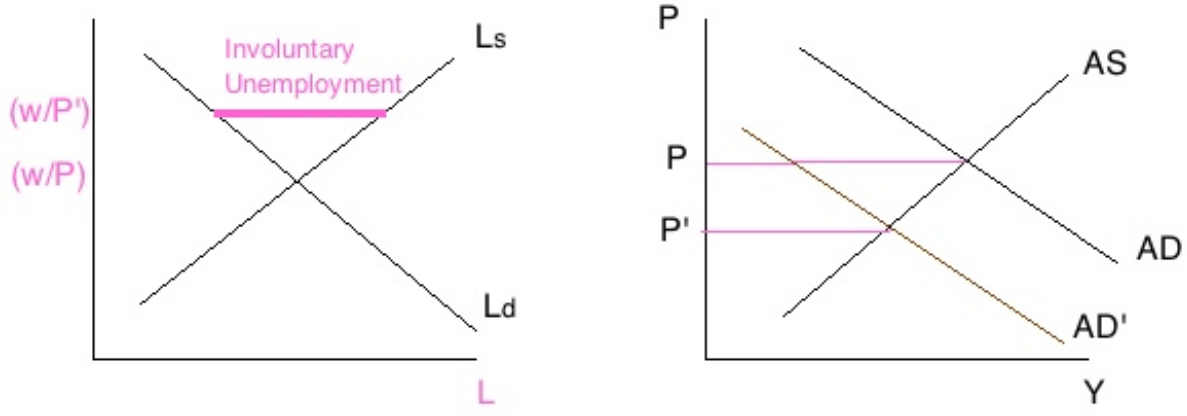
1. This is the AD which at a level of employment is also equal to the AS (i.e. point e in the figure above). Thus employment in the economy in short run is determined by the level of effective demand.
2. Underemployment equilibrium: It is not necessary that the equilibrium level is always at full employment. Keynes said that the aggregate demand price and the aggregate supply price will be equal @ full employment only if the investment demand is sufficient to cover the gap between the aggregate supply price @ full employment and the consumption expenditure @ full employment. But when investment demand falls short of this level, recession may result leading to emergence of involuntary unemployment.

Money Wage Rigidity Model

Causes of Money Wage Rigidity

1. Money illusion: Workers tend to resist cut in nominal wages. This is because they think that the fall in price has raised the real wages of all the workers in other industries as well so if they accept nominal cuts their relative real wages will fall. Secondly a cut in nominal wages is blamed on their employers while a fall in real wages due to a rise in prices is attributed to the economy and hence easier to achieve.
2. Wage fixation through contracts: Such contracts are for some fixed time.
3. Minimum wage laws.
4. Efficiency wages: Sometimes employers themselves are not interested in cutting wages as they think higher real wages will make the workers more efficient and any cut in nominal wages will lead to disruption and less efficiency.

Price Flexibility and Rigid Money Wages



1. Here flexibility of prices but rigidity of money wages has led to emergence of involuntary unemployment.

Explaining Depression

1. Animal spirits: Consumption demand is relatively stable. It is the investment demand which is volatile and large fluctuations in investment demand may cause depression. The volatility of investment demand is because a very important criteria in an investment decision is the expected profitability of the investment. Now an investment yields profits in future and future profits are uncertain. This uncertainty leads to investments being hugely influenced by expectations of entrepreneurs about future profits and these expectations may change as there is no good basis for these expectations. This is called animal spirits.

Keynes vs Monetarists on Great Depression / Effectiveness of Monetary Policy

1. Keynes: He said fall in investment led to fall in Y and reverse multiplier came into operation to accentuate the fall. He emphasized the role of fiscal policy to lift investment and downplayed the role of monetary policy. He pointed out that more important than interest rate it is the changes in MEC which influence investment decisions. In a recession business are in the grip of pessimism about future π and even if easy monetary policy makes credit cheaper they won't invest. Furthermore in a recession usually the money demand curve (he called it the 'liquidity preference' curve) becomes highly elastic (i.e. flat) and interest rates are so low that any increase in money supply doesn't lower the interest rates to any appreciable extent.
2. Monetarists: They point out that it was a drastic decline in the quantity of money supplied which led to severe depression. It was the failure of fed to prevent bank failures and decrease in money supply which increased the severity.

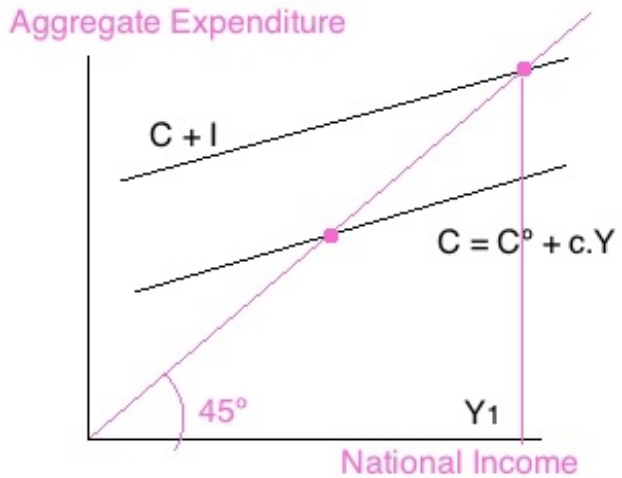
Determination of Income - 2 Sector Model, Constant Prices
Consumption Demand

1. In the short run the consumption function doesn't change. This is because the mpc (c) depends upon the tastes, preferences, income distribution, population growth, wealth distribution etc. of the society which don't change much in the SR. This means that the consumption demand is determined primarily by Y i.e. $C = C^o + c.Y$.
2. When a government changes fiscal or monetary policy, consumption function can shift. Thus when interest rate (r) is reduced, people borrow more for durable consumer goods etc. and with this the consumption demand at a given income level may increase leading to shift in C curve. Similarly taxes may change Y_d hence for a given level of national income (Y) change the consumption level.

Investment Demand

1. MEC: This is the expected rate of π which the business community hopes to get from the investments. MEC depends on replacement cost of capital on one hand and profit expectations on the other hand. Profit expectations are more important because they often change even in SR and cause fluctuations in I.
2. Income and investment: Keynes held I to be responsive to MEC and r (to a less extent) only and because both are independent of Y, I doesn't depend on Y and can be taken as autonomous.

Equilibrium / Effective Demand

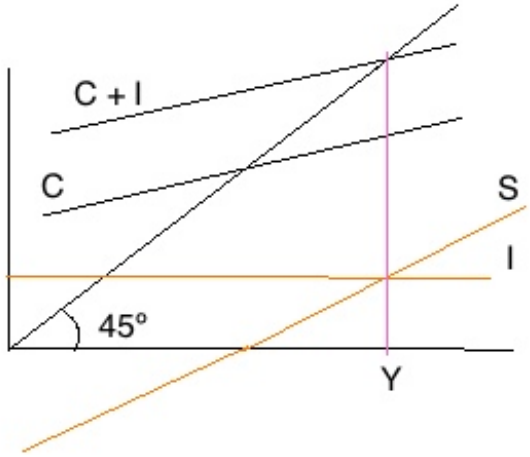


2. Income can't be below Y_1 because if that is so then AD > what is produced. So suppliers will supply the gap from

their inventories. This leads to a run down of inventories below the desired levels and it will induce the firms to produce more to restore inventories. So national income will increase. Similarly the reverse case.

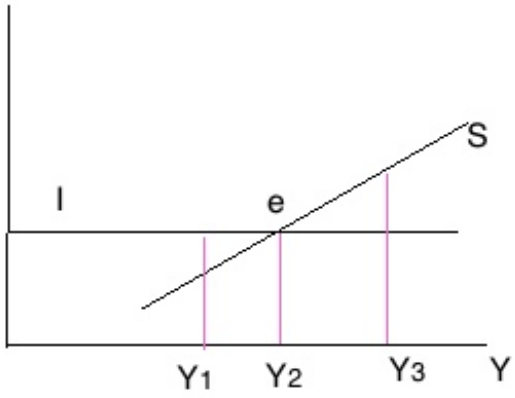
3. Thus if there is a recession then the key policy decision is to lift AD so that Y also increases to catch up.
4. Involuntary unemployment: Keynes said exhaustion of savings by investment is not necessary. People who save are different from people who invest and the two are often guided by very different set of factors. Savers save for old age, education, marriages of children, speculation and to provide for unanticipated future emergencies. Investments depend on marginal efficiency of capital (MEC) i.e. expected rate of profits, interest rate, population growth and technological progress. Keynes said savings is dependent mainly on income and it is the changes in income which bring about equality in savings and investment rather than the changes in interest. Since both I and S are determined by separate variables, it is not necessary that investment should be equal to savings by the people at full employment level.

Savings - Investment Approach to Income Determination



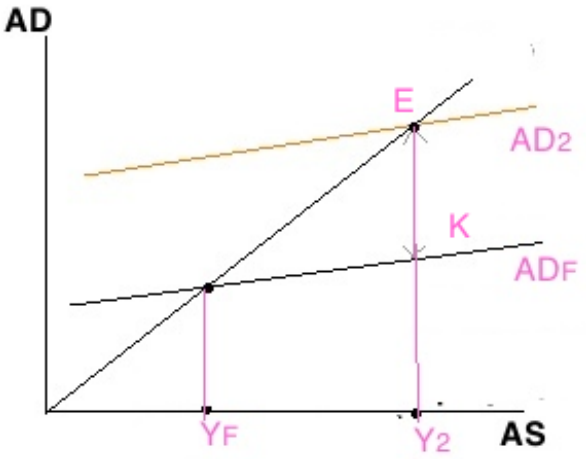
Relationship Between S & I

1. Ex post S & I: Pre Keynesians were of the view that S and I are generally not equal (since they are done by different class of people for different purposes which are independent of each other). But Keynes said ex post S and I are always equal. This is because if planned investment > intended savings then there will be excess demand and hence a run down on inventories (prices remaining fixed). Hence ex post investment < planned investment to the extent it becomes equal to ex post savings. When intended savings > planned investments, then there is demand glut, hence inventories rise (prices remaining fixed).



1. Ex ante S & I: Keynes said these are equal only in equilibrium and in fact are generally not equal (since they are done by different class of people for different purposes which are independent of each other). When in an year planned investment > planned savings the level of income rises. At the higher level of income planned savings will increase (S = f(Y)) and thus planned savings becomes equal to planned investment. Similarly vice versa and thus planned savings and planned investment are equal only in equilibrium.

Inflationary Gap

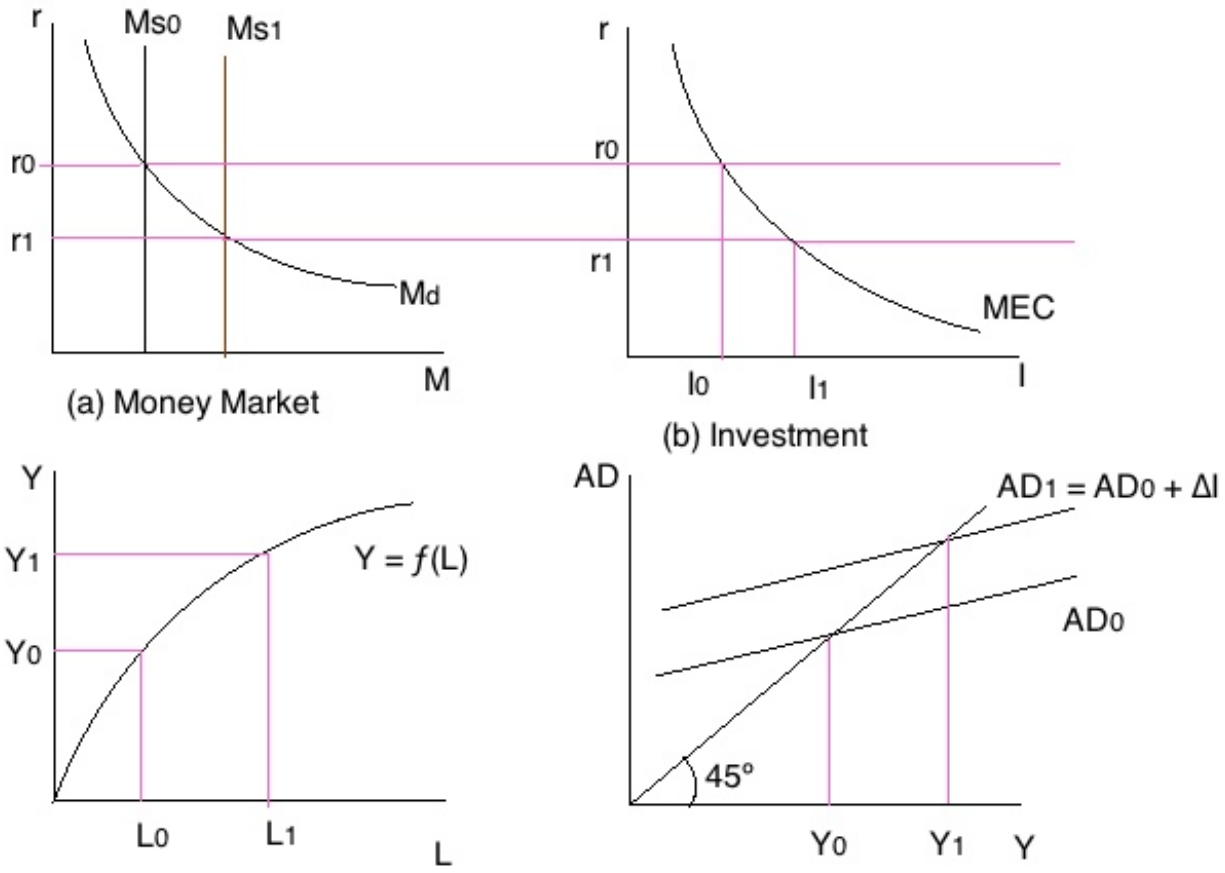


1. This occurs when the actual AD (AD_2) > full employment AD (AD_F). Since Y_F is the full employment level, output beyond it will only be inflationary. The amount by which AD_2 needs to be reduced to come back to full employment level is called the inflationary gap. Vertical distance EK is the inflationary gap.
2. Deflationary gap is the reverse i.e. the amount by which we need to raise the AD so that the level of output becomes equal to the full employment output.

Keynes' Complete Macroeconomic Model: Integration of Goods and Money Market

Keynes vs Classicals on Monetary Policy

1. Keynes believed interest rate is determined by demand of money and supply of money i.e. money market equilibrium whereas classicals believed it was determined by savings - investment equilibrium i.e. capital market equilibrium.



1. Impact of monetary policy: Classicals thus believed that changes in money supply are irrelevant for real markets (called classical dichotomy). But Keynes believed that money supply can impact real variables via 3 factors - (a) elasticity of liquidity preference curve, (b) elasticity of investment curve, and (c) multiplier. An increase in monetary supply can lead to a fall in interest rates. This will depend on the elasticity of the money demand curve (i.e. the liquidity preference curve). If it is not too flat i.e. not too elastic, a change in money supply will lead to a change in interest rates. Now I is dependent on both MEC and r. So if investment curve is not too inelastic i.e. vertical wrt r, then a change in r will lead to a change in I. A change in I will lead to a change in Y depending upon the multiplier.

Q. 'Monetarists are of the view that only money does and Keynesian believe that money doesn't matter.' What is your reasoning of the extreme views held by the monetarists and the Keynesians? (2011, I, 20)

Determination of Income - 3 Sector Model, Constant Prices

Government Spending

1. Government spending is decided by the government in consideration of promoting social welfare, employment and growth of the economy and thus is independent of Y. Hence G is also an autonomous variable i.e. G^o.
2. Crowding out effect: $S = I + (G - T)$. Thus if G increases without any change in T, then I will decrease. This happens through the rise in r. If G is increased and the budget is balanced by increasing T, still interest rates will increase crowding out I. This is because as T increases, Y_d decreases and this decrease leads to a fall in both C and S. The decrease in S leads to rise in r and thus fall in I.
3. Crowding in effect: In India there are many infrastructure bottlenecks. Since government expenditure is also spent in infrastructure projects it may actually lead to increase in MEC and thus crowding in of I.

Balanced Budget

1. Balanced budget or budget multiplier of 1 is the condition when t = 0 and only lump sum taxes are there. All government expenditure is exactly financed by levying lump sum taxes only.

Fiscal Drag

1. Any change in G^o will lead to ΔY = multiplier * ΔG^o. But if instead of increasing G^o, Tx^o were decreased, then effect on Y would have been smaller. It would be mpc (ß) * multiplier. This gap is fiscal drag. Thus to come out of recession increasing G^o is the preferred way than cutting Tx^o.
2. If G^o is increased and is financed exactly by raising Tx^o then the impact on output is exactly ΔG^o.

Determination of Income - 4 Sector Model, Constant Prices

Augmented Savings Investment Approach

1. $S + (T- G) = I + NX$. Thus a CAD leads to capital inflows and plugging the savings - investment gap.
2. In Keynes, $Yd = C + S$. Also $Yd = Y - Ta + Tr$. This means $Y = Yd + Ta - Tr$ or $Y = C + S + Ta - Tr$. But $Y = C + I + G + NX$ as well. This means $C + I + G + NX = C + S + Ta - Tr$. This gives $S = I + (G + Tr - Ta) + NX$ which means that if all output was in loaves of bread, whatever loaves we don't consume can be - (a) borrowed by government, (b) exported, or (c) invested.

Theory of Consumption Demand

Consumption Function

1. $C = C^o + ß \cdot Y$ where ß is the mpc and $ß < 1$. Thus as Y increases the average propensity to consume decreases and a progressively larger part of Y is saved. Thus to achieve and maintain equilibrium @ full employment level, increasing proportion of Y needs to be invested. If sufficient profitable opportunities for I are not available, the economy would run into trouble, AD would be < AS and depression would occur.

Determinants of MPC

1. Demonstration effect: People of lower and middle classes try to imitate the consumption standards of the rich and this increases their mpc.
2. Real balance effect: Changes in price levels lead to change in real balances (nominal money balances / P). If P increases then real balances fall i.e. the real value of money balances held by people (their purchasing power) falls. This leads to a cut in consumption and a downward shift in the consumption function.
3. Fiscal policy: By levying taxes, excise duties etc. the government can impact the consumption.
4. Interest rate: Higher interest rates induce people to save more and thus mpc falls. At the same time people who

are looking for a fixed savings target will now save less.

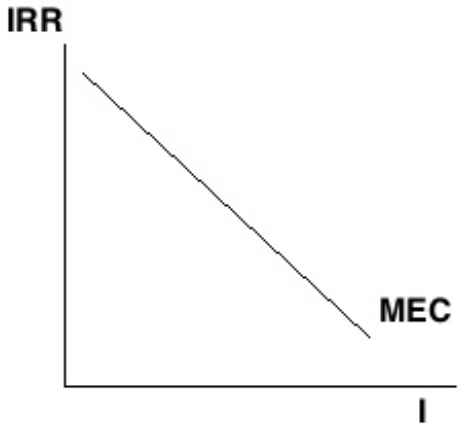
5. Wealth stock: Greater the amount of wealth (physical + financial assets) more the consumption at same income since one of the important objectives of savings is to accumulate wealth.
6. Credit conditions: Availability of easy credit increases mpc and shifts the consumption function upwards.
7. Income distribution: Higher the inequality, lower the mpc since rich consume less.
8. Changes in expectations: When people are uncertain about their future incomes they start to save more.

Importance of Keynes' Consumption Function

1. Invalidation of Say's law: As Y increases, the rise in C is < rise in Y. Remaining goes into savings and there is no guarantee that all planned savings will go into planned I.
2. Brings out the crucial importance of I.
3. Gives rise to the theory of multiplier.
4. Business cycles: Entrepreneurs' expectations regarding future π (MEC) is determined by their estimates of future consumption demand which in turn is derived from current demand. But as Y rises rise in C is less and rise in S is more (since apc decreases as Y increases). Thus at a point in time investors become uncertain if the future demand will be able to sustain I. In a depression the apc increases as Y falls. Thus at a point consumption becomes large enough to sustain fresh investments.

Theory of Investment Demand

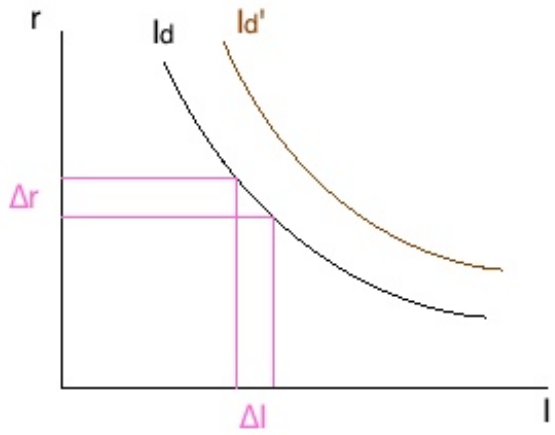
Q. The marginal efficiency of capital together with the current rate of interest determine the profitability of an investment project. How does it help in the selection of an investment project? (2011, I, 20)



MEC in General Economy

1. It is the MEC in general which will indicate the scope of investment opportunities in the economy. At a particular time in an economy, MEC in general is the ME of that particular capital asset which yields the highest rate of π. As more I is done, MEC in general will decline. This is so because as more investment is done, output will be higher in future and this will suppress the prices in future leading to fall in π. Also more the investment, more the demand of capital goods and higher the supply price of capital.

Investment Demand Curve



1. This curve shows how much investment will be undertaken at various interest rates. If the curve is less elastic then investment demand will not increase much even with a fall in r. But if the curve is elastic a small fall in r can boost I.
2. As MEC changes, I_d curve will shift as @ same interest rates now different profits are expected and thus different I_d.

Factors Causing Shift in I_d Curve

1. Change in MEC due to change in π expectations.
2. Change in expected demand of products.
3. Technology and innovations: They can reduce costs like computers did and increase π.
4. User cost of capital.
5. Availability of credit.
6. Fiscal policy: There can be both crowd out as well as crowd in effects.

Monetary and Fiscal Policy Implications of Keynes on I

1. Monetary policy: Early Keynesians believed that monetary policy was not very effective for increasing I. This was based on the view that in depression r is already very low and liquidity trap exists. Expansion of money supply doesn't lower the r any further, thus M_d curve is very flat. Besides I_d curve is relatively inelastic so that even a lowering of r doesn't affect I much and it is more affected by MEC. Thus monetary policy is useless. But later Keynesians concede that M_d curve is less elastic @ normal rates and I_d curve is more elastic, thus monetary policy can be effective.
2. Fiscal policy: Early Keynesians believed it is very effective though later Keynesians concede the crowding out effect exists. Further accelerator model increases investment.

Multiplier Model
Model

1. Let $C = C^o + ß(Y - Tx + Tr)$. Let $M = M^o + mY$. Let $Tx = Tx^o + tY$. Now $Y = C + I^o + G^o + X^o + M$. Substituting everything we get, $Y = (C^o - ßTx^o + ßTr^o + I^o + G^o + X^o - M^o) + Y*(ß*(1-t) - m)$.
2. Thus $Y = A^o$ * multiplier. Here A^o (Autonomous expenditure) $= C^o - ß(Tx^o - Tr^o) + I^o + G^o + X^o - M^o$ and multiplier $= 1/(1 - ß*(1-t) + m)$.

Assumptions

1. MPC remains constant as Y increases. This is supported by empirical research which shows in SR mpc remains stable.
2. The secondary effects (like crowding out) are negligible or already taken into account in ΔI. There is no time lag between ΔI and ΔY.
3. Excess capacity exists in consumer goods industry so that when demand increases, more amounts of goods can be produced to meet this demand. If the economy is already @ or close to full employment then increase in AD will lead to a rise in prices and not rise in Y. This makes it of limited use in developing economies.

Leakages in the Multiplier Process

1. Savings is a leakage since if there were no savings, mpc would be 1 and multiplier would be infinite.
2. Imports, taxes.
3. Inflation: Since as prices increase the effect of multiplier gets reduced as the output can't be increased.

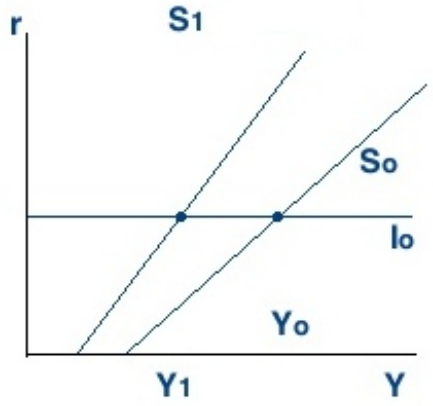
Dynamic Multiplier - Continuous Injection Model

1. Let in period 1 Y be @ equilibrium. In period 2 the firm decides to invest. As a result income of factors engaged in the production of capital goods goes up and AD increases. It is assumed that impact in AD comes 1 period later. Thus $Y_t = C_t + I_t$ where $C_t = a + b.Y_{t-1}$ and $I_t = I_t$. Thus $Y_t = a + b.Y_{t-1} + I_t$. Here we are assuming I is an autonomous variable. We also assume that the change in investment is permanent i.e. it continues to be made in subsequent periods.
2. Thus $Y_2 = Y_1 + \Delta I$. In the 3rd period the consumption rises as a result of rise in Y in the 2nd period, thus $Y_3 = Y_1 + \Delta I + b\Delta I$. In the 4th period, consumption will again rise b . (ΔY_3) i.e. b * b * ΔI. So we can write $Y_t = Y_1 + \Delta I + b.\Delta I + b^{2}.\Delta I + ... + b^{n-1}.\Delta I$. Solving as n tends to infinity, we get $Y_n - Y_1 = \Delta I (1/1-b)$ or the multiplier $(\Delta Y/\Delta I) = 1/(1 - b)$.

Dynamic Multiplier - Single Injection Model

1. If only an impulse of ΔI is given in the 2nd period and it is discontinued afterwards then it can be proved that the multiplier remains same using above technique.

Paradox of Thrift



1. Classical economists believed that increased savings would mean higher investments and thus higher income.
2. But Keynes said that when all people in the economy try to save more they are actually unable to do so. In fact it may even lead to a decline in their income and worsening of recession. This is because as people try to save more, it will lower the consumption demand and thus AD will fall. At the lower level of Y, savings will be same but consumption will fall.

Can the Thrift Paradox be Avoided?

1. Thrift paradox holds good when the economy is in recession. But classical economists believed it can be avoided if the extra savings can be channelized back into investments. If this is done then savings will go up leading to a fall in r and thus rise in I. But Keynes said that in recession, I_d curve was very steep so that I depends very little on additional savings and more on MEC. Without expansionary fiscal policy, thrift paradox can't be avoided.

AD & AS Model - With Variable Prices
AD Curve - Why is it Downward Sloping

1. Real balance effect: Changes in price levels affect the real value i.e. purchasing power of money balances with fixed nominal values. With rise in P, real balances decline making people poorer and thus inducing them to reduce their consumption and AD falls. Similarly as P falls, real balances rise, so does the purchasing power and AD rises.
2. Interest rate effect: At higher prices, people will need more money to carry out a given amount of transactions. This will lead to higher demand for money for transaction purposes. But given a money supply, higher money demand will lead to higher interest rates and thus a fall in investment demand. Thus AD falls @ higher prices.
3. Foreign trade effect: As price levels rise, domestic goods become expensive. This leads to an increase in demand for imports as well as a decrease in demand for exports (as they become expensive too).

Multiplier with Changes in Prices

1. In the flexible prices environment, multiplier effect is less than full. This is because as prices rise, real balance effect, interest rate effect and foreign trade effect come into play and this leads to a fall in Y along the AD curve.

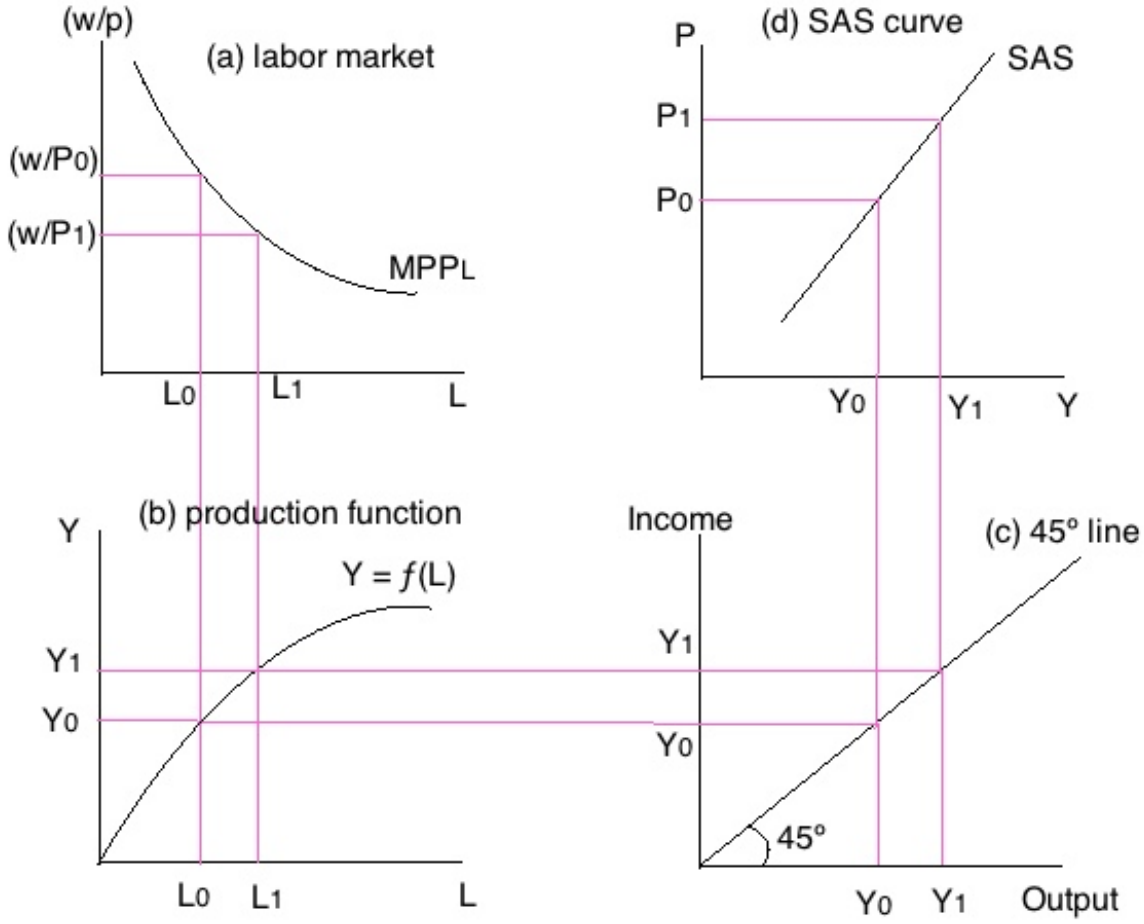
Intermediate Range of SAS Curve - Why Upward Sloping Before Full Employment?

1. The overall economy consists of a number of industries and markets. Full employment is not attained simultaneously in all markets and industries. So AS curve starts to slope up even before full employment.
2. To overcome the shortage of skilled labor or efficient capital, less efficient factors may be employed which leads to escalation in costs along with increase in output.

Long Run AS Curve

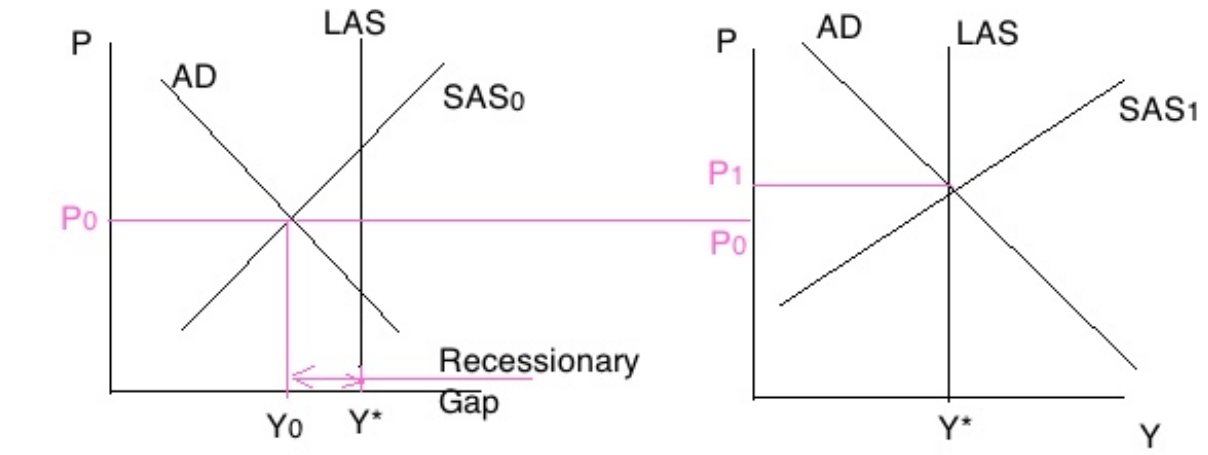
1. It is vertical because LAS depends on quantity of available labor, stock of capital and state of technology and not on money or prices.

Derivation of SAS - Sticky Wage Model



1. The fundamental SR supply equation is $Y = Y^o + \alpha . (P - P_e)$. When there is unexpected price change, nominal wages remain sticky hence the real wages change. As real wages change, labor market readjusts to come back to equilibrium but @ different employment level. This changes the output and thus SAS when plotted against prices shows an upward sloping curve.

LR Equilibrium



1. In the LR, real GDP equals potential GDP. But this LR equilibrium of the price level and real GDP occurs when the money wage rate adjusts so that the SAS shifts to intersect the AD curve @ a point on the LAS curve. As can be seen SAS_0 is in equilibrium with AD @ < Y*.
2. If money wages were flexible (as they are according to classicals, monetarists, new classicals) then they would have fallen and SAS would shift to right and thus it would meet LAS and AD @ P_1. This is the long run equilibrium point.

Keynes' vs Classical Economics

Say's Law

1. A part of the income is saved. Say's law assumes that all this savings will go into additional investments. If all this savings is not channelized into investments there will be a structural deficiency in AD. This will lead to producers being unable to sell all their output, fall in π and hence involuntary unemployment. Keynes said exhaustion of savings by investment is not necessary. People who save are different from people who invest and the two are often guided by very different set of factors. Savers save for old age, education, marriages of children, speculation and to provide for unanticipated future emergencies. Investments depend on marginal efficiency of capital (MEC) i.e. expected rate of profits, interest rate, population growth and technological progress. Keynes said savings is dependent mainly on income and it is the changes in income which bring about equality in savings and investment rather than the changes in interest. But classical economists ignored the changes in income because of their assumption of full employment.

General Wage Cut

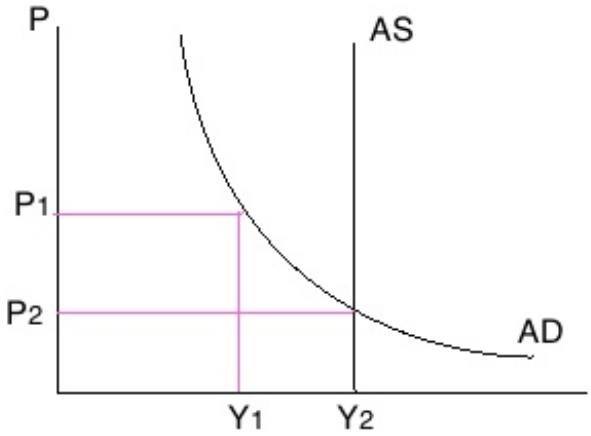
1. Wage - employment paradox: Pigou advocated general wage cut to get out of depression. But Keynes said it will reduce AD. Wages are not only cost of production but they are also the incomes of workers which constitute majority of purchasing power in the economy. If there is a general cut in wages, incomes of workers will fall and hence AD will fall too. As a result of decline in AD the output cannot increase and may have to be reduced causing further unemployment.
2. Sticky wages: Keynes said prices and wages are inflexible downward (as against the quick adjustment assumption of classical economics) and thus a fall in AD leads to involuntary unemployment. Classicals believe AS is vertical. So when AD reduces it merely reduces the price levels (via fall in money prices and money wages). But Keynes thought AS is horizontal in short run. Thus when AD falls, real output falls as well since money wages don't fall accordingly.

Effect of a General Wage Cut

1. Propensity to consume: It is likely to reduce C_d by adversely affecting mpc. Wage cuts are likely to lead to a redistribution of income from wage earners to the relatively richer sections. Since their mpc is lower, overall mpc is going to come down. Similarly wealth will redistribute from debtors to creditors (since wage cuts will lead to price cuts) and creditors have lower mpc than debtors.
2. MEC: Effect of wage cuts on MEC is uncertain and depends upon expectation effect. This is that if the entrepreneurs expect that although wages have been cut in present they will rise in future it will have favorable effect on MEC. This is because higher wages will mean higher purchasing power and hence higher AD in future. But if they expect that the current wage cut will lead to more wage cuts in future, MEC will fall. The negative expectation effect is usually more dominant. A cut in money wages reduces C_d which influences future prospective π.

3. Interest rate: A cut in wages will lead to a fall in prices and thus will reduce the transactions demand for money. As a result the money available for speculative purposes will increase which will lead to a decline in r. If r falls more I will take place which will raise AD. But the effect depend upon - (a) elasticity of M_d curve, (b) elasticity of I_d curve, and (c) multiplier. Anyways, Keynes agree that a cut in wages will stimulate investment via a fall in r. But he argue that r can be lowered equally by an increase in money supply and there is no need for a wage cut.
4. Real balance effect or Pigou effect: Pigou claimed that cut in wages will lead to increase in employment. Apart from lowering cost of production, according to Pigou when wages fall the prices fall and this leads to an increase in the real balances i.e. purchasing power of the balances held by people. This induces them to increase their consumption. Keynes agreed to real balance effect but expressed doubts over its quantitative significance. Empirical evidence is not in support of Pigou effect being strong.

Theories of Aggregate Demand - Stable vs Unstable AD



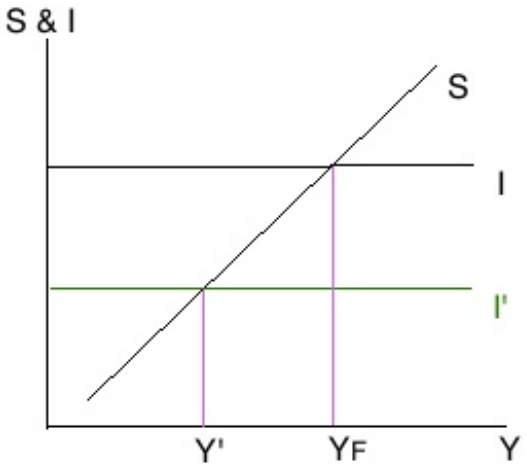
1. Classical economists didn't have an explicit theory on AD. An implicit theory of AD is derived from their quantity theory of money. P = MV/Y. Now V is assumed constant so PY is determined by M. Given a fixed supply of money, the price and AD are inversely related in a rectangular hyperbola. An increase in money supply, according to classicals, will only lead to change in price levels as the AD curve shifts to right. Thus a government must control the supply of money to prevent inflation. If AD falls, prices and wages will quickly adjust to restore full employment output. AD curve according to them is stable so long as money supply is stable.
2. Keynes believed AD = C + I + G + NX. AD is unstable and quite often changes from one period to another due to unstable I demand. Keynes thought that AD can thus change irrespective of changes in money supply and thus there is no guarantee that increasing money supply will increase prices or controlling money supply will decrease prices. AD fluctuations cause business cycles. If AD falls, then system will not correct itself and we need government intervention to correct it.

Theories of AS

1. Classicals thought supply depends only on labor, technology and capital and not on prices. So AS curve is vertical in LR. And since prices and wages adjust quickly to restore equilibrium, AS curve is vertical in SR as well. AD thus plays no role in output and employment determination.
2. Keynes thought while LAS may be vertical, SAS is horizontal or very flat. This is because there is lot of idle capacity in SR if the economy is in depression. Wages are rigid and thus fall in prices increases real wages and hence involuntary unemployment arises and economy may attain equilibrium below the full employment level. When AD increases more output can be provided at the same prices. Its only when economy starts to approach full employment that SAS curve becomes upward sloping. At full employment it becomes vertical. So Keynesians divide AS curve into 3 ranges - (a) flat or Keynes range, (b) upward sloping or intermediate range, and (c) vertical or classical range. Moreover in Keynes, AD has important role to play in determination of output and employment.

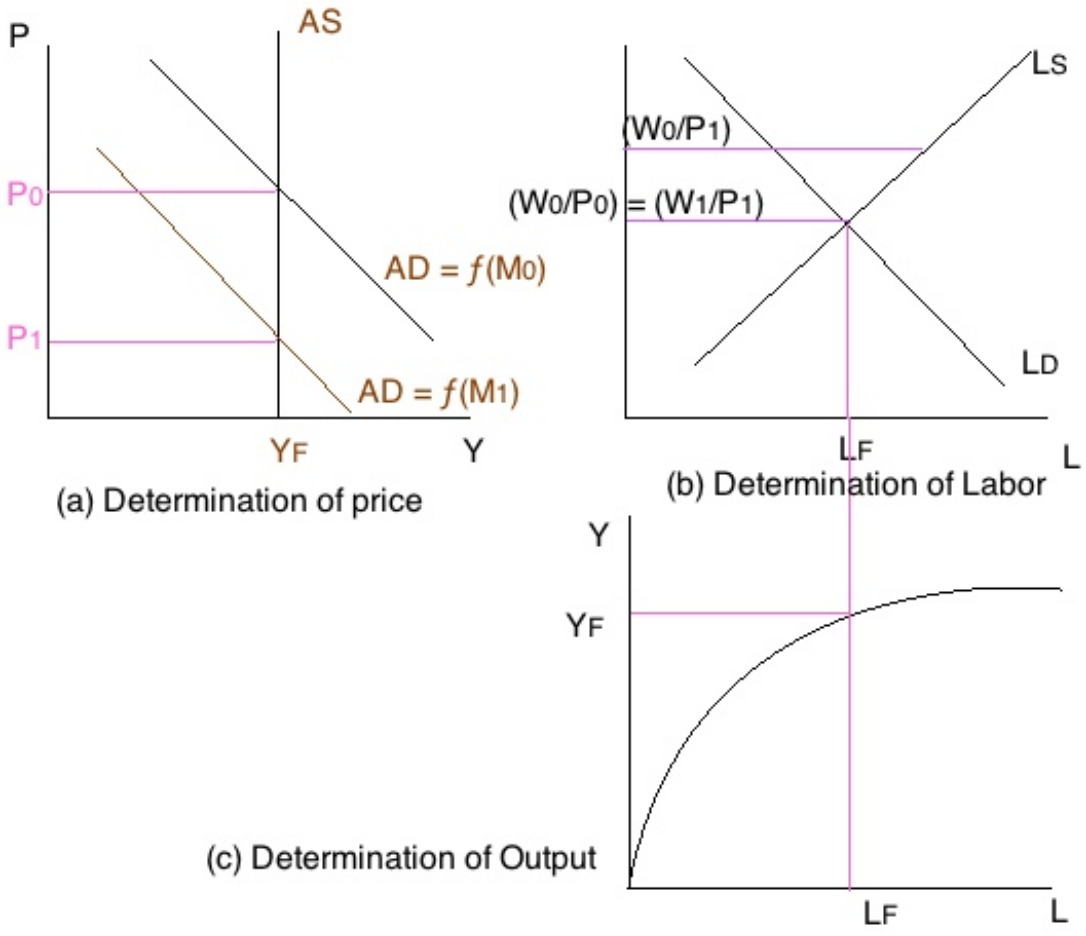
Savings - Investment Equilibrium: Are Savings Automatically Invested?

1. Classicals due to their belief in Say's law believed that planned savings are always equal to planned investment. Supply creates its own demand and there is no leakage. Savings and investment are determined by interest rates and whenever savings exceeded investment, interest rates fell to bring them back into equilibrium.

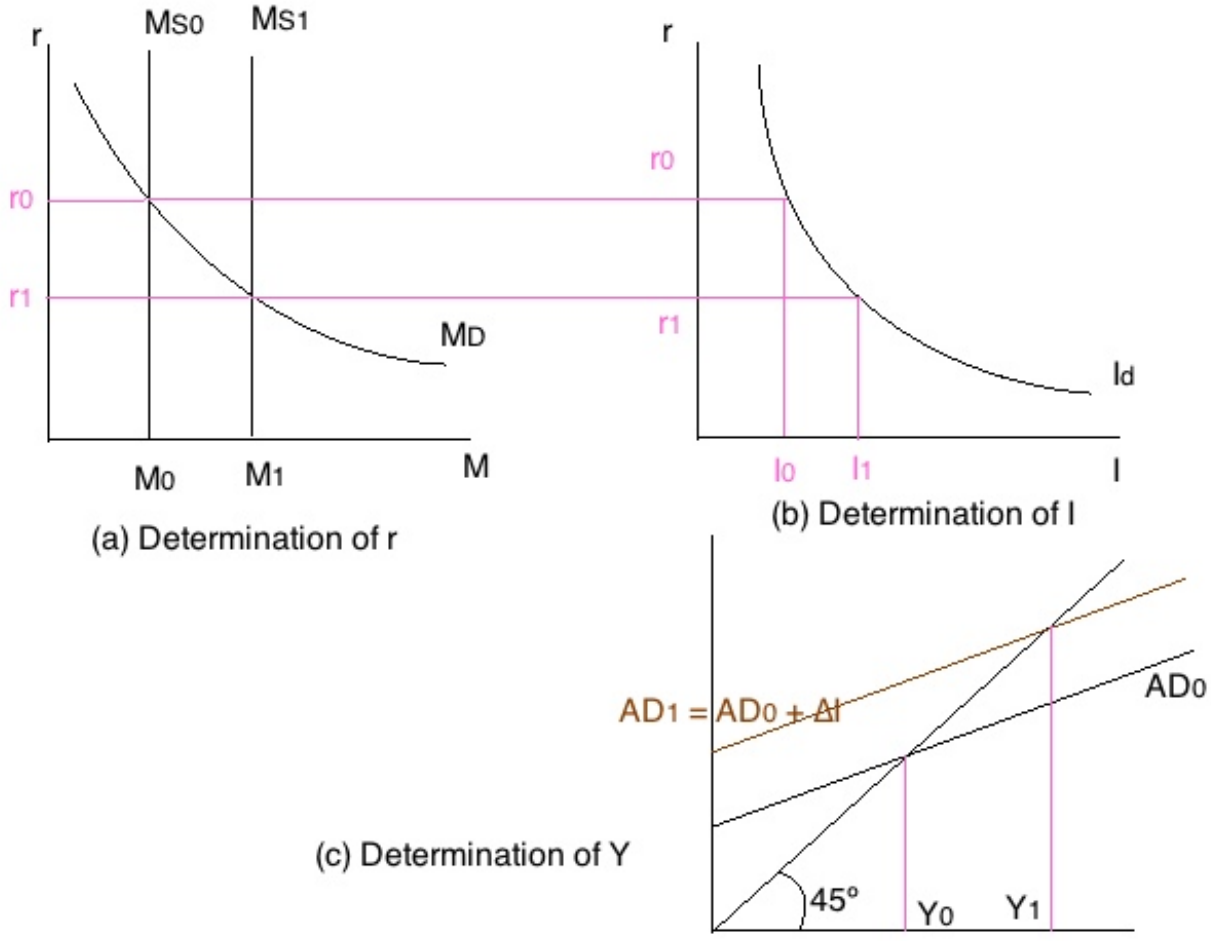


1. Keynes held that Say's law is not valid and so planned savings need not be equal to planned investment. Investment is not determined by r but predominantly by MEC and hence is autonomous. Savings is a function of income. If planned investment falls short of planned savings then classicals believed r would bring them back to equality. But Keynes asserted that fall in I will lead to fall in Y and the new equilibrium will be much below the full employment output. Similarly if economy decides to save more, thrift paradox will occur and output will fall more.

Classical Dichotomy - Role of Money



1. Classicals thought as money supply decreases from M_0 to M_1 the AD curve shifts down and prices fall (since for the same level of output now prices are less P = MV/P). As prices fall real wages go up (from W_0/P_0 to W_0/P_1) but labor market goes into disequilibrium. Quickly money wages fall from W_0 to W_1 and labor market equilibrium is restored @ L_F. Since labor employed remains unchanged output remains unchanged too and thus change in money or prices has no impact on real variables.



1. Keynesian thought is as depicted above. Key thing is that the impact of monetary policy depends upon: (a) elasticity of M_d curve, (b) elasticity of I_d curve, and (c) multiplier.

Explanation of Great Depression

1. Classical economics failed to provide an explanation to the depression. They advocated a general cut in wages to restore full employment. Their theory is based on (a) diminishing marginal productivity of labor and (b) theory of marginal productivity of distribution. While the former says as more labor is employed the marginal product falls, the latter says factors are paid their marginal product. Taken together it means that as more labor is hired wages fall, so they advocated a general cut in wages to lift employment.
2. Keynes proved depression occurred due to fall in MEC and hence fall in I and hence fall in AD. To get out AD needs to be lifted via government intervention. He argues a cut in wages will only reduce AD and worsen the depression. Keynes accepted the law of diminishing returns and marginal productivity theory of distribution but turned the conclusion upside down by saying as P rise, real wages will fall and more labor will be employed. Increase in employment of labor will lead to higher marginal costs, hence higher prices and lower real wages. So he advocated raising AD to raise employment.

Explanation of Inflation

1. According to classicals, M = kPY where k is the propensity to hold money. Thus $(\Delta M/M) = (\Delta P/P) + (\Delta Y/Y)$ because k remains constant. Thus inflation (π) $= (\Delta P/P) = (\Delta M/M) - (\Delta Y/Y)$. Output growth is determined by growth in labor, capital and technology. In short run, all these things remain constant, thus $\pi = (\Delta M/M)$. So central bank should ensure stable money supply and change in money supply causes π.
2. Keynes said change in money supply is just one of and not a decisive reasons for π. k is not a constant and in fact can fluctuate a lot in SR. AD fluctuations are more relevant in determining π. If SAS is a horizontal line then an increase in AD caused due to increase in money supply may not cause any inflation. The effect of money supply on inflation will depend on elasticity of M_d curve, elasticity of I_d curve and slope of SAS curve.

Applicability of Keynes to Developing Countries

Keynes' Multiplier
(a) VRV Rao

1. Rao showed that the multiplier is not much applicable in case of developing countries. This is because unlike developed countries where lot of excess capacity and idle resources exist in a recession and there was a high elasticity of output to changes in AD, developing countries had very little excess capacity (and specially in consumer goods industry). Thus when there is an injection of I and as a result of successive rounds of operation of multiplier the demand for consumer goods increases but due to lack of additional capacity only their prices increase and not output.
2. Second condition proposed by Rao was that for proper working of multiplier raw materials and financial capital must be highly elastic to increase in AD. In developing countries economy is mainly dependent on agriculture which is not elastic to demand.
3. Third was that multiplier assumed that there is involuntary unemployment. But in developing countries this condition is not fulfilled as there is disguised unemployment supported by the joint family system and people are not willing to migrate.

(b) Modern View

1. There has been lot of economic growth and structural transformations. So presently it can't be said multiplier is not applicable. There are many sectors in the economy where there is lot of excess capacity at times. Raw and intermediate goods sectors like cement, steel, fertilizers can all suffer from excess capacity and hence high elasticity to demand.
2. Planned investment can lead to creation of many infrastructure projects which can lead to multiplier effect on Y.
3. Even in agriculture, due to green revolution and expansion of irrigation food grain output can be adequately increased in response to demand. Prices work as important signal in agriculture as well. Also large amount of involuntary unemployment in India is present as more and more people are migrating and disguised unemployment is reducing.
4. In the LR context increase in I anyways leads to manifold increase in Y.

Keynes on Deficit Financing and AD

1. The nature of unemployment prevailing in developing countries was different from that prevailing during recessions in developed countries. In developing countries it was of the type of disguised, chronic and lack of wage goods type. So raising AD via deficit financing will not be effective in developing countries. Deficit financing can only help when there are idle resources in the economy.
2. But the development in last half a century has made AD an important factor in determination of Y and employment. It can no longer be assumed that the country will not have deficiency of demand.

Investment Behavior

1. Keynes said that I is autonomous and as I goes up, Y will go up (multiplier) and as a result S will go up. More importantly I will depend on MEC. This view is as much applicable to developing countries as to the developed. No longer it is sufficient to stress that savings should be increased. Rather a proper investment climate needs to be created as well.

Portfolio Choice by Investors

1. Classical economists were concerned with an economy where money played no role as a store of value. But Keynes asserted it acts as a store of value as well and for this people have the alternative between holding financial assets and money.
2. In the Indian economy traditionally households savings were predominantly in form of physical assets but over past 2 decades financial savings have increased tremendously. In fact now depending upon the business cycle and fluctuations in interest rates, we can see the relative changes in physical and financial assets highlighting the role played by money as a store of value.
3. In India because real rates of interest have been negative due to financial repression, households have traditionally preferred to save in physical assets. Only between 1983 to 1999 the financial savings exceeded physical savings. Financial savings by households now increasingly depend on the business environment and risk appetite. It increased from 10% in 2004-05 to 11.5% in 2007-08, fell to 10% in 2008-09 and in the market recovery of 2009-10 it rose to 13%. But in 2010-11 it came back to 10%. Physical asset savings show an opposite trend declining from a high of 13.5% in 2004-05 to a low of 10.8% in 2007-08. Then it spiked to 13.5% in 2008-09, fell to 12.4% in following year but in 2010-11, it rose to 12.8% again.

Consumption Function

1. Classical economists didn't have an explicit theory on consumption. But since C = Y - S, and S depends on r and Y is independent, so according to them, C depends on r. But Keynes said C = a + b.Y i.e. consumption is mainly dependent on income.
2. Empirical research has supported Keynes in India.

Role of Government Intervention

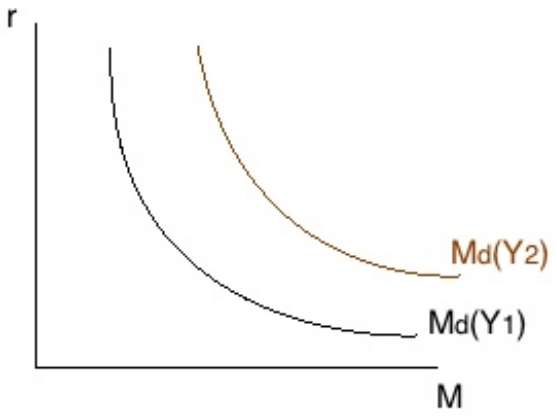
1. Classicals argued government intervention should be minimum while Keynes supported it. Obviously Keynes is applicable. G can cause crowding in effect in developing countries.

Determination of Interest Rate - Liquidity Preference Theory

Basic Concept

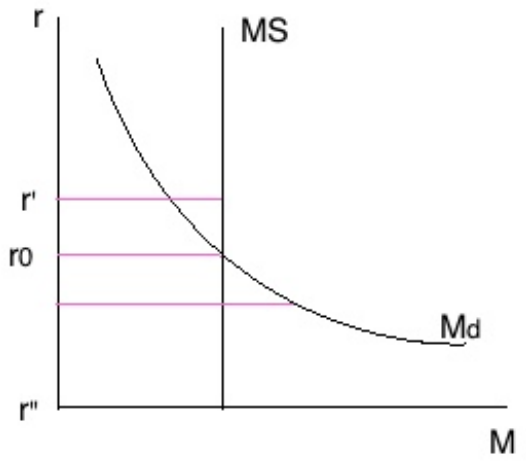
1. Keynes believed r is purely a monetary phenomenon and is determined by demand for money and supply of money. He considered interest to be a reward for parting with liquidity for a specified period. Since people prefer liquidity to meet their various motives, they need to be compensated for surrendering it.
2. This is in contrast with classical theory which determines r purely in terms of real variables like S and I. Keynes on the other hand made r determination a purely monetary phenomenon. He agreed that marginal revenue product of capital (MRP_K) tends to become equal to r but it is not r which is determined by MRP_K but the other way round. One can use the MEC concept to explain this.
3. Also Keynes asserted its nor r which equalizes S and I. But this equality is brought about by changes in Y.

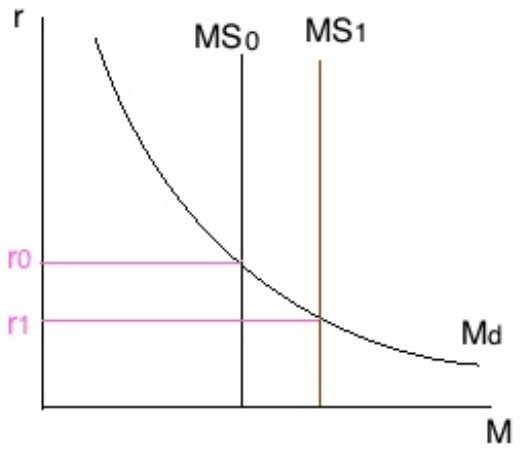
Demand for Money



1. Keynes assumed a simple economy where people can hold either cash (which doesn't pay any interest and is fully liquid) or bonds (which pay interest and are not fully liquid).
2. Transactions & precautionary motive: Higher nominal income means higher transaction needs and hence higher real balanced demanded and hence higher M_d.
3. Speculative motive: Higher the r, lower the speculative demand for money. This is because - (a) higher r means higher opportunity cost of holding money. (b) If current r is higher than what it is expected to be in future, people will like to hold more bonds and less money. Since r is a mean reverting variable, at higher r, more people will think r will fall in future and hence lower M_d.
4. Money demand: Due to speculative motives M_d decreases with rise in r and with fall in nominal income. Plotting it against r we get a downward sloping curve. A higher nominal income will mean a rightward shift in the curve.

Equilibrium and Interest Rate Determination





1. The supply of money is fixed by the central bank. Equilibrium is established where both curves intersect. If r is higher than the equilibrium rate, $M_s > M_d$ and people will react by reducing their real balances by buying bonds. This will be people will expect r to fall and hence bond prices to rise and hence buy bonds. Since total money supply is fixed, this will lead to increase in bond prices i.e. fall in r. Similarly if r were to be less than equilibrium rate, $M_d > M_s$ and people will like to sell bonds to hold greater quantity of money and r will rise.
2. Effects of money supply: See figure.

Shift in LP / M_d Curve

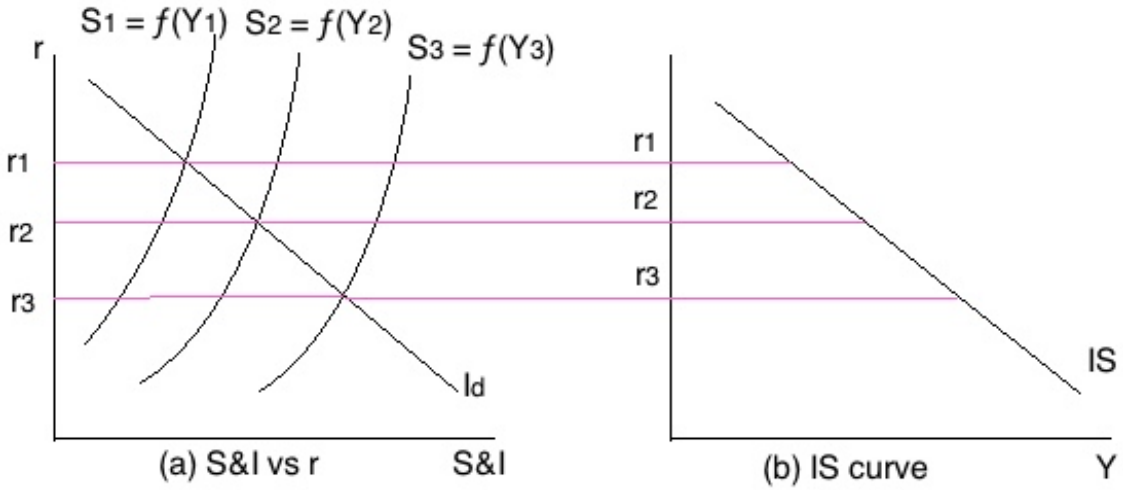
1. The position of LP (M_d) curve depends on 2 factors - (a) nominal income, and (b) expectations of future interest rate moves.
2. If nominal income goes up then for same r people would want to hold more money (transactions demand for money will go up). So LP curve will shift up.
3. If expectations for for future interest rates change that rates will be higher than what was previously thought then people will like to hold more money (to take advantage of investing @ higher rates) and sell bonds. This will lead to an upward shift in LP curve. This will cause r to rise.

Criticism

1. Indeterminacy: In Keynes we need to know Y to determine r and we need to know r to determine Y. This is because r is determined by M_s and M_d curves. And M_d curve depends on Y (due to transaction demand for money). Then r is used to determine I and thus Y.
2. Ignores real factors: r is not purely a monetary phenomenon. Real forces like productivity, thrift impact r. If MEC improves and thus I increases, r will go up. Similarly if people decide to save less (mpc rises) savings would change and thus r will change.

Q. In Keynesian theory "rate of interest is what it is because it is expected to become other than it is. If it is not expected to become other than it is, there is nothing to tell us why it is what it is." Critically evaluate this comment and explain the role of rate of interest in determination of equilibrium income. (2010, I, 40)

Neo Classical Synthesis
IS-LM Framework
IS Curve
(a) Conceptual Analysis

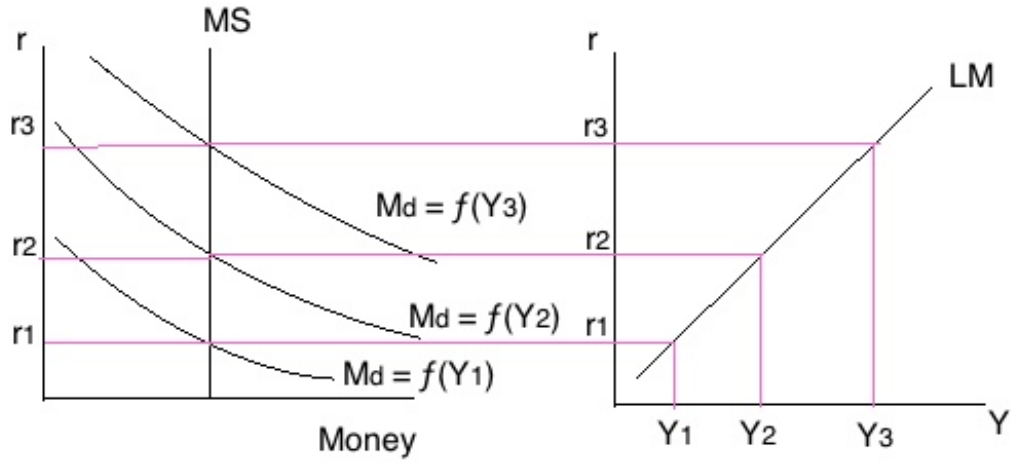


1. Derived from classical economics: S = f(Y). So as Y increases, S increases. If we are plotting S against r, we will see S curve shifting rightwards as Y increases. But I_d is autonomous of Y and thus there is no shift in I_d curve as Y changes. Also I_d is downward sloping. So the equilibrium point successively shifts down for higher Y. Hence IS curve is downward sloping.
2. Slope: (a) IS curve is the locus of equilibrium points of S & I curves and hence represents equilibrium in goods market. Keynes said I_d curve's steepness or elasticity will determine the slope of IS curve. Flatter the I_d curve, flatter the IS curve. (b) Slope of IS curve will also depend upon the magnitude of the multiplier. Higher the multiplier, flatter the curve.
3. Shift: It comes by autonomous expenditure.

(b) Mathematical Analysis

1. We know $Y = A^o * k$, where A^o (Autonomous expenditure) = $C^o - ß(Tx^o - Tr^o) + I^o + G^o + X^o - M^o$ and the multiplier (k) = $1/(1 - ß*(1-t) + m)$. Now I^o is not exogenous but depends on interest rates. Specifically $I = I^o - b.i$ where i = interest rate and I is the total investment and I^o is the exogenous investment in it.
2. Thus we can rewrite Keynes as $Y = k_e * A^o - k_e.b.i$. In other words income (Y) is inversely proportional to rate of interest (i).

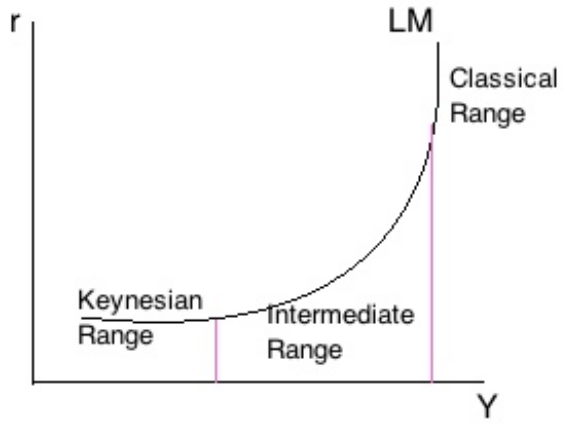
LM Curve
(a) Conceptual Analysis



1. Derived from Keynes: Higher the level of income, higher the transactions demand for money and hence rightward shift in M_d curve for a given r. Assuming money supply to be constant (fixed by central bank), LM curve is upward sloping.
2. Slope: The slope of LM curve will depend on (a) responsiveness of M_d to changes in income. This will determine the extent of the shift in M_d curve for a given ΔY. Higher transactions demand for money reduces the money available for speculative motives and hence higher r. Thus higher the responsiveness, higher the change in transaction demand, lower the money available for speculative purposes and higher the change in r for a given Y. (b) elasticity of M_d curve itself or its responsiveness to change in r. Lower the elasticity, flatter the LM curve. Assume the

M_d curve is very flat. Then any change in money supply for speculative purposes will not change r much. So effect of ΔY will be muted.

3. Shifts: (a) Change in money supply. Higher MS will lead to lower r for same M_d curve (and hence same Y). (b) Change in liquidity preference (the function f in $M_d = f(Y)$). If the liquidity preference shifts up, it will lead to higher r for same Y.



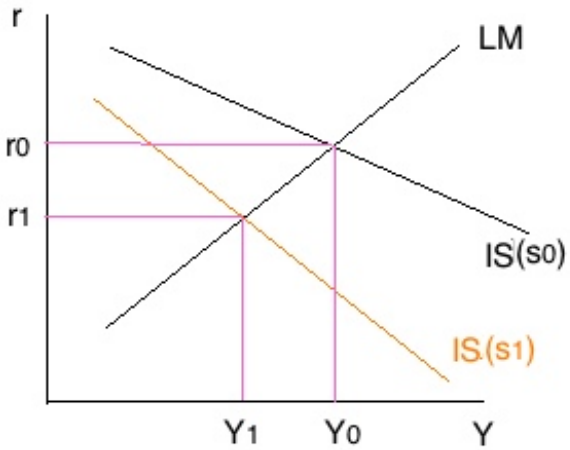
1. Elasticity of LM Curve: In the Keynesian range, M_d is flat thus any increase in Y doesn't lead to an increase in r and hence LM curve is very flat. In classical range, M_d is vertical and thus an increase in Y causes large change in r.

(b) Mathematical Analysis

1. Let real money supply be M^o i.e. nominal money supply / price levels (M^o/P). According to fisher equation, $M^oV = Y$ i.e. $M^o = kY$ where $k = 1/V$. Keynes argues money is also a store of value apart from being a medium of transaction. So $M^o = kY - h.i$. Thus demand for money is directly proportional to income (Y) but inversely proportional to rate of interest (i) because if interest rates rise people park more money in bonds and demand less cash balances and if interest rates fall, people sell their bonds and hold more cash balances.
2. Thus we can rewrite Keynes in money markets as $Y = (1/k).M^o + (h/k).i$.

IS-LM Equilibrium
(a) Conceptual Analysis

1. Shift: The determinate theory of interest is dependent upon (a) I_d curve or MEC. (b) Savings function $S = f(Y)$ or mps. (c) Liquidity preference curve. (d) Money supply. Any change in these will cause shifts.



1. Effect of change in mps: Higher mps means lower multiplier means steeper IS curve. Also higher mps means lower AD and hence lower Y. Thus the level of Y will fall @ each r and more steeply.

(b) Mathematical Analysis

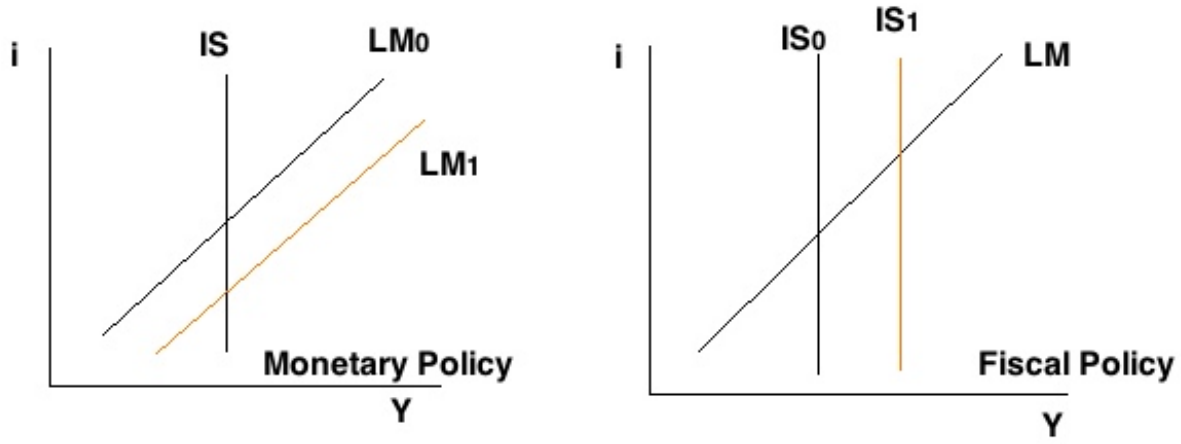
1. Let D = h + k_e.k.b. Then solutions are Y = (h.k_e/D) * A^o + (k_e.b/D) * M^o and i = (k_e.k/D) * A^o - (1/D) * M^o. (h.k_e/D) is called the fiscal multiplier while (k_e.b/D) is called the monetary multiplier.

(c) Criticism

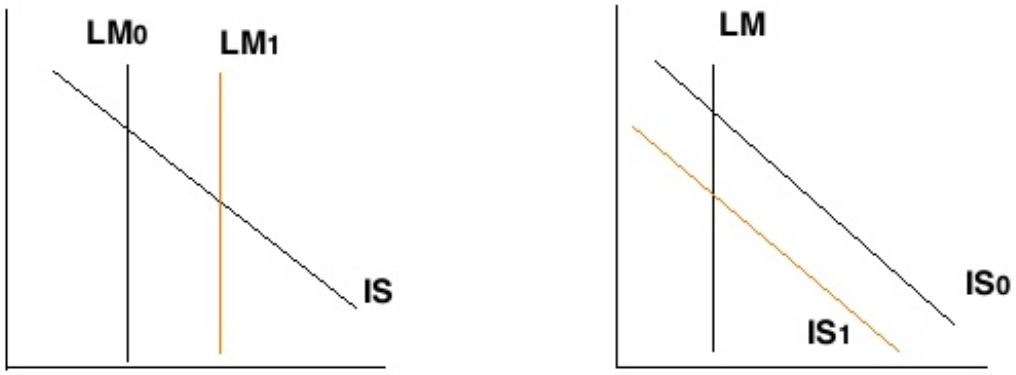
1. It assumes r is flexible and not fixed by central bank. If it is not, the adjustments don't take place.
2. It assumes I_d is elastic.
3. Lack of price adjustment: Patinkin has criticized IS - LM model for not allowing flexible prices. A change in any of these variables invariable changes prices.
4. Artificial separation: Friedman and Patinkin criticize it for artificially segmenting economy into goods and money sector. Real economy is not so water tight and these sectors are quite interwoven.

(d) Special Cases

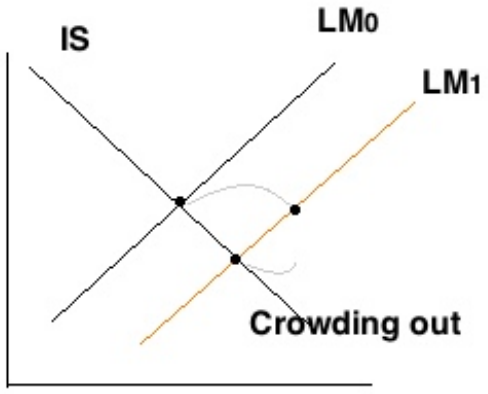
1. Vertical IS curve: Let b = 0 i.e. investment is completely exogenous and goods markets don't depend on interest rates. Thus IS curve is vertical. An expansionary monetary policy will have no impact (as seen from the graph below and also because monetary multiplier is (k_e.b/D) and hence 0). Fiscal policy, on the other hand, will have full impact.

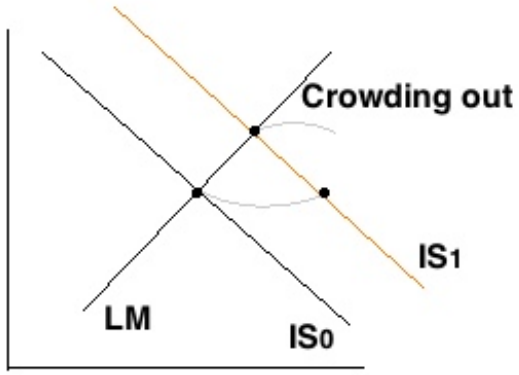


2. Vertical LM curve: Let h = 0 i.e. store of value utility of money is zero and money is purely used as a transaction medium. Thus LM curve is vertical. An expansionary fiscal policy will have no impact (as seen from the graph below and also because fiscal multiplier is (h.k_e/D) and hence 0). Monetary policy on the other hand will have full effect.

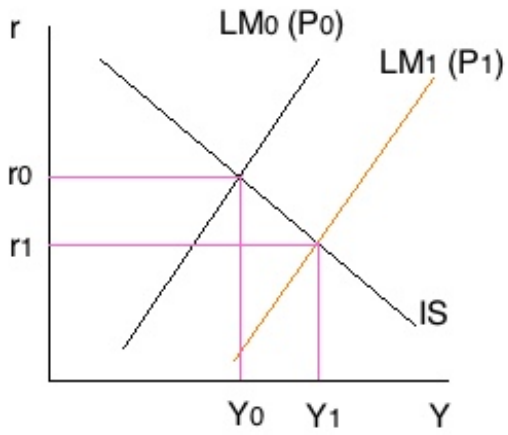


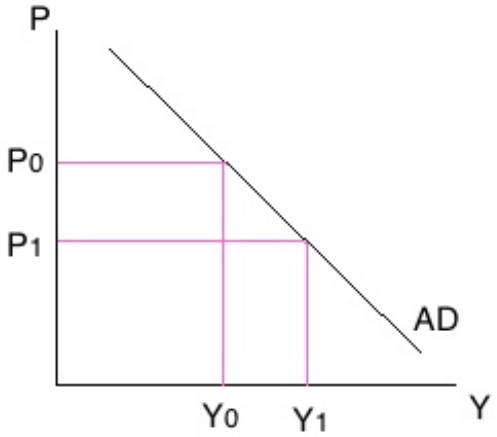
3. Crowding out effect:





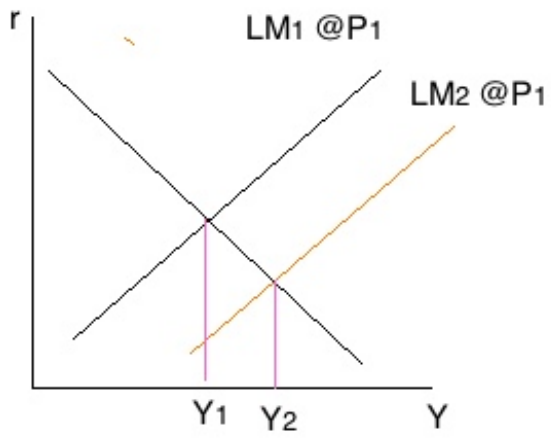
Deriving AD Curve with IS-LM Model

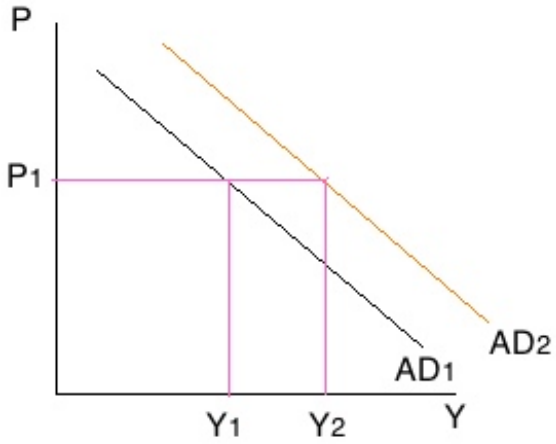




1. For any given money supply as prices fall, the supply of real money balances increases. The increase in real money balances causes a shift in the LM curve - decreasing prices is like increasing money supply.

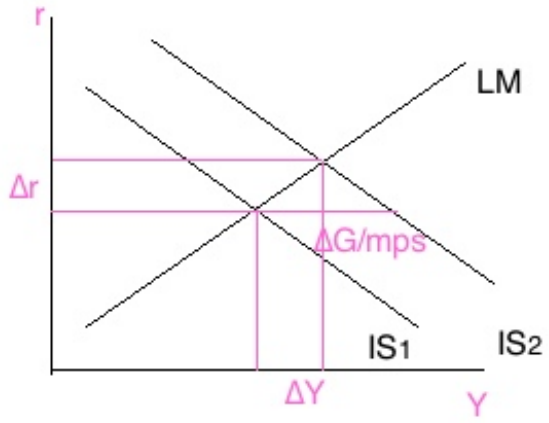
Shift in AD Curve with Change in Money Supply





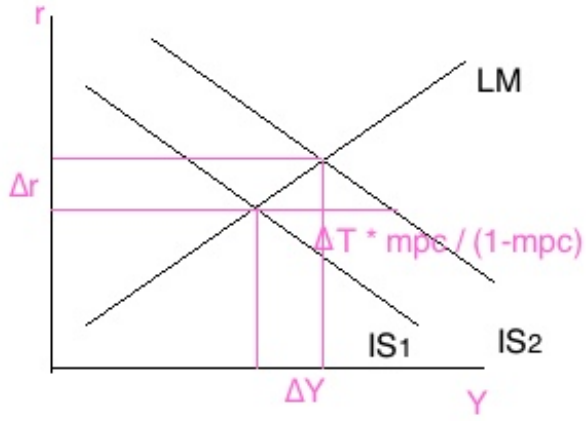
1. Increase in money supply causes rightward shift in LM curve. Thus for the same price, now more is demanded.

Effect of Increased G in IS-LM Framework



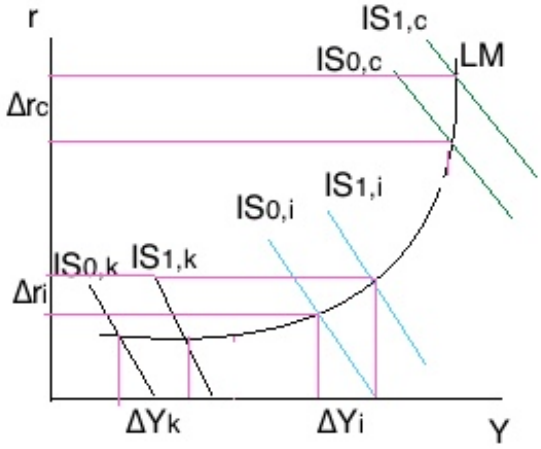
1. ΔY < what is suggested by Keynesian multiplier. This is because if crowding out effect (r rises).

Effect of Reduction in Taxes in IS-LM Framework

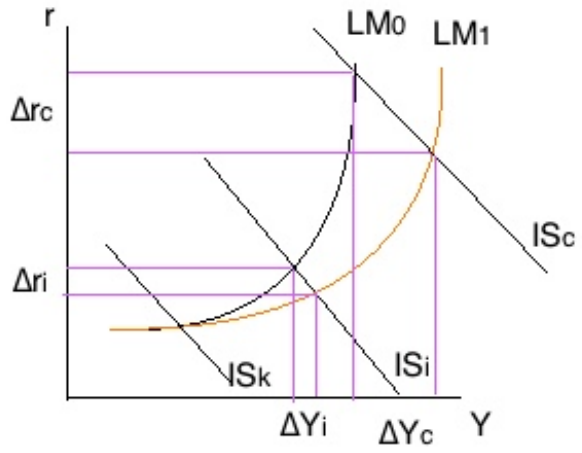


1. IS curve will shift out as people will have higher Y_d and hence higher consumption demand. But ΔY < what is suggested by Keynesian multiplier due to crowding out effect.

Effectiveness of Fiscal Policy



Effectiveness of Monetary Policy



Q. Why does the point of intersection of IS and LM curves coincide with the equilibrium of two markets? (2010, I, 20)

Q. What are the fiscal and monetary implications of vertical IS and vertical LM curves? (2010, I, 20)

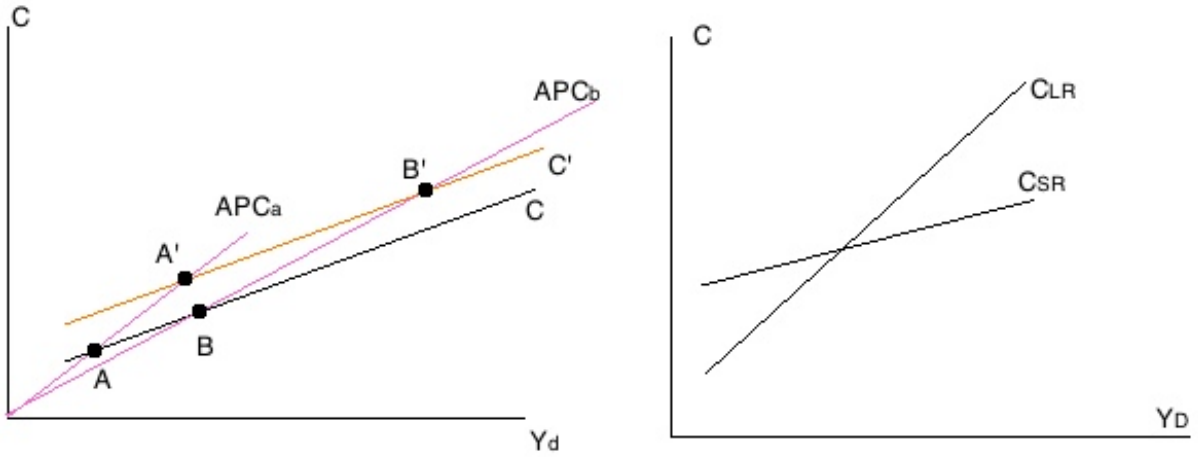
Keynes on Business Cycles

1. Fluctuations in AD due to fluctuations in I_d due to fluctuations in MEC cause business cycles which get amplified due to multiplier effect.
2. MEC fluctuations occur because as expansion takes place there is - (a) increased demand for capital goods which raises their prices, and (b) increased income leads to increased M_d and hence rise in r. Due to these 2 factors there is a declining trend in growth of I which raises doubts about their prospective yield. Once pessimism starts recession occurs. Stock market collapses and this reduces MEC.

Theory of Cash Balances
Theory of Consumption
Keynes' Consumption Function and Kuznets' Findings

1. Kuznets' consumption function: He analyzed the time series data of US for a long time and came up with the consumption function: C = ß.Y. Recall that Keynesian function is C = a + ß.Y. Also Kuznets estimated that mpc in US was ~ 0.9. Thus there was no tendency for apc to decline as Y rises.
2. Explanation: Keynes' consumption function is SR while Kuznets' is LR. In the SR one can consume @ low income by borrowing from future income or his wealth but in LR one can't consume anything without income.

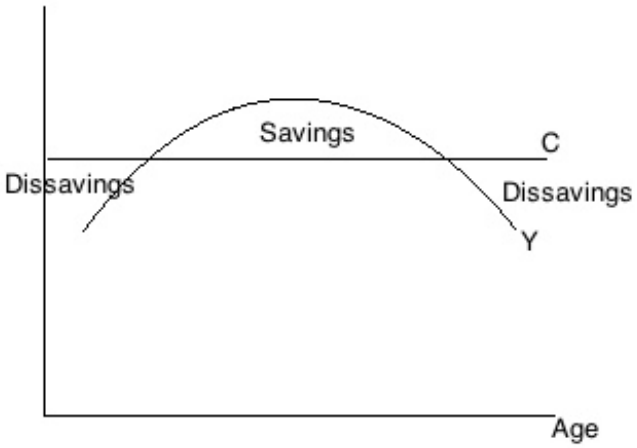
Duesenberry's Relative Income Theory of Consumption



1. According to him the consumption pattern (or apc) of a person depends not on his absolute income but on the relative income. Another departure from Keynes is that the consumption is not a variable of current income but a certain previously reached income level. Thus if the distribution pattern in a society remains largely unchanged then its mpc will remain unchanged as well.

2. In the above figure it means that when the income of the society increases (without any change in relative distribution) then instead of moving on the same consumption curve (C) upwards, there is a shift in the consumption curve (C') such that the new position of individuals leaves the apc unchanged.
3. One reason for such a behavior is the demonstration effect i.e. individuals try to copy the consumption behavior of their neighbors or families in a particular community. This means that a family living in an urban area will tend to consume more for a given income than a family living in a rural area @ the same given income.
4. Another reason is the Ratchet effect. This means that even as the incomes fall, people don't want to show their neighbors that they are less well off and so try to maintain their consumption at a previously reached income level only - at least in SR. Alternatively they are used to the previous consumption pattern and hence are hesitant in changing it. This means that the mpc in SR is very small (see right panel in the figure above).

Life Cycle Theory of Consumption - Modigliani



1. Some of the assumptions are that there is no net savings over the life, a person maintains more or less constant consumption through his life. Thus we can see that a SR change in income (or a temporary change) will be saved and not consumed and thus mpc in SR is very small. $C_t = a.Y_t + b.Y_{e,t} + c.W_t$ where the consumption at any given time depends on the income earned (labor income) at that time, average expected value of the future income at that time and the wealth accumulated at that time. Alternatively we can also write it as $C_t = (a + b).Y_{LT} + c.W_t$. The mpc from wealth is very low (and temporary current income only adds to wealth and hence SR mpc is so low).
2. It also explains why apc is lower in higher income families than in lower income families. It is likely that the higher income families are those which belong to the middle savings zone and hence their savings is higher.

Permanent Income Hypothesis - Friedman

1. Friedman too believes that people are unlikely to consume their income in one go, rather they spread it over and try to minimize the fluctuations in consumption. Thus $C = k.Y_P$ where Y_P is the permanent income and k is the mpc to consume out of that.
2. The value of k will depend on - (a) i or the rate of interest since higher the interest rate, higher the tendency to save and hence lower the consumption. (b) w or the proportion of human wealth (human capital etc.) to non human wealth (actual financial and physical assets) since non human wealth is more liquid and realizable. So higher the proportion of non human wealth in the total wealth, higher the consumption. (c) u or the desire to add to one's wealth. Higher the desire to add to wealth, lower the consumption. Thus $k = f(i-, w-, u-)$.
3. To measure the permanent income, Friedman suggests we use a function where permanent income is the previous income + a fraction of the change in income in this period. Thus $Y_P = Y_{t-1} + å.(Y_t - Y_{t-1})$. This means that the increase in the permanent income will be less than the increase in the income in any given period and thus mpc in SR < mpc in LR.
4. It also explains why apc is lower in higher income families than in lower income families. It is likely that the higher income families are those whose incomes are rising. Thus they will have lower apc (since only a fraction of the rise changes the permanent income). Similarly families with lower incomes are those whose incomes are declining. So they will have higher apc (since the decease in permanent income < decrease in actual income).

Theory of Investment

Tobin's Investment Theory (Q)

Accelerator Model (Induced Investment)

(a) Concept

1. As applied to inventories: According to this model, firms hold the total stock of inventories (of raw materials, goods) proportional to their level of output. Thus when Y is high more inventories are planned and when Y is low, low inventories are planned. Thus if N stands for stock of inventories, $N = ß.Y$. Since $I = \Delta N$, $I = ß.\Delta Y$. Thus for a given ß when the output increases, firms are induced to invest more (in inventories) and when Y falls, firms are induced to invest less.

(b) Autonomous vs Induced Investment

1. Autonomous investment: Keynes thought that I depends on MEC and r. He thought changes in Y don't affect I and thus I is autonomous (in SR). This investment depends on technological changes, government preferences, population growth etc. and not on Y.
2. Induced investment: This is affected by changes in Y. Higher the Y, higher will be the C and to produce more consumer goods larger I is needed.

(c) Assumption

1. Capital - output ratio (v) is constant.
2. There is no excess capacity i.e. no machines are lying idle and no extra shifts are possible.

(d) Value of Accelerator

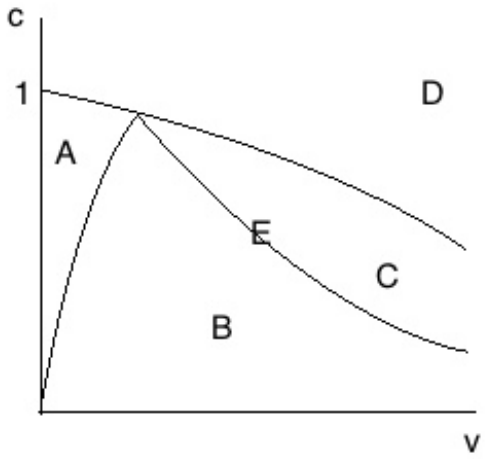
1. Accelerator is the relation between change in I due to a change in Y. $K_t = v.Y_t$ where K_t is the stock of capital at time period t, v is the capital - output ratio (assumed to be constant) and Y_t is the income in time period t. Under the assumption that v is constant, we can also write $\Delta K = v.\ \Delta Y$ or v is the accelerator.

(e) Criticism

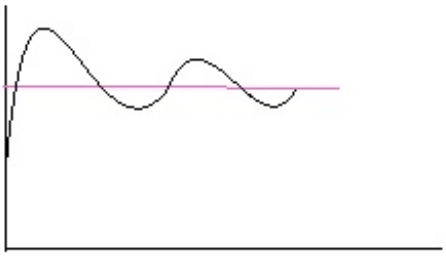
1. Kaldor said that we cannot assume constant v throughout the trade cycle. This is because if already some machines are lying idle during a depression we would utilize them first before rushing for new investment. This will lead to a fall in v.
2. Also if entrepreneurs think that the rise in demand is only going to be a temporary one, instead of installing new capacity they will overwork their plants using existing capital only.
3. But these criticisms fail to recognize inventories as investment as well.

(f) Samuelson on Business Cycles: Interaction between the multiplier and the accelerator

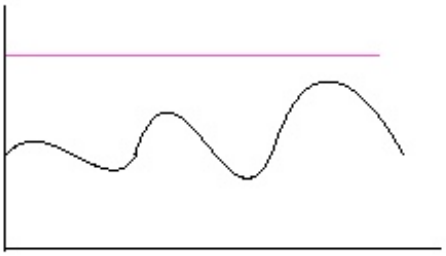
1. Keynes had said that it is the ups and downs in I (which in turn depend on the profit expectations) which cause business fluctuations and the impact of fluctuations in I gets magnified by the multiplier. But he didn't explain the cyclical and cumulative nature of the fluctuations. Samuelson showed that it is the interaction between the multiplier and the accelerator that gives rise to the cyclical and cumulative nature of the fluctuations in economic activity. An increase in autonomous I leads to a magnified increase in income via multiplier. This increase in income induces additional investment through accelerator which in turn increases the aggregate demand by an even larger amount.
2. Thus $Y_t = C_t + I_t$ where $C_t = C^o + c.Y_{t-1}$ and $I_t = I^o + v.(Y_{t-1} - Y_{t-2})$. Thus one period lag has been assumed for income to determine the level of consumption and similarly one period gap has been assumed for ΔY to determine the level of investment. Static state is defined to be a state where $Y_t = Y_{t-1}$ and so on. The values of c and v decide the nature of business cycles.



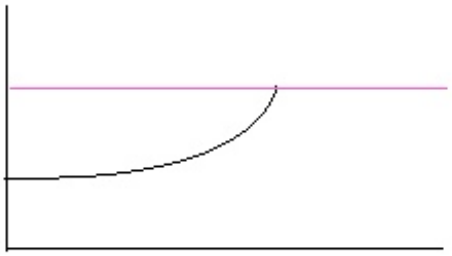
Region A



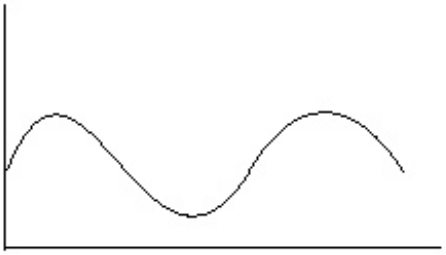
Region B



Region C



Region D



Region E

1. Thus we see that only combinations B, C and E produce business cycles. The upper limit is the buffer imposed by real life constraints beyond which cycles can't explode.

Expected Output and Desired Capital Stock

1. Rate of investment is determined by the speed with which firms adjust their capital stocks towards the desired level. Because it takes time to build and install new machines, firms can't immediately achieve the desired stock level. So they have to decide @ what rate should they make adjustments to attain desired stock level. Demand of firms for capital will depend on MPP_K and user cost of capital (also called rental cost of capital). As long as present value of MPP_K> user cost of capital, a π maximizing firm will invest.
2. In the Cobb - Douglas production function, $Y = A \cdot K^{å} \cdot L^{(1-å)}$. $MPP_K = å.(Y/K)$. If r is the user cost of capital and p is the price level of output, then to maximize π a firm will equate MPP_K with (r/p). Thus $å.(Y/K) = (r/p)$ or $K^* = å.Y_t / (r/p)$ or the desired stock of capital (K^*) depends on the size of output (Y_t) and is inversely proportional to the real

user cost of capital (r/p). As long as MPP_K > (r/p) the firm will add to its stock of capital.
3. In the above discussion, it can be seen $K^* = \alpha.Y_t / (r/p)$. But Y_t is not current output but the expected output for some future period where the capital stock will be used. But current output level affects the expectations of future output level. This means when the expectations are good, MPP_K or the desired capital stock will shift to right.

Rental Cost of Capital

1. $r = i - \pi_e + d$ where r is the rental cost of capital (user cost of capital), i is the nominal interest rate, π_e is the expected rate of inflation and d is the depreciation rate. This is because π_e leads to an appreciation in the asset price and thus needs to be subtracted from interest rate and depreciation rate.
2. Taxation: Greater the corporate income tax, greater the cost of capital. But an investment tax credit will lead to a fall in cost of capital, thus $r = i - \pi_e + d - t_c$ where t_c is the investment tax credit rate.

Flexible Accelerator Model

1. Adjustment costs: As firms try to adjust their capital stock, in addition to direct costs there will be adjustment costs i.e. shutdown of plants, overtime etc. So firms don't reach their target capital stock at once. Instead in each period they invest a certain fraction of the capital stock gap.
2. Thus, $K_t = K_{t-1} + \lambda . (K^* - K_{t-1})$ or $I = K_t - K_{t-1} = \lambda . (K^* - K_{t-1})$. This implies that I will be less volatile in the SR than is the case with the simple accelerator model which visualizes I to respond to the changes in current income fully in one period only.
3. A variation in λ can change the speed of investment. Thus if interest rates are lower, λ will increase as businesses try to fill more of the gap when costs are lower.
4. Thus the neoclassical investment function is $I_t = f(Y_e, i_t, d, \pi_e, t_c, K_{t-1})$.

Fiscal and Monetary Policy Implications of Neoclassical Investment Theory

1. Keynes said expansionary fiscal policy will increase AD and Y and thus will increase MEC and hence higher I. But at the same time the increase in AD will also raise interest rate and thus crowd out I.
2. Fiscal policy: Neoclassical economics says that if the expansionary fiscal policy is combined with a tax policy such as greater investment tax credit or lower capital gains then it will nullify the crowding out effect (higher t_c can offset higher r) and promote I. This is because t_c lowers the cost of capital. Besides t_c can be used independently as a tool for stabilizing I and thus prices. Recall that $K^* = \alpha.Y_t / (r/p)$ and thus an expansionary fiscal policy increases both Y_t and r. Which effect dominates depends on whether ΔY_t is more or Δr. But an increase in corporate tax or a fall in investment tax credits will definitely increase cost of capital and thus reduce I.
3. Monetary policy: Neoclassical like Keynes believe that it affects I through its effect on real interest rate. Expansionary monetary policy lowers r and this reduces real cost of capital and thus increases desired capital stock and thus I.

Q. "Neo classical macro economics not only rejects the demand management policies of Keynes, but also the propositions of mainstream monetarists such as Friedman." Do you agree? (2010, I, 20)

Impact of Inflation on I

1. Recall that $r = i - \pi$ so if inflation increases then real rate of interest falls and hence user cost of capital falls and thus I increases. When the inflation is anticipated, money wages and interest rates will be adjusted to incorporate that. So there will be no benefit. Its only when it is unanticipated that it will lead to fall in real wages and real interest rate and thus rise in profits and hence higher investment.
2. Keynes: Beneficial effect of π was also based on the view that wages tend to lag prices and thus π will cause higher profit margins, redistribute income in favor of wealthier class which will lead to higher savings and thus higher investment. But this is based on classical theory of equality of savings and investments. As Keynes showed this may not hold true and excess of savings may lead to fall in consumption (since workers have lower real wages and hence less C) and this will lead to fall in I by lowering MEC.
3. Developing countries: Far from encouraging savings and investment, it slows down the rate of capital accumulation. This is because as prices rise, people would tend to hold goods instead of money and thus C increases and S decreases. Besides rapid π erodes the value of S and thus discourages people from saving. Also it leads to investment in physical assets like gold, real estate etc. which don't increase the productivity of economy.

Theory of Money

Tobin's Portfolio Approach to Demand for Money

1. On Keynes' speculative demand function, Tobin asserted that in Keynes, an individual holds all his wealth either in money or in bonds depending upon his estimate on the future direction of the rate of interest. But according to Tobin, faced with uncertainty and depending upon the degree of risk aversion, individuals like to hold their wealth in a portfolio comprising of money and bonds.
2. Next he argues that with an increase in interest rate, wealth holders will be generally attracted to hold a greater fraction of their wealth in bonds and thus reduce their holdings of money. Thus at higher interest rates demand for money falls. Thus he does away with the natural rate of interest assumption in Keynes.

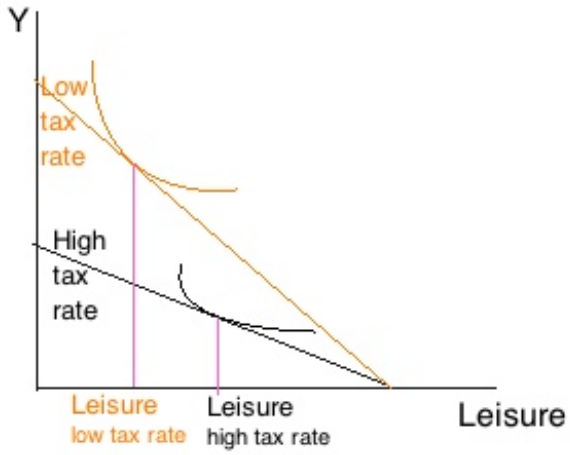
Baumol's Inventory Approach to Demand for Money

1. Here he argues that even the transactions demand for money is dependent upon interest rates. Thus the average cash holding = $\sqrt{(2b.Y/r)}$ or $M_d = f(r,Y)$.

Supply Side Economics on Stagflation

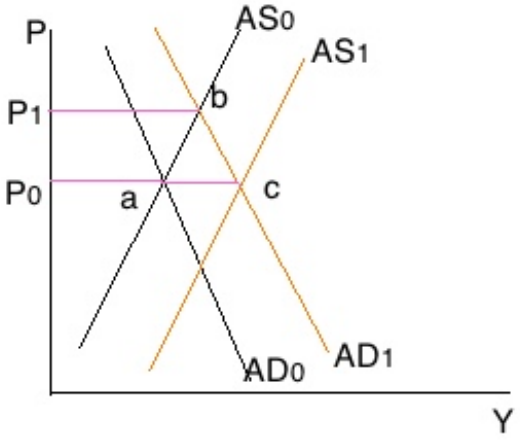
1. They argue that the stagflation is caused by adverse supply shocks which leads to increase in price level as well as fall in output given an AD curve. So they argue to shift AS curve tot he right rather than shift the AD curve. To them managing AS curve is more important than managing AD curve.
2. They believe that reductions in tax rates can be used to stimulate incentive to work, save and invest and to take risk which can cause AS curve to shift right. They also argue that reduction in tax rates up to a point will increase government revenues (Laffer curve).

Basic Propositions



1. Taxation and labor supply: Lower marginal tax rates will increase labor supply as it will induce people to work more. But this can be debated as people will fixed target incomes will work less. Also this will increase income inequalities.
2. Incentive to save and invest: Lower marginal tax rates will increase post tax returns on savings and investment and hence increase S & I (recall I depends on MEC which is expected post tax profits in future). But this can be debated as people with fixed target income will now save and invest less.
3. Cost push effect of taxes: They believe sooner or later all taxes are incorporated in form of higher product prices and thus lead to cost push inflation. This is in contrary to Keynesian thought.
4. Black money: Higher marginal tax rates encourage corruption and black money.
5. Laffer curve: Reduction in marginal tax rates increase compliance as well as increase production as incentives to work are created. But this is debatable in implementation.

Effects of Tax Cuts



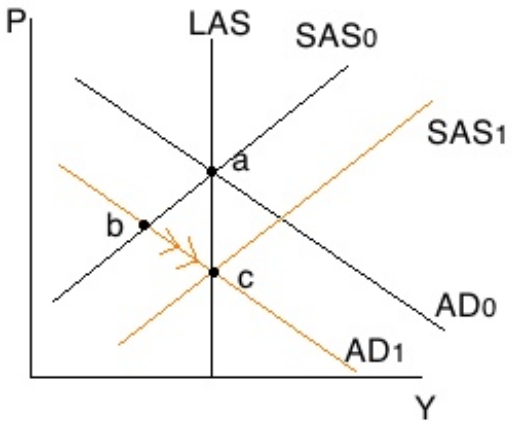
1. Keynesians argue that tax cuts (specially income or corporate taxes) will lead to increase in AD via increased C_d or I_d. This may lead to π. But supply side economics argues that the increase in supply (due to higher work, savings and investment) will more than offset any rise in prices due to rise in AD. Empirical evidence doesn't support them however.

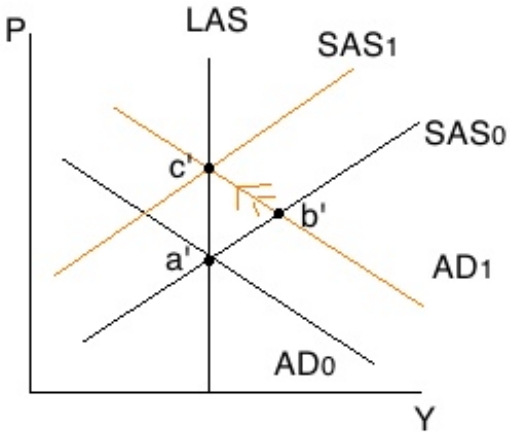
Friedman on Business Cycles

Friedman's Framework

1. He regards free market economy as inherently stable and thinks that it is the instability in growth of M_s which causes business cycles by affecting AD. Thus opposed to Keynes who thought autonomous changes in I bring fluctuations, Friedman thought autonomous changes in money supply bring fluctuations.
2. Friedman's money multiplier: For this he puts (ΔY/ΔM) as the money multiplier as against Keynesian investment multiplier (ΔY/ΔI).
3. Transmission mechanism: Friedman thinks changes in money supply affect level of output via portfolio adjustments. When there is increase in M_s individuals are left holding more money than desired. Thus they readjust their portfolio of assets (money + bonds + equity + commodities) so as to spend some of the extra money on goods and services and some on other assets. This increases their prices i.e. reduces their rate of return or interest. The fall in interest and increase in wealth of people (as prices have gone up) induce more I_d and C_d and thus increase in AD.
4. Response of AS: In the LR, AS is determined by real factors and is a vertical straight line. Thus in M = k.PY, k and Y remain constant so ΔM can only lead to ΔP in LR. But the SR AS curve is upward sloping (because of sticky wages) i.e. both P and Y change as AD shifts up.

Explanation of Recession & Boom





1. They assume that wage rates are only temporarily sticky and in LR we come back to LAS.

Effect of Lags in Monetary Policy

1. Empirical data suggests that the effect of monetary policy change occurs after uncertain and variable lags. The

initial effect of change in M_s is on r and wealth as the increased money is spent on financial assets. This drives up their prices and lowers the r and hence boosts I_d and C_d (increase in wealth effect). But the time period taken for this entire activity is uncertain and it may happen that the central bank may inject more liquidity when the economy is already recovering from a recession. This may lead to overheating and π.

Patinkin's Model on Income Determination

Goods Market

1. He took $C = f(y+, r-, M/P+)$ where y is the real income, r is the real interest rate and M/P is the real cash balance. Now when r rises, real savings go up (like in classical) so C falls. Similarly when real cash balances rise, people increase their consumption. When y rises, consumption increases as well.
2. He took $I = f(r-, M/P+)$ where as real interest rates rise investment falls (as in classical) and as real cash balances rise, investment increases. On the other hand he took G as completely exogenous. Thus $AD = C + I + G = f(y+, r-, M/P+)$.

Money Market

1. He took money supply as exogenous (determined by state). He took the transactions, precautionary and speculative demand of money as assumed by Keynes. Thus he took $M_d = f(y+, r-, M/P-)$ and in equilibrium this equals Ms/P. If prices go up, real cash balances go down which means that the households now demand more money to replenish their real cash balances.

Combined Model

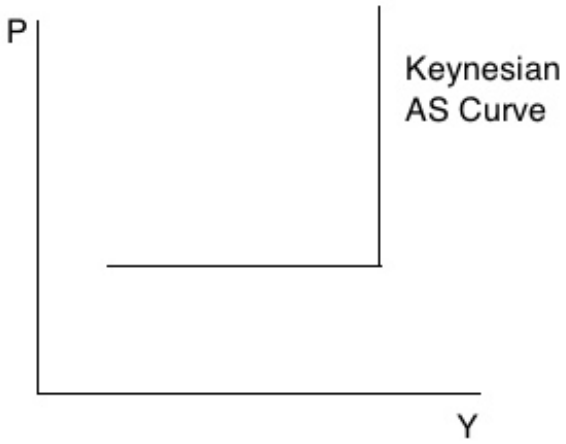
1. His aim was to construct a model which is money neutral without assuming classical dichotomy. Let us double the money supply. Thus we can see that the increase in money supplies increases the money balances in the hands of people. They would like to spend which increases the AD. P should go up, but lets hold P constant for a while and see if there is any other adjustment which we can make.
2. In the money market, we can see that the increase in money supply leads to a decline in interest rates (assuming constant Y and P) as the real money supply curve shift right. This in turn will raise both consumption and investment in the goods market causing excess demand conditions again (since Y is fixed @ full employment). So P will now rise. Rising P reduces the cash balances and thus reduce excess demand. In the money market, rising P lead to fall in real money supply, the curve shifts back up and interest rates rise thereby restoring the equilibrium.

New Classical Economics

Inflation - Unemployment Tradeoff: Philips Curve

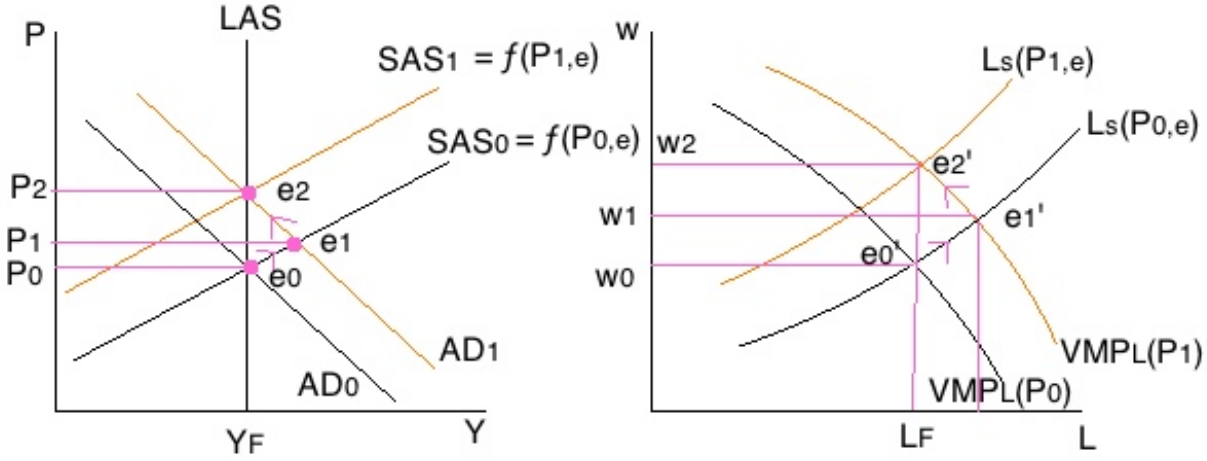
Keynes on Philips Curve

(a) Simple Keynes' Model



1. He didn't think there was any tradeoff between π and employment. Because in the horizontal range of AS curve, p will not increase only employment will. And in the vertical range of AS curve Y will not increase, only P will. However later on he acknowledged upward sloping AS curve and later Keynesians agree with Phillips curve.

(b) Keynesian Explanation of Phillips Curve



1. Let the initial economy be @ e_0. People expect the current price level P_0 to continue in future as well and the SR AS curve is SAS_0 and it remains fixed in SR. Demand for labor is VMP_L curve which is MPP_L * P. Supply of labor is a function of (w/P_e) where P_e is the expected price level.
2. As AD rises movement will happen on SAS_0 and we reach point e_1. But now the prices are also higher. So the demand for labor curve shifts outward. Supply of labor curve remains the same because it is based on price expectations and not actual price. Thus we move to e_1' on the labor figure. Thus output and employment both are higher in the SR @ higher prices.
3. But in the LR the workers perceive that the price level has gone up from P_0 to P_1 and they substitute $P_{0,e}$ in their expected prices with $P_{1,e}$ while deciding the supply curve. Thus supply curve moves to left and we reach e_2'.
4. Alternatively, as Y increases, diminishing returns set in and thus MPP_L declines. Assuming w remains fixed, it causes rise in MC and as a result prices increase. As economy approaches Y_F even w begin to rise and hence MC increases even further.

(c) Keynesian Explanation of Shift in Philips Curve

1. High fuel prices led supply shock leads to leftward shift in AS curve and hence higher prices as well as lower output (and hence higher unemployment). This leads to a shift in Phillips curve.

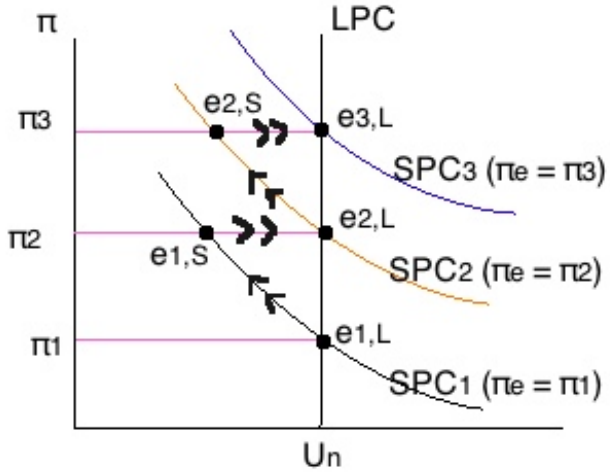
Friedman on Philips Curve

1. He said 'full employment' is a mystery. Why? Because it can't be achieved. There will always be a natural rate of unemployment (μ_n) which is the structural unemployment and frictional unemployment. So when an economy is operating at natural rate of unemployment ($\mu_a = \mu_n$), it is said to be operating at full employment. $\mu_a - \mu_n$ is called the cyclical unemployment.
2. Augmented expectations hypothesis: He found that there is a relationship between cyclical unemployment and unexpected inflation (π_{ue}). It is from this relationship that he derived the modern Philips curve. The degree of sensitivity between the two was ~ -2. Thus $(\pi_a - \pi_e) = -h * (\mu_a - \mu_n)$. He also said $\pi_{e,t} = \pi_{a,\ t-1}$. This is called augmented / adaptive expectations hypothesis.

(a) Friedman's Explanation of Shift in Philips Curve

1. He challenged the concept of a stable LR downward sloping Philips curve. He argued that the tradeoff between π and employment is only in SR i.e. there exists a downward sloping philips curve in SR but it is not stable and shifts left or right. Due to these shifts there is no LR tradeoff between π and employment. Thus LR philips curve is a vertical straight line.

(b) Friedman's Adaptive Expectations Theory / Natural Unemployment Rate Theory



1. He argued that in the determination of PC the expectations about the future rate of π play an important role. According to him, people form their expectations about future π on the basis of π in the period just gone. Thus $\pi_{e,t+1} = \pi_{a,t}$. So if current π changes expectations about future π will also change.
2. Once these expectations are built, they will be used in negotiating wages, debt contracts etc. Lets say initially the economy is in equilibrium ($e_{1,L}$) on LPC while the SR PC is SPC_1. Lets say the actual π turns out to be π_2 (> π_1). Since wages and debt contracts were already fixed higher prices mean higher profits. This leads entrepreneurs to produce more in SR and hence the unemployment decreases. Thus the economy moves from $e_{1,L}$ to $e_{1,S}$ and the rate of unemployment now is < natural rate of unemployment (U_n). But this equilibrium is not stable.
3. Workers will realize that due to higher π their real wages have fallen. So as people revise their expectations of π for the next period, their new π_e will be π_2. As a result nominal wages will rise, nominal cost of debt will rise and hence the profits of entrepreneurs fall. The incentive which made them produce higher in the previous period is no longer there and they will restore their output to Y_F and thus unemployment rate will become U_n again @ the new π rate (π_2). The economy will move back to $e_{2,L}$ on the LPC and SPC shifts from SPC_1 to SPC_2.
4. If the actual π again turns out to be higher then same cycle will repeat and we will see a movement to $e_{3,L}$. Thus any π rate can occur in LR and there is no π - employment tradeoff in LR.

Rational Expectations Model

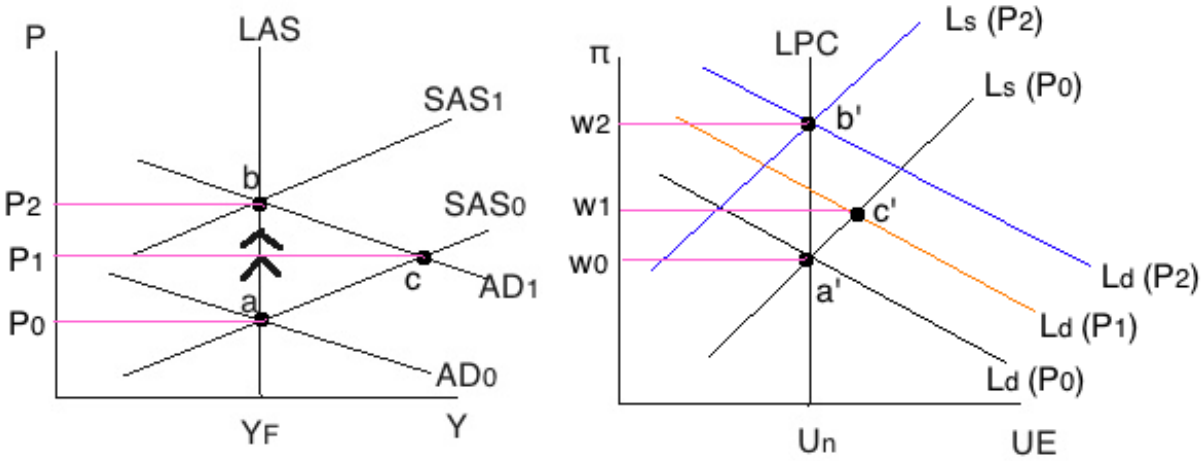
Assumptions

1. Economic agents are rational and have a correct understanding of economy. Thus they correctly anticipate the effects of any government policy or change using all the available relevant information. This anticipation quickly and correctly gets reflected in their expectations of future price levels.
2. All factor and product markets are highly competitive. Thus wages, debt rates, prices all are flexible and adjust quickly in SR itself.

Lucas' Critique of Keynes' and Friedman's Explanation of PC

1. He criticizes them to assume that adjustments in price expectations will be slow. The behavior of firms and workers in real world can't be taken to be naive that they will not learn from their past mistakes and will continue to make systematic mistakes in setting future contracts. Instead as the situation changes they will quickly revise their expectations using all the available information and intelligently predict the changes in prices and form expectations accordingly.

Model



1. Prior PC models were simplistic models which assumed that as π rises workers will not demand higher wages and entrepreneurs will benefit in the form of higher profits and hence higher output and lower unemployment. But they assumed that while deciding wages workers don't take full available information into consideration.
2. AS function: On the contrary Lucas and other rational expectations followers assume that information flow is perfect and people adjust very fast. They don't argue that people's forecasts are always correct but assume that they make no systematic errors. Like Friedman he takes AS function to be: $Y = Y_F + å.(P - P_e)$. But unlike him due to quick adjustments in expectations there is no need to assume $\pi_{e,t} = \pi_{a,t-1}$. Instead $\pi_{e,t} = \pi_{a,t}$. Thus Philips curve is vertical.
3. Inflation expectations: He uses $M = k.PY$ and given constant k, $(\Delta M/M) = (\Delta P/P) + (\Delta Y/Y)$ or $\pi_e = (\Delta M/M)_e - g_e$. Thus the expected inflation will depend on the expected growth rate of money supply as well as expected income growth rate. The factors which can affect the price level (and hence expectations) can be expected levels of money supply, government spending, taxes, autonomous investment and supply side factors. A change in any of these expectations leads to change in price expectations as well.
4. Labor supply curve: $L_s = f(w/P_e)$ or labor supply is a function of real wage rate. As prices rise, workers will quickly adjust their price expectations and hence real wage rate will fall for any given w. So they will demand higher nominal wages (w) as well and so labor supply curve will shift left.
5. Unanticipated changes: As a result of an unexpected rise in AD from AD_0 to AD_1 (because of say increase in autonomous investment) the economy will move from a to c and prices will rise from P_0 to P_1. Due to the price rise, Keynesian model will predict economy will reach c and c' in SR as higher prices increase VMP_L and labor demand curve shifts out (from $L_d(P_0)$ to $L_d(P_1)$). This increase (in AD) was unexpected and this was the response and it is exactly the same as what Keynes says.
6. Anticipated changes: But Lucas goes further and says that once the prices have risen to P_1 they will cause workers to change their expectations and hence L_s curve will shift left. As a result SAS curve will shift left too and the new price level reached will be P_2. With the rise in prices to P_2 labor supply curve will rise further left to $L_s(P_2)$ and accordingly the labor demand curve will rise to $L_d(P_2)$ (because VMP_L will be now based on P_2) and equilibrium will be restored.
7. Alternatively the effect of rise in prices will be fully and quickly anticipated and wage and debt contracts will be immediately revised to reflect that. Thus the incentive to produce extra (in Friedman's adaptive expectations hypothesis) will no longer be there. This means SAS will shift up as well quickly and movement will be directly from a to b. Thus the anticipation and reaction of the agents nullifies any intended impact of policies.
8. Explaining business cycles: They argue it is only an unanticipated change in AD which leads to business cycles.

Role of Government

1. Policy impact: Keynesians believe that government spending or increase in money supply will lead to increase in AD and thus output. Rational expectations model tells us that a policy in case of an unanticipated change is desirable (since the unanticipated change has made the economy move away from the equilibrium) but it is not feasible. This is because the government policy will be made in light of future expected changes in AD (say investment). But if the future changes are expected then public will already incorporate them into their decisions. And if the future changes are unexpected then how can the government make a policy? Being unable to forecast the future government policies may only become unpredictable and tend to destabilize the economy. So they, like Friedman, argue for a rule based monetary policy so that there is no destabilization due to unanticipated change in money supply.
2. Effect of government credibility: They argue that the credibility of government and the central bank plays an important role in anchoring π expectations. Given a situation people will learn to anticipate policy changes by the central bank / government and will form their expectations accordingly. If people think central bank's commitment to

price stability is credible π expectations will remain low. If π expectations remain low then π will remain low without much fall in Y. Thus if central bank is credible π can be controlled in a painless manner. Thus there is no tradeoff between π and employment.

Rational Expectations vs Friedman

1. While Friedman only said that discretionary monetary policy will have no impact in LR but non discretionary monetary policy will have impact in SR, rational expectations says monetary as well as fiscal policy will have no desirable effect either in SR or LR.

Rational Expectations vs New Keynesians

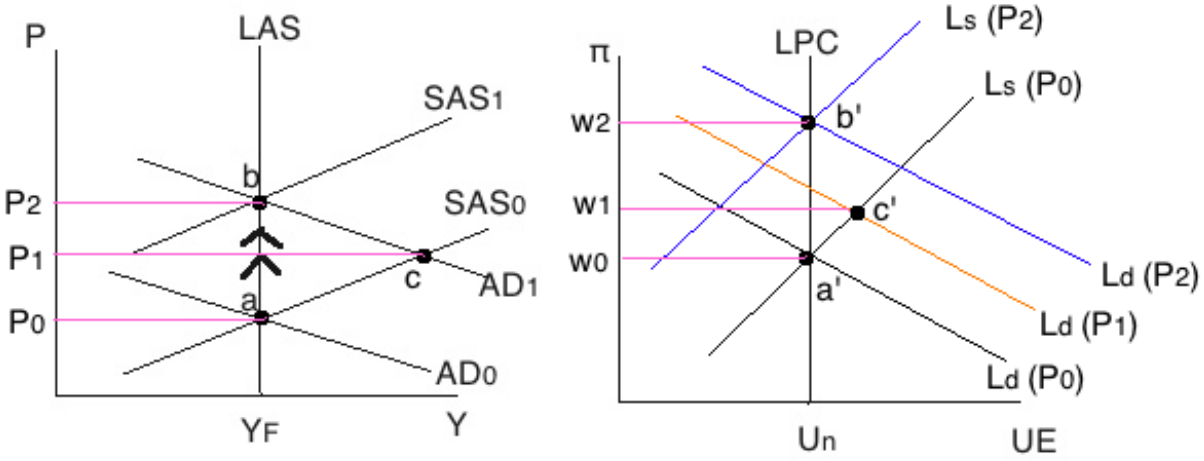
1. New Keynesians acknowledge the role of rational expectations but they argue that wages are fixed by medium term contracts. When these contracts are signed rational expectations play a role and such contracts are dependent on the inflation levels prevailing at the time of signing the contract. Once the contract is signed even though people change their expectations according to rational expectations hypothesis, the contract can't be renegotiated. Thus wages remain sticky. On the other hand new classicals argue that contracts can be renegotiated.

Criticism of Rational Expectations

1. Empirical studies have found that there is a strong correlation between anticipated money supply growth and GDP growth.
2. Assumption of full knowledge is too much and unrealistic.
3. Wages can be sticky in SR.

Lucas on Business Cycles

Explaining Recessions & Booms



1. Lucas thinks that it is only the unanticipated changes in AD which can lead to business cycles.
2. Unanticipated changes: As a result of an unexpected rise in AD from AD_0 to AD_1 (because of say increase in autonomous investment) the economy will move from a to c and prices will rise from P_0 to P_1. Due to the price rise, economy will reach c and c' in SR as higher prices increase VMP_L and labor demand curve shifts out (from $L_d(P_0)$ to $L_d(P_1)$) since workers' labor supply curve was based on old expectations.. This increase (in AD) was unexpected and this was the response and it is exactly the same as what Keynes says.
3. Anticipated changes: But Lucas goes further and says that once the prices have risen to P_1 they will cause workers to change their expectations and hence L_s curve will shift left. As a result SAS curve will shift left too and the new price level reached will be P_2. With the rise in prices to P_2 labor supply curve will rise further left to $L_s(P_2)$ and accordingly the labor demand curve will rise to $L_d(P_2)$ (because VMP_L will be now based on P_2) and equilibrium will be restored.

Q. "Cambridge equation determines income (Y) assuming rate of interest (r) as given, whereas Keynes theory of interest rate determination assumes given income. Both are thus incomplete."
Do you agree with the above assertion? How would then these two variables be determined simultaneously? (2009, I, 20)

Q. "If expectations (regarding price level) were always fulfilled, short run aggregate supply curve would always be

vertical." Critically examine this statement of new classical economics. What would be the shape of the curve, if expectations were not realized? What other assumption is made by new classical economics in this context and what is its implication? (2009, I, 60)

The Neoclassical-Keynesian Synthesis

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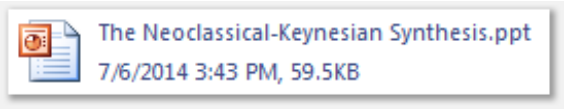

III. Friedman's Modern Quantity Theory of Money

Milton Friedman (another Nobel Prize winner) developed a model for money demand based on the general theory of asset demand. Money demand, like the demand for any other asset, should be a function of wealth and the returns of other assets relative to money. His money demand function is as follows:

where Yp = permanent income (the expected long-run average of current and future income)
rb = the expected return on bonds
rm = the expected return on money
re = the expected return on stocks
pi(e) = the expected inflation rate (the expected return on goods, since inflation is the increase in the price (value) of goods)

Money demand is positively related to permanent income. However, permanent income, since it is a long-run average, is more stable than current income, so this will not be the source of a lot of fluctuation in money demand

The other terms in Friedman's money demand function are the expected returns on bonds, stocks and goods RELATIVE the expected return on money. These items are negatively related to money demand: the higher the returns of bonds, equity and goods relative the return on money, the lower the quantity of money demanded. Friedman did not assume the return on money to be zero. The return on money depended on the services provided on bank deposits (check cashing, bill paying, etc) and the interest on some checkable deposits.

Friedman vs. Keynes

When comparing the money demand frameworks of Friedman and Keynes, several differences arise

- Friedman considers multiple rates of return and considers the RELATIVE returns to be important
- Friedman viewed money and goods and substitutes.
- Friedman viewed permanent income as more important than current income in determining money demand

Friedman's money demand function is much more stable than Keynes'. Why? Consider the terms in Friedman's money demand function:

- permanent income is very stable, and
- the spread between returns will also be stable since returns would tend to rise or fall all at once, causing the spreads to stay the same. So in Friedman's model changes in interest rates have little or no impact on money demand. This is not true in Keynes' model.

If the terms affecting money demand are stable, then money demand itself will be stable. Also, velocity will be fairly predictable.

IV. Empirical Evidence on Money Demand

So who is right? Well, the chief differences between Keynes and Friedman lie in the sensitivity of money demand to interest rates and the stability of the money demand function over time. Looking at the data on these two features will yield some answers about the best theory of money demand.

Tobin did some of the earliest research on the relationship between interest rates and money demand and concluded that money demand IS sensitive to interest rates. Later research in the 1950s and 1960s backed up his findings. Furthermore, the sensitivity did not change over time. Many researchers looked at this question and their findings are remarkably consistent (which in economics is somewhat miraculous :)).

Now for the stability of the money demand function. Up until the mid-1970s, researchers found the money demand function

to be remarkably stable. In other words, money demand functions estimated in the 1930s, worked just as well predicting money demand in the 1950s or 1960s. The relationship between money demand, income and interest rates did not change over time.

However, starting in 1974, the stability of the money demand function (M1) began to breakdown. Existing money demand functions were overpredicting money demand (i.e. actual money demand was lower than what old money demand functions were predicting). This case of the "missing money" was a problem for policy makers that relied on these functions to predict the effects of monetary policy. What caused this breakdown? It is likely that financial innovations in the 1970s (money market accounts, NOW accounts, electronic funds transfers) changed the working definitions of money even though our official definitions did not change. This problem grew worse in the 1980s.

$$\left(\frac{M^d}{P}\right) = f\left(Y_p, r_b - r_m, r_e - r_m, \pi_e - r_m\right)$$

as it did in the 1944 paper or in *The General Theory*. The real monetarist claim is a claim about the numerical values of the parameters of the IS and LM curves, and perhaps about the speeds of adjustment that are elided from the textbook static model. Monetarists have to believe that the IS curve is quite flat and more especially that the LM curve is very steep (meaning that the demand for money-to-hold is (almost) independent of the interest rate). In that configuration demand shocks--the only kind talked about before the OPEC crisis--will generate only small changes in real income and employment, and changes in the money supply will generate relatively large fluctuations in real income and

employment. If, in addition, the economy adjusts quickly and smoothly to demand disturbances, the standard monetarist prescription for macroeconomic policy would be reasonable: no use of fiscal policy, at least no discretionary fiscal policy, and steady growth of the money supply, thus in practice no discretionary monetary policy either. (Milton Friedman used to drive home the point by remarking that when he said four percent annual growth of the money stock he meant 1/13th of one percent per week.

In contrast, throughout his career, Franco insisted that sticky nominal wages, at least downward stickiness, was a basic principle of Keynesian economics and also of real-world economics. In his version of ISLM, prolonged excursions away from full employment were perfectly possible. He did not much care whether these were classified as sub-optimal equilibria or as very-slowly-correcting disequilibria. His main point was that they could be diminished or corrected by appropriate monetary-policy and fiscal-policy moves, and therefore should be diminished or corrected by discretionary monetary and fiscal policy.

Money, Banking and Finance

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Demand and Supply of Money
Money Multiplier Quantity Theory of Money
Fisher
(a) Theory

1. If accounting identity i.e. value paid = value received holds true then value of goods and services sold = value of money paid for them. Thus in any period if the total number of transactions is T and P is the average price of these transactions then total value of transactions made is P.T. Value of money used in these transactions = money supplied (M) * average number of times a unit of money was exchanged for transaction purposes (V). So MV = PT.
2. Above equation is an identity. But by making assumptions regarding behavior of variables V, M and T, Fisher transformed it into a theory of demand for money.
3. He said money supplied (M) is fixed by the central bank and thus is exogenous. Number of transactions (T) are a function of national income i.e. greater the national income, greater the number of transactions required to be made. But in SR, @ full employment, Y is fixed. So T is also fixed.
4. V is determined by institutional and technological factors involved in transaction processes. Since these factors and forces don't vary much in the SR, again we can take V to be fixed.
5. The quantity of money supplied is fixed by the central bank and is exogenous. Thus M_d = M = PT/V and any change in M will lead to a change in P.
6. Income version: In the income version only the real output was considered instead of total number of transactions. Note total output includes only final goods and services whereas total number of transactions include all transactions. So M = PY/V.

(b) Limitations

1. Fisher's approach is sort of mechanical and represents more of an identity and less of a theory.
2. He includes not only those transactions which involve current production of goods and services (Y) but also those which arise in the sales and purchase of assets. Due to frequent changes in the value of these assets it is not appropriate to assume T will remain constant because Y remains constant @ Y_F.
3. Inclusion of assets also makes it difficult to define a price level which captures both GDP and assets.

(c) Keynes' Critique

1. Useless truism: MV = PT is an identity.
2. V is not stable: Keynes thought V varies inversely with the changes in money supply. An increase in money supply given constant M_d leads to a fall in r. As a result people will be induced to hold more cash balances (under speculative mode). This means V falls.
3. Increase in M_s may not lead to increase in P: QTM assumes (a) constant V and (b) constant Y. So an increase in M can only lead to increase in P. But Keynes said in recessions, M_d curve is more elastic so increase in M_s doesn't lead to any appreciable fall in r. Moreover I_d curve becomes inelastic so there is no change in I and hence no change in AD. Thus increase in M_s may not lead to increase in P.
4. Constant Y is not a valid assumption.

(d) Fisher Effect

1. Fisher equation: Classical dichotomy suggests nominal variables can't have any effect on real variables. Fisher gave $i = r + \pi$ where i is the nominal interest rate and changes in it can occur due to change in r which is the real interest rate or inflation (π).
2. Fisher effect: Now r is affected purely by savings and investment and π by change in money supply. When central bank increases M, π rises. This leads to a rise in i. This adjustment in i due to change in π is called Fisher effect.

Q. "Simplicity of the quantity theory of money is its strength as well as its weakness." Discuss. (2006, I, 20)

Pique / Cambridge Cash Balance Theory
(a) Cambridge vs Fisher

1. Fisher emphasized the role of money purely as a medium of exchange whereas Cambridge theory (Marshal and Pigou) emphasizes role of money purely as a store of value. They focus their analysis on factors which determine individual demand for holding money.
2. Cambridge theory is superior to Fisher theory in the sense it relates M_d with Y in a behavioral manner as against the mechanical manner done by Fisher.
3. They too like Fisher were classical economists and believed in constant full employment output in SR.

(b) Theory

1. P = KR/M where P represents the purchasing power of money (and not price level which would actually be inversely related to it), R is the real income expressed in terms of a particular commodity, K is the propensity of public to hold cash and M is total money stock. If we allow for bank deposits then we get, P = KR/M (C + h * (1 - C)) where C is the proportion of money which public keeps in the form of cash, 1 - C is the deposits, h is the proportion of cash reserves to total deposits held by the banks.
2. During a period of inflation, people tend to keep a smaller proportion of their income in form of money or K declines. In deflation K increases.
3. Money as a store of value functions as a medium to give purchasing power at a later date. The factors influencing individual demand for money are - (a) current interest rate, (b) wealth owned, (c) expectations of future prices and interest rates. But changes in all of these are believed to be constant or proportional to changes in income. Thus net net they thought that an individual's demand for nominal cash balances is proportional to nominal income. Thus $M_d = k.PY$ where k is the propensity to hold cash.
4. All the other factors like interest rates, wealth, expectations were supposed to be incorporated in determination of k and were not supposed to vary over SR.
5. From the equation ($M_d = k.PY$) it follows that both income and price elasticity of demand of money is 1 so that any change in prices causes equal proportionate change in money demanded.
6. Now since Y remains constant in SR (full employment) and k remains unchanged in SR, an increase in M leads to increase in P.

(c) Limitations

1. Income elasticity of money can vary from unity. Cambridge theory didn't specify any theoretical reason for it to be unity. Empirical evidence also doesn't support the theory in this matter.
2. Incorporation of interest rates, wealth, expectations in k is weak.
3. k is assumed to remain constant in SR whereas empirical data shows k can vary a lot specially in SR. Keynes said k can vary specially with r as @ low r people will have higher propensity to hold cash and @ higher r people will have lower propensity to hold cash.

Q. "Wicksell has added the missing chapter to the classical monetary theory by emphasizing the importance of rate of interest in the monetary theory."
In the light of the above statement examine the significance of the rate of interest as an instrument of monetary management. (2006, I, 20)

Friedman
(a) Propositions

1. Demand for money: $M_d = k(r_b, r_e, r_d).PY$ i.e. demand for money is a function of nominal income (PY) and k (determined by r but highly stable).
2. M determines PY: He assumes k is fairly stable and hence ΔM will lead to Δ(PY).
3. ΔM can affect Y only in SR. In LR, ΔM can affect only P as Y is determined by real factors.
4. Money alone matters: He thinks money has a direct and significant impact on PY and in recession there is a direct effect on Y.
5. Active vs passive monetary policy: Active discretionary monetary policy must be avoided. Instead they recommend a rule of constant growth of money consistent with LR output growth rate. M should not respond to changes in Y because if say actual growth rate < natural growth rate then money supply will automatically be more than what is desired and due to the slack in economy, cause Y to increase. If actual growth rate is > natural growth rate then money supply will automatically be less than what is desired and thus will apply breaks on PY and because of over employment will lead to a fall in prices.
6. Money supply target vs interest rate target: Keynesians advocate targeting interest rates. By doing so, they believed one can maintain stable AD via stable I_d. But monetarists support targeting money supply. If there is a recession and the central bank doesn't give up its target r then it will have to suck liquidity out of the system. This will lead to a further fall in PY and vice versa.
7. Stable private sector: They believe private sector and free market is inherently stable and fluctuations are caused by wrong government policies. Thus, according to them, the great depression was caused by failure of fed to prevent bank failures and the reduction of liquidity.

(b) Demand Function for Money

1. He emphasized that k in Cambridge approach should be interpreted as the desired / ex ante propensity to hold a part of their income in money. Thus in Cambridge, $M_d = k.PY$. Next he incorporates important aspects of Keynes into the Cambridge theory. Keynes had emphasized the role of money as an asset apart from its role in meeting transactions demand.
2. He thinks money provides a service of giving general purchasing power so that it can conveniently be used for buying goods and services. He doesn't consider any motives for holding money nor does he distinguish between speculative and transactions demand for money. He considers demand for money as a mere application of general theory of demand for capital assets.
3. So people can hold their wealth in a portfolio of money, bonds, equity and commodities. His demand for money, $M_d = f(W, h, r_m, r_b, r_e, P, (\Delta P/P), U)$ or $(M_d/P) = f(W, h, r_m, r_b, r_e, (\Delta P/P), U)$ where M_d is the nominal demand for money, (M_d/P) is the demand for real money balances, W is the wealth of individuals, h is the proportion of human wealth to the total wealth held by individuals, r_m is the rate of interest on money, r_b is the rate of interest on bonds, r_e is the rate of return on equities, P is the price level, (ΔP/P) is the inflation and U is for institutional factors.

(c) Factors Affecting M_d

1. Wealth (W) and human wealth (h): It is the major factor determining the demand for money. In it not only non human wealth like bonds, shares, money are included but also human wealth or human capital. Human wealth means the present value of a human's present and future earnings. While non human wealth can be easily converted into money i.e. made liquid, human wealth can't. Thus human wealth represents the illiquid component of wealth. Wealth represents the maximum limit of holding money and is similar to the budget constraint of a consumer in the theory of demand. The greater the wealth, the more money he will demand. Since human wealth represents the illiquid part of wealth, greater h means greater demand for money to make up for the illiquidity.

2. Rates of return (r_d, r_m, r_e, r_b): r_m is the interest rate on savings and time deposits. Given other interest rates, higher the r_m higher the demand for money. The opportunity cost of holding money is given by r_d, r_b and r_e. Thus higher these rates mean lower the demand for money.
3. Price level (P): A higher price means people will require larger nominal money balances to do the same amount of transactions (real balances effect). If income (Y) is used as a proxy for wealth (W) then nominal income P.Y becomes a crucial factor in deciding the demand for money.
4. Expected π ($\Delta P/P$): If people expect a higher rate of π they will reduce their demand for money holdings. This is because π reduces the purchasing power value of their money holdings. So when higher π is expected, people will convert their money holdings into other assets. If π_e is lower then M_d will rise.
5. Institutional factors (U): Factors such as mode of wage payments and bill payments also affect M_d. War, recession etc. also are included in U.

(d) Simplified M_d function ($M_d = f(Y_p, r)$)

1. It is difficult to estimate wealth. So he suggests wealth (W) can be taken as present value of all nominal income i.e. Y_p/r where Y_p is the permanent nominal income and r is r_m. Thus $M_d = f(Y_p, h, r_m, r_b, r_e, r_d, (\Delta P/P), U)$.
2. If we further assume that no inflation is expected, h and U remain constant over SR and all interest rates are same, then $M_d = f(Y_p, r)$.
3. He rewrites it as $M_d = k(r_b, r_e, r_d).PY$. Given the stable money function, any rise in money supply (M) will lead to a rise in nominal income or decline in rates of returns i.e. increase in k.
4. But Friedman believes that much of the effect of ΔM will go in $\Delta(PY)$ rather than k. Thus r_b, r_e, r_d have little or no effect on k and k can be assumed to be a constant. Thus $M_d = k.PY$. While in SR both P and Y may be affected, by ΔM, in the LR only P will be affected by ΔM. He recognized that in recessions AS curve may be fairly elastic so ΔM will lead to ΔY only and not ΔP. But in LR, LAS was vertical.
5. If $M_s > M_d$ then people will spend more leading to an increase in AD. In recessions, this ΔAD can be met with little ΔP.

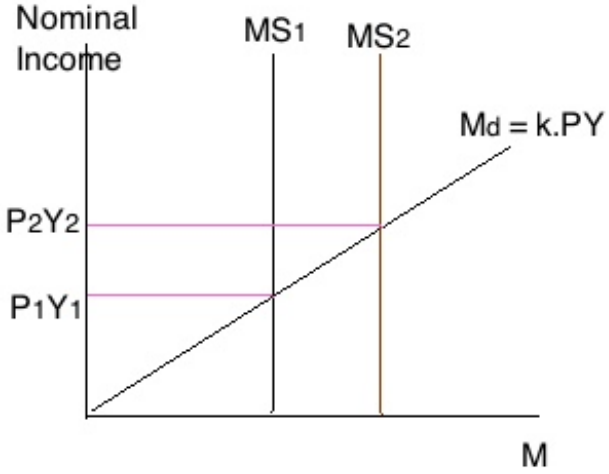
(e) Friedman vs Keynes vs Cambridge

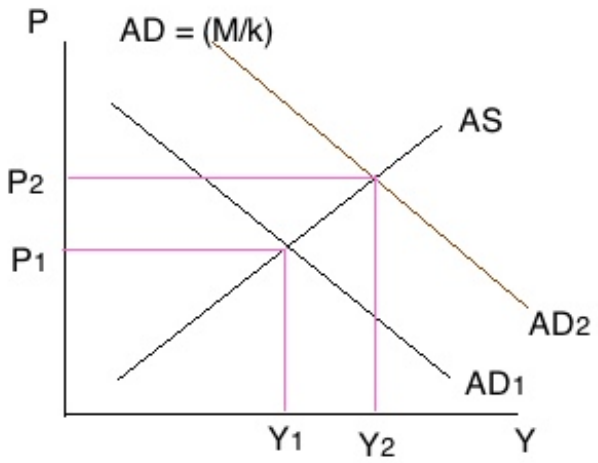
1. Different approaches to AD: Keynes considered its primary determinants to be C + I + G + NX while Friedman focused only on money being a primary determinant of AD (M/k is the AD in Friedman) and thus M = k.PY. Further since he thought k is stable, so there is a direct relationship between M and PY.
2. Keynes had clubbed together all other assets into "bonds" and then examined what determined people's allocation of their wealth between money and bonds. Friedman considers rates of return on bonds, equity as well as commodities.
3. Stability of k: Keynes regarded money demand function as unstable in SR and particularly k depended upon r. At higher r, people had a lower propensity to hold money and at lower r people had higher propensity. Keynes regarded k as the proportion of nominal income that people "want" to hold as money whereas Cambridge regarded k as the proportion of income people "actually" hold as money. Friedman agrees with Keynes' view of k in it being an ex ante variable but held it to be very stable. He held money demand function as very stable. Cambridge took k as mainly dependent on the transactions and not on r.
4. Transmission mechanism: Keynes thought ΔM first changes r, then changes I_d then AD through multiplier and then depending upon the slope of AS will change Y. But Friedman thought that ΔM has a direct effect on PY. There is no space for liquidity trap and elasticity of I_d in Friedman.
5. He agrees with Keynes that ΔM can lead to a change in real Y.
6. Money alone matters: Friedman thinks money has a direct and significant impact on PY and in recession there is a direct effect on Y. Keynes thought it works via transmission mechanism.
7. Role of fiscal policy: Keynesians were great advocates of fiscal policy. But monetarists thought that an expansionary fiscal policy will have little effect due to crowding out of private investment if the government finances it via borrowings. If the government monetizes the deficit then of course there will be an increase in AD but that will be because of increase in money supply.
8. Active vs passive monetary policy: Active discretionary monetary policy must be avoided. Instead monetarists recommend a rule of constant growth of money consistent with LR output growth rate. M should not respond to changes in Y because if say actual growth rate < natural growth rate then money supply will automatically be more than what is desired and due to the slack in economy, cause Y to increase. If actual growth rate is > natural growth rate then money supply will automatically be less than what is desired and thus will apply breaks on PY and because of over employment will lead to a fall in prices.
9. Money supply target vs interest rate target: Keynesians advocate targeting interest rates. By doing so, they believed one can maintain stable AD via stable I_d. But monetarists support targeting money supply. If there is a recession and the central bank doesn't give up its target r then it will have to suck liquidity out of the system. This will lead to

a further fall in PY and vice versa.

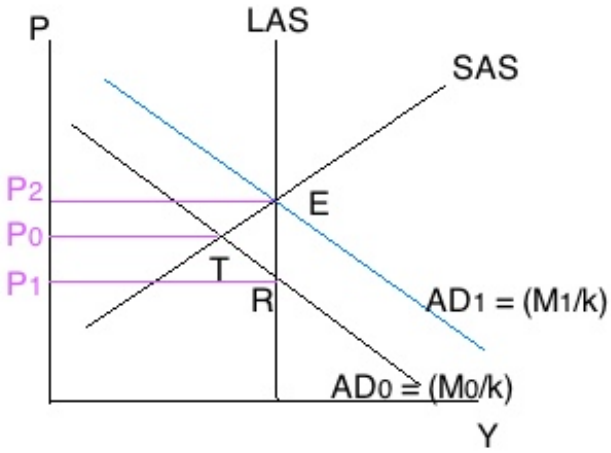
10. Stable private sector: Monetarists believe private sector and free market is inherently stable and fluctuations are caused by wrong government policies. Thus, according to them, the great depression was caused by failure of fed to prevent bank failures and the reduction of liquidity.

(f) Determination of Income





(g) SR and LR Impact of Change in Money Supply



1. Let the initial equilibrium be @ T and economy be in recession. Now Friedman believes that eventually wages will fall and equilibrium will be restored @ R i.e. Y_F. But he also says that instead of waiting for Y_F to be restored like this, we can simply increase the money supply (M_0 to M_1) and this will lead to a rise in AD (AD_0 to AD_1) and economy will reach point E i.e. Y_F.

(h) Criticism

1. Empirical studies show that there are wide fluctuations in k. Thus the base from monetarists goes.
2. It fails to explain stagflation and cost push inflation. They think π is caused by increase in M and that M is exogenously determined by the central bank. But this is not always the case. When wages of workers are raised by the efforts of trade unions or when the costs of raw materials up like energy, they are passed on to the consumers as price hikes resulting in cost push inflation. Increase in M which is observed then is not a reason behind the π but merely an accommodative response by the central bank to avoid a recession. Thus ΔM becomes an effect of π and not a cause.

(i) Explanation of Inflation

1. Keynes explains inflation as arising out of increase in AD over supply. But this AD increase is caused by real sector forces - autonomous increase in I or C or G. Friedman also explains inflation as arising out of increase in AD. But this increase in AD is caused by increase in money supply. If money supply increases, people will like to reduce their money holdings and thus will spend and this will cause them to demand more nominal output. If there is no proportionate increase in output, inflation will result. M = k.PY. Given constant k, (ΔM/M) = (ΔP/P) + (ΔY/Y).

2. It is generally agreed that whatever be the initial cause of inflation (demand pull or cost push) for the price level to continue rising period after period, it must be accommodated by an expansion in money supply. Thus sustained inflation is purely a monetary phenomenon.

Q. Is Friedman's quantity theory of money close to Classical or Keynesian approach to the aggregate demand for money? Give justifications for your arguments. (2011,I, 20)

Q. What is high powered or base money (H)? Is it an autonomous policy determined variable? Explain. (2009, I, 20)

Q. Explain Milton Friedman's reformulation of the quantity theory of money. (2009, I, 20)

Keynes Theory of Money
Liquidity Preference
(a) Concept

1. How much of his income will a person hold in the form of ready money (cash and non interest paying bank deposits) and how much will he part with or lends depends on his 'liquidity preference'.
2. People hold money instead of interest bearing bonds because of - (a) transactions motive, (b) precautionary motive, and (c) speculative motive.

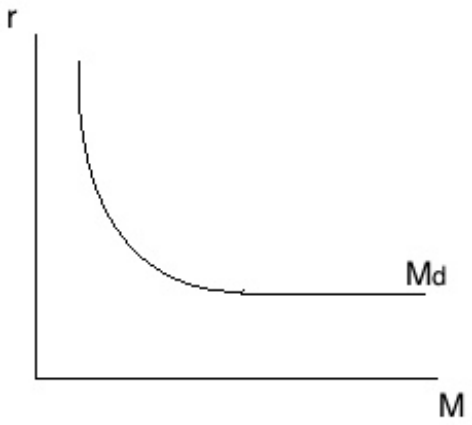
(b) Theory

1. Transactions demand for money (M_1): It depends on the real value of people's cash balances. As prices go up, their real cash balances go down (purchasing power decreases) so they will demand more money to restore the real value of their cash balances. Keynes said that the transactions demand for money depends upon the nominal income (larger the income, larger the real balances he would want) and not on r.
2. Precautionary demand for money (M_1): It refers to the desire of people to hold money for unforeseen contingencies. This demand will depend on psychology of an individual and the conditions in which he lives.
3. Speculative demand for money (M_2): It relates to the desire to hold one's resources in liquid form in order to take advantage of the market movements regarding the future changes in r. If interest rates are higher, less money will be held for speculative purposes than if interest rates are lower. Thus this demand is an inverse function of r.
4. Aggregate demand for money: It is the summation of each of the above 3 demands i.e. $M_d = M_1 + M_2$. $M_1 = f(Y_{nominal})$ and $M_2 = f(r)$. Thus $M_d = f(Y_{nominal}, r)$. Thus Keynes demand for money is an additive demand function.

(c) Criticisms

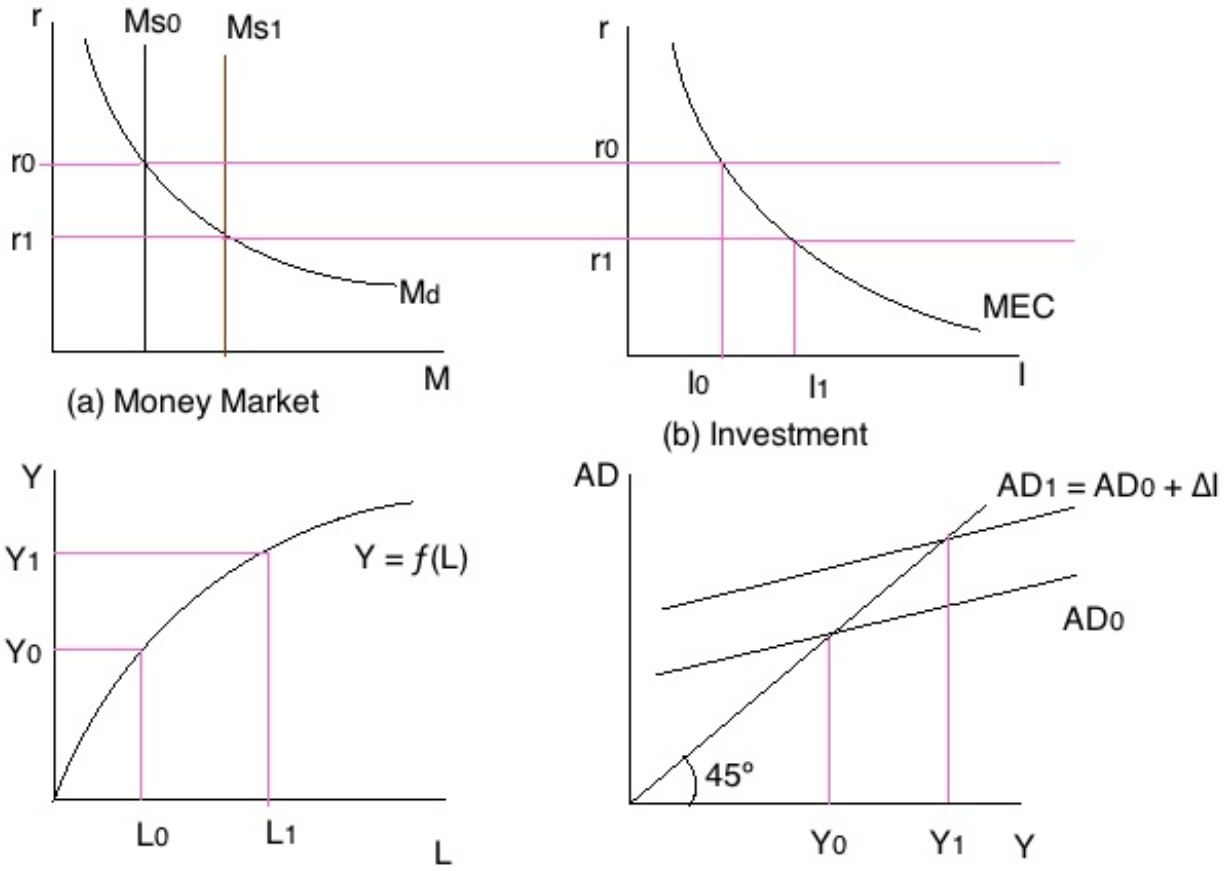
1. Transactions demand for money: Tobin and Baumol say that r is the opportunity cost of holding money and hence transactions demand of money also depends upon r. They say, higher the r, less the T_d.
2. Aggregate demand for money: Keynes' additive form of demand has been rejected by modern economists who say money represents a single asset and not several ones. There may be more than one motive to hold it and same unit of money can serve several motives. Thus demand for money can't be divided into separate independent components.
3. Portfolio argument: Keynes assumes while working out the speculative demand for money that people hold all their money either all in cash or all in bonds. THis is unrealistic and gave rise to the portfolio approach to demand for money (Tobin, Baumol and Friedman).

Liquidity Trap



1. At certain low r the M_d curve becomes perfectly elastic (or speculative demand curve for money becomes elastic). This means people will hold any money which is supplied. Thus any amount of increase in liquidity cannot reduce interest rates and monetary policy becomes ineffective. This is because when interest rates are too low, people think they can't get any lower and thus will not invest in bonds (and rather hold as cash).
2. The speculative demand for money depends not as much on the current rate of interest as on expectations about changes in interest rate. If there is a change in expectations, the whole curve of demand for money (or liquidity preference) will change accordingly. Thus if public believes that r will go higher than previously expected, whole M_d curve will shift up as people will demand to hold more money at each interest rate.

Keynes' Transmission Mechanism



1. Classicals believed that changes in money supply are irrelevant for real markets (called classical dichotomy). But Keynes believed that money supply can impact real variables via 3 factors - (a) elasticity of liquidity preference curve, (b) elasticity of investment curve, and (c) multiplier. An increase in monetary supply can lead to a fall in

interest rates. This will depend on the elasticity of the money demand curve (i.e. the liquidity preference curve). If it is not too flat i.e. not too elastic, a change in money supply will lead to a change in interest rates. Now I is dependent on both MEC and r. So if investment curve is not too inelastic i.e. vertical wrt r, then a change in r will lead to a change in I. A change in I will lead to a change in Y depending upon the multiplier.
2. Classicals believed that changes in MS will lead to direct changes in prices. But Keynes said there won't be a direct relationship. It will depend on elasticity of M_d, elasticity of I_d, multiplier and slope of AS curve.

Drawback

1. r seems to be determined purely by M_d and M_s. Effect of changes in goods market (investment) seems to have no impact on money market equilibrium.

Explanation of Inflation

1. AD = C + I + G + NX. Under normal functioning, AD is equivalent to cost of production of the output. But sometimes the government, or entrepreneurs or households may attempt to secure a larger part of this output and if the other sectors are not willing to let them do so, all will together try to get more of national output than what has been produced. This leads to AD going up and causing demand pull inflation.
2. Keynes thus explains inflation as arising out of real sector forces - autonomous increase in I or C or G.

Q. What is 'liquidity trap'? How does it occur? Illustrate. (2011, I, 20)

Q. Is the speculative demand for money responsible for the existence of involuntary unemployment in Keynesian system? Give reasons. (2010, I, 20)

Q. Outline the Keynesian theory of money and interest. What is the role of expectations in the theory of determination of rate of interest? (2007, I, 60)

Monetary Management

Effects of Inflation

Classical Fallacy

1. They believed that since wages adjust quickly to any change in prices, there are no costs of π and any perceived costs are purely psychological.

Costs of Anticipated π

1. Shoe leather costs.
2. Menu costs: Since people try not to change prices frequently it may lead to change in relative prices with time and hence economic inefficiency.

Costs of Unanticipated π

1. High inflation leads to savings migrating from financial assets to physical assets which are unproductive. Thus it reduces the incentive to save in assets that can be mobilized in financial markets.
2. High inflation also increase risks of inflation overshoot and hence inflation premia.
3. High inflation leads to worsening of trade balance.
4. It has distribution effects which are typically against the poor and unprotected.
5. Effect on output - demand pull π: Economists argue that low single digit π is good for the economy. The reasons given are - (a) If we target zero π and the actual π comes out to be negative then due to wage rigidity (recall money illusion) real wages will rise and there will be no mechanism to restore them quickly and the economy may be stuck into a recession. (b) In the intermediate range of Keynes' AS curve, the AS curve is upward sloping. So any increase in output will be necessarily accompanied by some π. Hence some π is desirable. (c) Some economists argue that wages typically are set in medium terms contracts and thus any π leads to fall in real wages and rise in real profits. This provides an incentive for businessmen to produce more and hence more investment in the LR.
6. Effect on output - cost push π: Unlike demand pull π, it leads to a fall in output.
7. Loss of confidence in financial system and currency itself.

Beneficial Effects of Deflation

1. It increases real wages.
2. It curbs speculative activities since there is no incentive to hoard commodities. But the utility of this is debatable since in deflationary environment there is anyways no lack of supply.
3. It leads to increase in value of money and hence people save more and hence total savings rise. But this is again debatable as thrift paradox may be invoked here.
4. It favorably impacts BoP. But in days of floating exchange rates this is again debatable.

Q. Would the introduction of ATMs make deposits more inconvenient and affect the money supply? Elucidate. (2011, I, 20)

Q. How do Keynesians, monetarists and rational expectation advocates differ in their views with regard to the tradeoff between inflation and employment? (2006, I, 60)

Closed Economies

Monetary Policy in Developing Countries

1. Earlier it was believed that because developing countries lack capital and higher the savings, higher the capital availability. So one must encourage savings to increase the supply of capital for investment and to encourage savings one must have higher r. This view was based on positive elasticity of savings to r.
2. But Keynes said that r represents the cost of investment and lower the r, more the incentive to invest. But he also opined that I was not much sensitive to r. In developing economies, it was believed, that lower r will help increase investment. So in 50s and 60s cheap credit policies were followed. But soon it was found out that I_d was quite inelastic to r.
3. So since mid 60s dear money policy has been pursued to curb inflationary effects of high deficit financing. It was expected that such a policy would encourage savings and cut consumption demand and also restrict I_d.
4. In developing countries monetary policy can also help in spreading financial inclusion via expansion of branches, new business models etc.
5. Monetary policy can also be used to promote public investment via deficit financing and SLR.
6. Selective credit controls can be used by the central bank to restrict credit flow in undesired sectors and check π.

Bank Rate - Limitations

1. It may be ineffective if banks' dependence on borrowed funds is less.
2. It needs efficient money markets. It needs competitive financial markets.
3. If economic conditions of boom are prevailing then demand of credit may not be constrained even by higher interest rates. Also if conditions are good, retained earnings may be high enough to fund investment projects. Corporates can also raise credit from ECB route.
4. It can't check supply side π.

OMOs

(a) Limitations

1. OMOs can be followed by a reverse cash movement i.e. if central bank purchases securities then the increased cash surplus may find its way back into the central bank as banks park their surplus cash back with it.
2. Then when cash with banks increases credit demand should increase too which may not be the case as MEC is important in deciding investment projects.
3. It assumes a constant velocity of money which may not be the case as it rises during rising business activity and falls in recessions.
4. If economic conditions of boom are prevailing then demand of credit may not be constrained even by higher interest rates. Also if conditions are good, retained earnings may be high enough to fund investment projects. Corporates can also raise credit from ECB route.
5. It can't check supply side π.

(b) Superiority over bank rate

1. It directly affects cash reserves with the banks and hence doesn't depend on the attitude of the banks or efficiency of markets for its success. Cash reserves of the banks can be adjusted in the desired way directly. All it needs is a broad market for government securities which is generally the case.

Open Economies

Goals

1. External and internal balance objectives may be at conflict. While preventing depreciation of a currency may

warrant a tighter monetary policy, promoting growth may warrant a loose monetary policy.

Flexible Exchange Rate Regime

1. If the central bank doesn't intervene in the fx market then it will not lead to change in money supply.

Fixed Exchange Rate Regime

1. To prevent currency appreciation, the central bank has to create additional high powered money and hence inflationary pressures.
2. It acts as an anchor against π. Since high inflation or money supply will lead to a downward pressure on a currency and persistent BoP deficit will result and the fx reserves will run out.

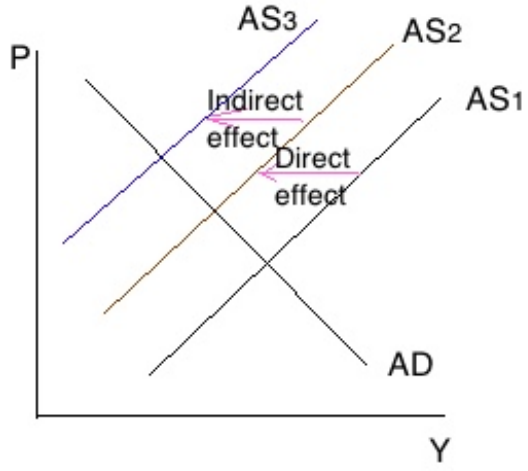
Relation Between Central Bank and Treasury

Central Bank's Dilemma

1. If the central bank doesn't monetize government's deficit then government will have to borrow from the market and hence a rise in interest rates and crowding out effect.
2. If the central bank monetizes the deficit it leads to creation of H and hence inflation. If the economy is in recession then deficit financing will not be inflationary and in fact raise output.

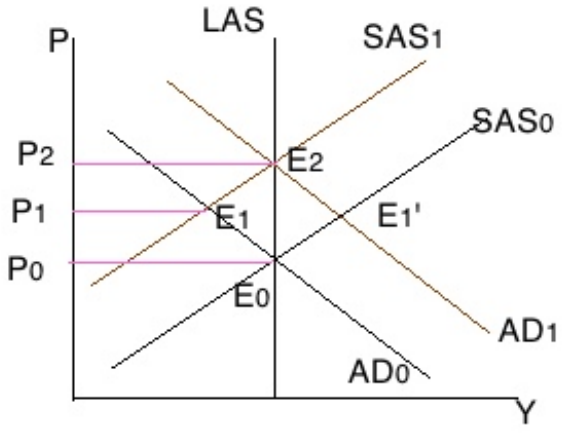
Cost Push Inflation

Direct vs Indirect Effect



1. Direct effect of an oil price hike is simply that oil costs more and hence pushes the prices up wherever it is used.
2. Indirect effect means that with the prices up, workers, creditors and entrepreneurs revise up their price level expectations and begin to ask for more wages, returns and profits. This further raises π.

Interaction between Demand Pull and Cost Push π



1. If cost push inflation occurs first, we move from E_0 to E_1. But then the central bank may decide to pursue

expansionary policy so as to prevent a recession. Thus we move from E_1 to E_2. Movement from P_0 to P_1 was cost push and P_1 to P_2 was demand pull п.

2. If demand pull inflation occurs first then we move from E_0 to E_1'. Now SAS is based on an expected price level by economic agents based on which they negotiate their wages, credit, profits etc. Since the price level has changed, economic agents would build in these new price level expectations in their contracts and we will see wages, interest rates, profits rising. Thus economy will move from E_1' to E_2 which is cost push п. This can lead to a wage-price spiral.

Structuralist Inflation Theory in Developing Countries (Myrdal, Streeten, Kirkpatrick, Nixon)

Concept

1. They argue that increase in investment and government spending and deficit financing are only apparent reasons for inflation in developing countries and not the real reasons. One should go deeper as to why the aggregate output (specially of wage goods) doesn't increase sufficiently in developing countries to match the increase in demand brought by investment and government spending and deficit financing. One should ask what are the factors why investment couldn't be fully financed by voluntary savings and the government had to resort to deficit financing.
2. According to them, the intersectoral linkages and flows in developing economies are not strong and thus highly aggregative demand - supply model shouldn't be used to study inflation here. We need to identify the structural reasons causing bottlenecks and hence п. An aggregative study will not account for the cases where we have shortages in one sector and excess capacity in others. But because of the shortages in key sectors, overall п will be high even though at the aggregate scale economy might be suffering from excess supply. So we need to analyze the sectoral demand - supply imbalances.

Type of Bottlenecks

1. Agricultural bottlenecks: Agriculture is primitive and can't match rising demand. Income elasticity of food demand is high in the initial levels and whereas due to primitive structures elasticity of supply is low. Because food comprises of a large portion in personal consumption expenditure, any rise in food prices immediately propagates through in the form of cost push п.
2. Government's budget constraint: Another important bottleneck is lack of resources for financing economic development. In developing countries governments play a vital role in planning and industrialization. This requires large resources but the structure of the economy is such that it is often not possible for the government to raise revenue via taxation or borrowings (lack of administrative structure, improper institutions, corruption, shallow financial markets, lack of surplus or purchasing power with people). So governments have to resort to deficit financing. Thus growth in M_S is only the apparent and not the real cause of п.
3. Fx bottlenecks: Developing countries need to import capital goods for their industrialization needs but they don't have fx for it. While their import needs run high, they don't have export surplus. This leads to BoP crisis which further pushes domestic prices up (as currency gets devalued) and also less imports in the first place mean they are not able to generate sufficient productive capacity to meet the demand.
4. Physical infrastructure bottlenecks: They lead to sluggish growth in output and hence inflation.
5. Black money: Central bank creates additional money supply to finance government and private sector's investment needs. These investments also generate productive capacities but if money goes into the black economy (real estate / gold), no productive capacity is created and inflation results.

Demand Pull or Cost Push п in Developing Countries

1. Demand pull: To promote heavy industrialization and keeping in mind the government's budget constraints the governments of the day have to resort to deficit financing. Similarly central bank resorts to deficit financing to finance the investment needs of the private sector. This expansion in M_S according to Friedman leads to demand pull п.
2. Cost push: But at the same time increase in prices of energy products, administered prices etc. lead to cost push п. When due to demand pull п price levels rise, workers and creditors demand more wages and interest and thus it becomes cost push as well. Thus there is a close interaction between demand pull and cost push п in developing countries.

Ceiling on Growth Rate of Money

Friedman

1. He is against an active discretionary monetary policy to tide over recession because he thinks that prices and wages are quite flexible and Y_F is restored quite rapidly.

2. Active discretionary monetary policy must be avoided. Instead monetarists recommend a rule of constant growth of money consistent with LR output growth rate. M should not respond to changes in Y because if say actual growth rate < natural growth rate then money supply will automatically be more than what is desired and due to the slack in economy, cause Y to increase. If actual growth rate is > natural growth rate then money supply will automatically be less than what is desired and thus will apply breaks on PY and because of over employment will lead to a fall in prices.
3. Keynesians advocate targeting interest rates. By doing so, they believed one can maintain stable AD via stable I_d. But monetarists support targeting money supply. If there is a recession and the central bank doesn't give up its target r then it will have to suck liquidity out of the system. This will lead to a further fall in PY and vice versa.
4. Friedman argued that changes in money supply affect output only after long, irregular and variable lags. This makes it very difficult to formulate the right monetary policy at the right time.

Keynesians

1. They think k is variable both in SR and LR and hence a constant money supply may lead to fluctuations in AD and instability.

New Classicals

1. They too agree with constant growth rate of money supply since they believe central bank can take no action which will have a desirable impact. This is because if central bank is taking an action on basis of certain expectations about future, market would already have incorporated it and there will be no effect of central bank's actions. Thus the only way left for the central bank policies to have an impact is if they are based on unanticipated events in which case it would be like a gamble.

Interest Rate Target vs Money Supply Target

1. Controlling r means central bank will be varying money supply. r and M_s can't be simultaneously stabilized. Thus by controlling r, according to monetarists, central bank would be actually destabilizing the economy. If say the economy is going in a recession. If r is to be kept constant then central bank will have to reduce M_s otherwise there will be a fall in r. But reduction in M_s will lead to a fall in AD and hence accentuate the recession. The need of the hour would be to keep M_s constant so that r automatically falls.

Public Finance in Market Economy

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Role of Public Finance
Stabilizing Supply
Allocation of Resources

1. Through fiscal and monetary incentives / disincentives government can influence resource allocation decisions.
2. It can also be used to mobilize resources.

Social Goods
(a) Social Goods and Market Failure

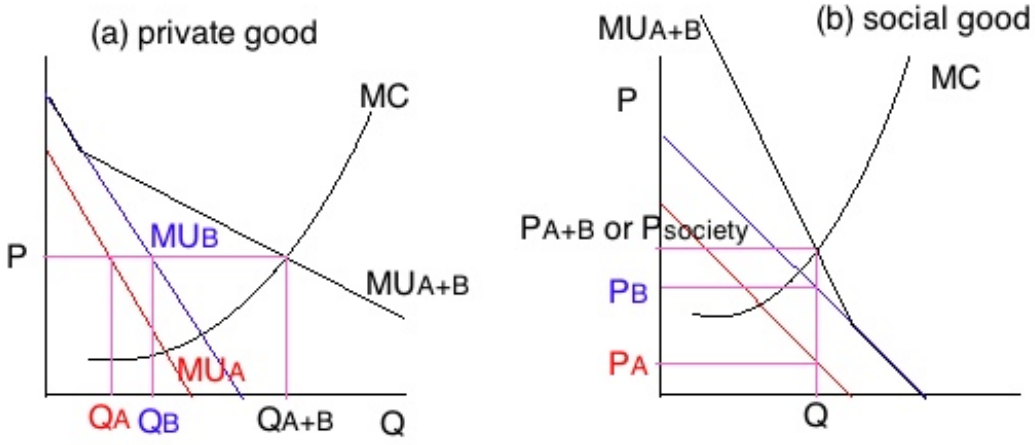
Q. The 'non-rival nature' of social goods consumption has important bearing on efficient resource allocation. Explore the problem with the examples and diagrams. (2011, I, 20)

1. Market failure due to non exclusiveness: Most social goods non exclusive in nature i.e. there is no feasible way for A to exclude B from using a social good even when B's consumption affects A's consumption. Due to non exclusiveness nature of most public good it is generally not feasible to charge each user. Thus on a busy road, use by B affects use by A but it is impractical to practice exclusion. So no one will pay for it (since one can enjoy it without paying) and market failure will occur.
2. Market failure due to non rival nature: Social goods are non rival in nature. This means that consumption by A doesn't affect consumption by B and thus marginal cost of providing social goods is zero. Thus they can't be provided efficiently (efficient provision means P = MC) by private sector even when they are excludable and it is

possible to charge them (say entry into a public park). The non rival nature of the social goods mean that the marginal cost of providing that service is zero. So efficiency principle will dictate that nothing should be charged. But then total costs need to be recovered and in this case there will be a market failure. The efficient way to do this is to charge a lump sum tax on the residents for the use of the social good in question.

Consumption	Exclusion	Exclusion
	Feasible	Not Feasible
Rival	Private	Public
Non Rival	Public	Public

(b) Efficient Provision of Social Goods - Market Mechanism



1. Comparison with private goods: Private goods are rival. Thus if a quantity is consumed by A it can't be consumed by B. So if we have the MU curves of 2 customers (A and B) for a private good (shown in a) then to determine the total demand we add up horizontally. Thus we get MU_{A+B} find MC, decide the price (P = MC) and the quantities consumed by each individual are where the horizontal price line (P) intersects their individual MU curves. On the other hand social goods are non rival. This means if a quantity is consumed by A it can be consumed by B as well without prejudicing A's utility in any way. So if we have MY curves of A and B then this is what they are willing to pay individually for the social good. Since same quantity can be given to both, we add up their curves vertically to find the MU curve of the society. By intersection of MC with MU_{A+B} we can get the efficient quantity. Then we see the MU of each individual at this quantity and charge them that (P_A and P_B). This is called Lindahl equilibrium. Note that if output is less than Q then it MC < marginal benefit to society and hence it would be beneficial for the society to produce more.
2. But here we assume that MU curves of both consumers are known just as they would be known for private goods.

(c) Issues in Market Mechanism Based Efficient Provisioning of Social Good

1. Free rider problem: If an individual is only one member of a large group and the total available supply to him is not affected to any noticeable extent by his own contribution then he will have no incentive to reveal his true marginal utility of the service. Thus he will free ride and will only reveal negligible marginal utility. The MU curves of A and B will never be revealed. Thus tax on a voluntary basis or as according to the marginal utility can serve no purpose.
2. Voting: Due to the free rider problem we need a voting based mechanism to reveal society's preferences as to the necessity of a social good and then to furnish resources for it. If an individual knows that he will have to comply with the majority decision then he will find it in his interest to vote for an outcome which is closer to his interests and in this way will reveal his preferences (or MU curve). To bring out the personal preferences efficiently the voting should be directly linked tax and expenditure decisions (i.e. it should tell this is the social good we provide, this much quantity and this much is the tax). In this case voters will reveal their MU curves.

(d) Clarke Groves Tax for Revelation of True Preferences

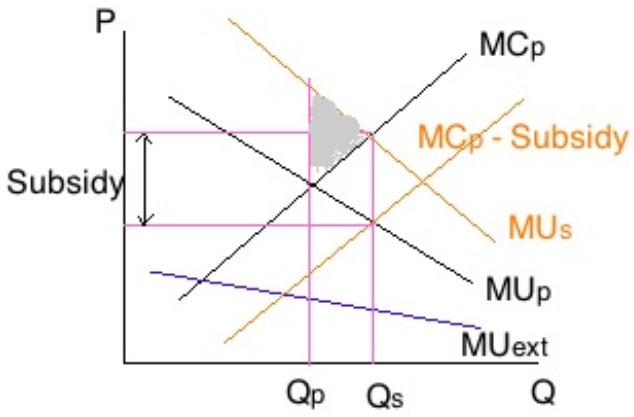
Voter	**Option 1 Utility**	**Option 2 Utility**	**Option 3 Utility**	**Tax Charged**	**Net Benefit of Voting After Tax**
A	50	20	10	25	15

B	10	60	20	0	0
C	40	10	55	20	10
Total	100	90	85		
Total Without Individuals Vote					
A: B + C	50	70	75		
B: A + C	90	30	65		
C: A + B	60	80	30		

1. If A had not revealed his preference, option 3 would have been selected. By revealing his preference option 1 is selected but in doing so loss in utility of B + C = 75 - 50 = 25. So A will have to pay a tax of 25. But his gain in utility = 50 - 10 = 40. So even after paying additional tax he is better off by 25.
2. B'd preference revelation doesn't change the outcome so he doesn't pay any tax.
3. C's preference revelation changes the outcome from option 2 to option 1 which entails a loss of utility by others of 80 - 60 = 20. So he pays a tax of 20. But his gain in doing so is 40 - 10 = 30. So he is still better off by 10.

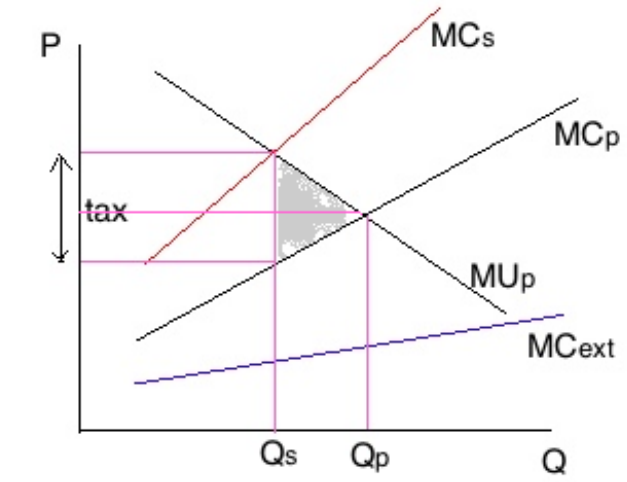
Mixed Goods - Externalities

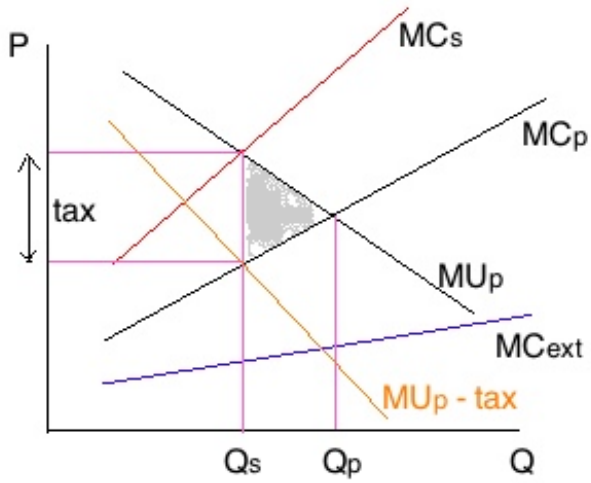
(a) Positive Externalities in Consumption



1. Let MU_p represent marginal utility of the good as perceived by its consumers. It will be derived by the horizontal addition of the MU curves of all individuals. Let MU_{ext} be the marginal utility of the good as perceived by others reflecting the positive externalities of the good. Note that MU_{ext} curve will be obtained by the vertical addition of all the individual MU_{ext} curves. We add MU_{ext} to MU_p vertically to get MU_s i.e. the total MU or benefit to the society.
2. Failure of market: Now a private market mechanism will only equate MU_p with MC_p and produce Q_p of the good. This is because individuals will be ready to pay only according to the MU_p curve. But this is inefficient from society's point of view because the actual benefit to the society is MU_s and hence Q_s would be an efficient production.
3. Need for government intervention: So to expand the output from Q_p to Q_s government will need to give either a subsidy to the producers to shift their MC curves lower or give subsidies to the consumers for this purpose. This subsidy should be equal to MU_{ext}. The burden of subsidy is financed by taxes on individuals - ideally in line with their individual MU_{ext} curves but because of the free rider problem - on the basis of a voting mechanism.

(b) Negative Externalities in Production

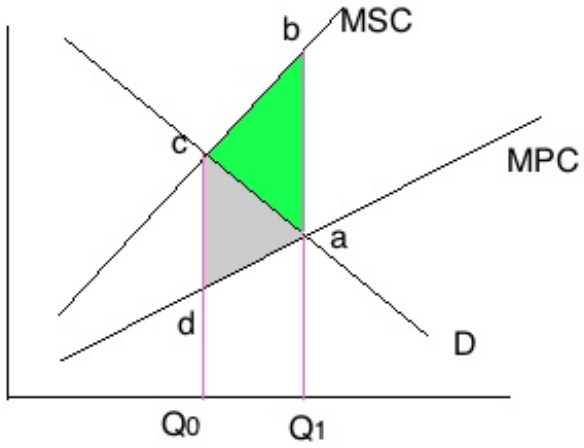




1. Here MC_{ext} are the external costs to the society of producing a private good. Left to itself, market will ignore MC_{ext} and produce Q_p which is obviously inefficient from society's point of view. Hence to move to the efficient production (Q_s) government needs to impose a tax on the producers so as to raise their costs to MC_s or on consumers so as to reduce the demand curve to MU_p - tax. This tax should be equal to MC_{ext}. Incidence on each individual can be determined based on the individual MC_{ext} curves.
2. The shaded region is the gain to society from the tax. This is excess of costs over benefits for the units which are eliminated by the tax. It can be proved using congruent triangles a well.

Pigou vs Coase

1. The above argument that the government must interfere in the case of market failure was advanced by Pigou. However, Coase challenged it. He argued that the presence of externalities doesn't necessarily mean an interference by government. After all the government intervention will have costs and if these costs are higher than the social benefits from intervention then government intervention will not increases social welfare.



1. He argues that in the case with negative externalities of production, let the socially efficient quantity be Q_0 but the production be @ Q_1. If the production were to be reduced from Q_1 to Q_0 the combined loss of welfare to the producer and the consumers will be the area ACD. But the gain to the society would be quadrilateral ABCD. Since ABCD > ACD so it should be possible for the society to bribe off the producers and consumers so affected. But of course whether such a thing happens or not will depend on the transaction costs.
2. How the bargaining takes place will depend on how the property rights are defined. If in a factory polluting the river case the residents downstream have the property right over the river then the factory will have to pay them to pollute the river. This payment will be MSC - MPC for each unit produced which will raise the cost of the factory and restore the output back to the socially optimum level. If the property rights were given to the factory then the downstream residents will have to bribe the factory the area ACD for not polluting the river.

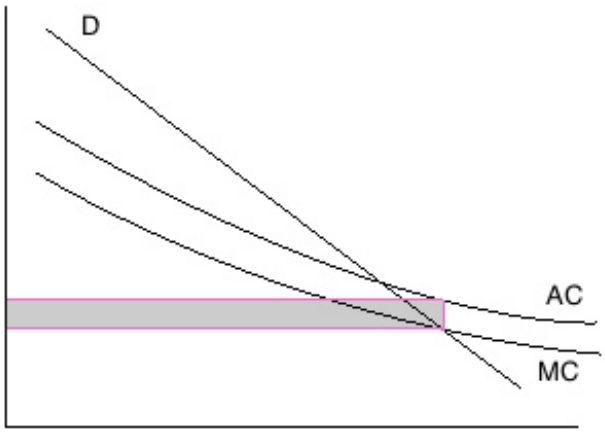
Earmarking

1. Some experts argue that earmarking a certain portion of revenue for a certain expenditure is not a good budget practice since it imposes constraints. The actual need may be more than or less than the amount earmarked. But earmarkings have benefits as well.
2. Some taxes may be linked to some expenditures because the tax payments approximate benefits derived from those services.
3. Earmarking also helps in preference revelation during voting.

Fiscal Decentralization

1. Although social goods are equally available to all concerned, their benefits may be spatially limited. Thus while national defence may benefit all, street lights may benefit only the people of a locality. Thus the issue of fiscal federalism arises.

Market Failure due to Increasing Returns to Scale



1. When the industry is subject to IRS, it is unlikely that it will be competitive. Because it will pay for a firm to eliminate all its competitors and thus to take advantage of the economies of scale. But under a monopoly the market will not be efficient (P > MC). So if the government takes it over and starts producing, the market can be efficient. In the above figure, we can see however that P = MC solution will lead to a loss equal to the shaded area and production is made unviable. What should the government do in such a case? If instead of making P = MC, it makes P = AC, it can recoup losses but then the production will not be efficient. Another solution is P = MC along with lump sum taxes which will ensure no efficiencies. But lump sum taxes are not feasible. Moreover if someone is not using this service, why should he pay for it.
2. If instead of looking at this PSU in isolation we consider all PSUs then we have a softer constraint: all PSUs together shouldn't earn losses though any individual PSU can. Also we rule out lump sum taxes and want to collect user fee only from the users of the services. The solution will not be efficient but our endeavor is to minimize the excess burden (or the inefficiency).
3. The difference between the user fee charged and MC is nothing but a tax that the government levies on the commodity to make sure that the PSUs as a group break even. Ramsey rule for optimal taxation dictates that such a tax on various commodities should be inversely related to their elasticities so that the demands for each commodity is reduced in equal proportion.

Distributional Effects of Taxation

Endowment Based Criteria

1. Keep what you can earn in the market.
2. Keep what you could earn in a competitive market.
3. Keep labor (earned) income only.
4. Keep what you could earn in a competitive market given equal positions at the start.

Utilitarian Criteria

1. Total welfare is maximized. Benthem argued that if A derives higher utility from an income then it should be given to A. Sen's handicap is punished here.
2. Average welfare is maximized.

Egalitarian Criteria

1. Welfare is equalized. This leads to opposite of total utility maximization. Sen's handicapped benefits here.
2. Welfare of the lowest group is maximized. It was propounded by Rawls. It permits higher tax rates so long as it increases the income of the poor. If carried beyond a certain point it will reduce the total income and hence reduce income of the poor. Ex ante people will not know where they will end up so they will vote for an outcome which maximizes the minima. Hence this criteria was considered to be fair by Rawls.
3. Categorical equity calls for provision in kind.

Mixed Criteria

1. Welfare floor is set with the endowment rule applicable above it.
2. Distribution is adjusted to maximize the welfare in line with social welfare weights.

Limits to Distribution

1. Size of the pie: If we charge higher marginal tax rates then the size of the pie i.e. the total available income to redistribute may shrink. This is because higher marginal tax rates after a point may reduce the incentive to work. As we increase the tax on rich they may initially work harder but after certain tax rate will reduce their work.
2. Efficiency costs: Levying a tax on A may leave him with greater welfare loss than T (tax collected) and transferring it to B may cause more deadweight loss to the society. However it must be noted that the fact that the donor loses more than the recipient gains needn't lead to a welfare loss for the society for it would depend on the social welfare function.

Development

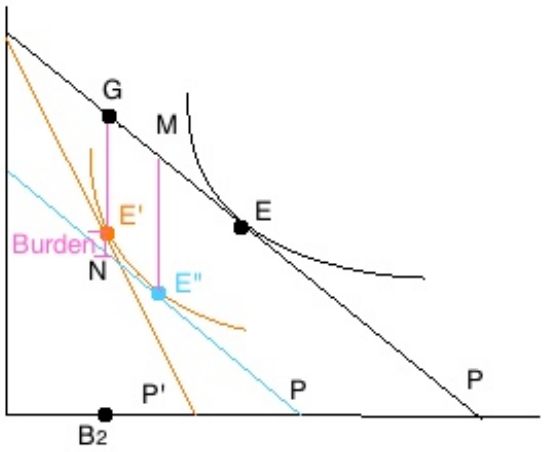
1. We have incremental capital output ratio (v) = (ΔK/ΔY) = (I/ΔY). Since GDP growth rate (g) = (ΔY/Y), we have I/Y = v.g. Assuming closed economy, I/Y = S/Y where S is the savings. Now S = S_p + S_g where S_p is the private savings and S_g is the government savings. Now S_p = mps. (Y - T) = mps.(1 - t).Y and S_g = (t - a).Y where a is the expenditure of the government as a fraction of GDP. Thus v.g = (mps - mps.t + t - a) or t = (v.g - mps + a) / (1 - mps) is the required tax rate.

Public Revenue

Efficiency Effects of Taxes

1. The burden of tax is more than the amount of tax collected. Two obvious sources are administrative costs and compliance costs (resources spent to comply with taxes).

Excess Burden & Efficiency of Lump Sum Taxes

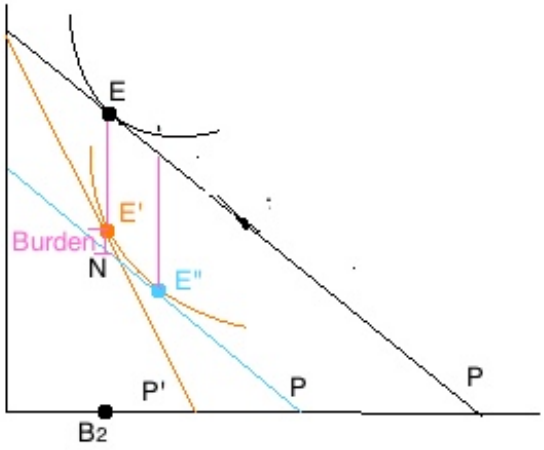


1. In the above case we can see that the imposition of the commodity tax has taken the consumer from a higher welfare to a lower welfare. While earlier in exchange of OB_2 amount of X a consumer was getting B_2G amount of Y now he gets only B_2E' amount of Y so that GE' is the tax collected by the government. The question is was it possible for the government to collect the same amount of tax by inflicting a lower utility loss on the consumer?
2. If we shift the price ray parallel inwards until the point it just touches the same new indifference curve, we get to point E". Now @ E" the consumer is at same utility as E' and yet the revenue collected by the government is E"M

which is > GE' (see parallel lines). This means that original taxation was inefficient and E'N is the excess burden. This arises from the substitution effect. The direct inward shifting reflects the income effect and is equivalent to a lump sum tax. Thus lump sum taxes don't cause any excess burden or dead weight loss.

3. But lump sum taxes are not equitable and if we insert an element of equity in it (say a person with higher income pays more) then it loses its efficiency property.

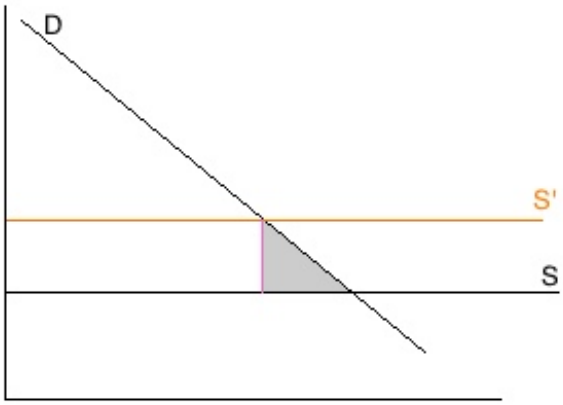
If the demand for a commodity doesn't change when it is axed, does this mean there is no excess burden?



1. In the above figure we can see clearly this is not the case. Its just that the income effect of the tax has been completely offset by the substitution effect.

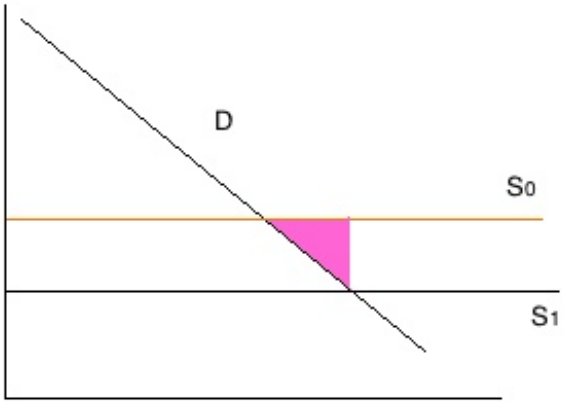
Excess Burden Measurement in a Partial Equilibrium Setting

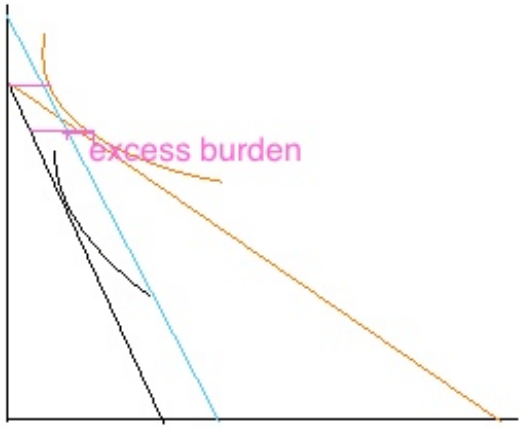
1. A compensated demand curve is the demand curve which shows the changes in demand only due to the substitution effect. Thus it is derived after negating the income effects.



1. In the figure above the excess burden is the shaded region. Its area is $0.5*(P.Q.\Delta t^{\wedge 2}) / (1/\eta_d + 1/\eta_s)$. We know the area of the triangle is 0.5 * base * height. Base = ΔQ, height = Δt.
2. Marginal excess burden can be used to determine the threshold benefit of the project as this represents the loss to the society by the tax imposed and hence should be the minimum benefit from the project.
3. But partial equilibrium analysis doesn't give us correct answers. Consider a setting where if a product is taxed then the consumption of its substitute will increase. That will change the welfare associated with the substitute market which needs to be taken into account (since it has been caused by imposition of this tax). In another setting consider a tax on a polluting technology. Taxing it improves social welfare (since it had negative externalities earlier). But since its prices go up it will create a distortion in other products as well because of its income effect (real incomes go down).

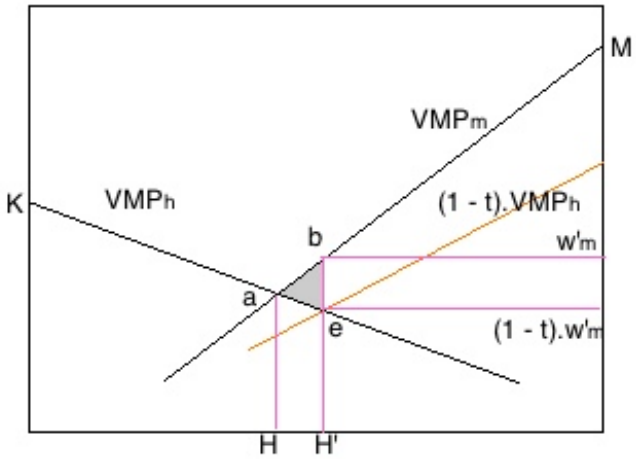
Excess Burden of a Subsidy





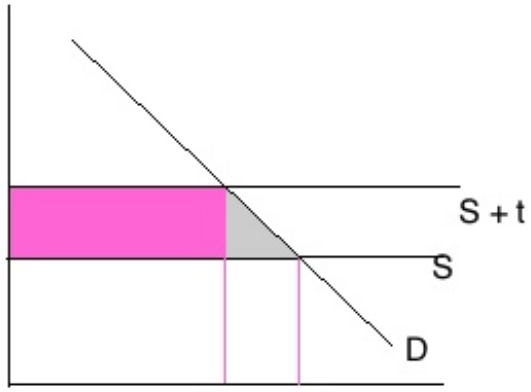
1. In the above figure we can see that the supply curve shifts down when a subsidy is introduced. Quantity consumed will increase but as we can see it will create an excess burden equivalent to the shaded area. This could have been eliminated by direct transfer of income. The general equilibrium graph is the reverse of the "excess burden of a tax" graph.

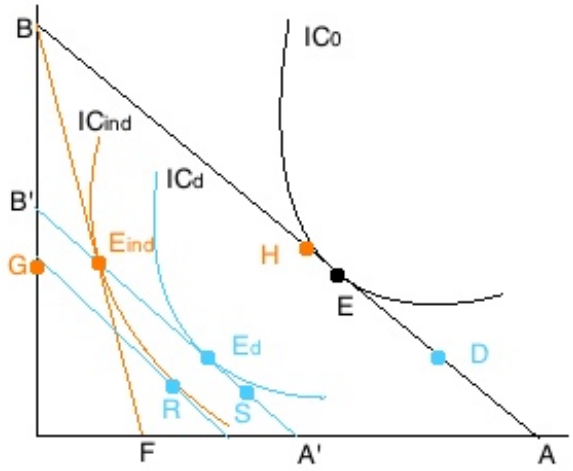
Excess Burden of Differential Input Tax



1. Lets say a person can work either @ home or @ market. Without any tax both markets will be in equilibrium @ a where $VMP_h = VMP_m$. This is because a worker is paid the value of his marginal product. Now when a tax t is imposed on the income from market, a person will now equate the post tax wage rates. Thus we move to e.
2. @ home, initially work done was OKaH. After tax the work done is OKeH'. So additional work done @ home is aeH'H. @ market initially work done is M'MbH'. Post tax work done in market is O'MbH'. So work lost is abH'H. This means net loss to the society is area abe. It is clear that the higher the elasticity of VMP_m curve and the VMP_h curve, higher the excess burden.

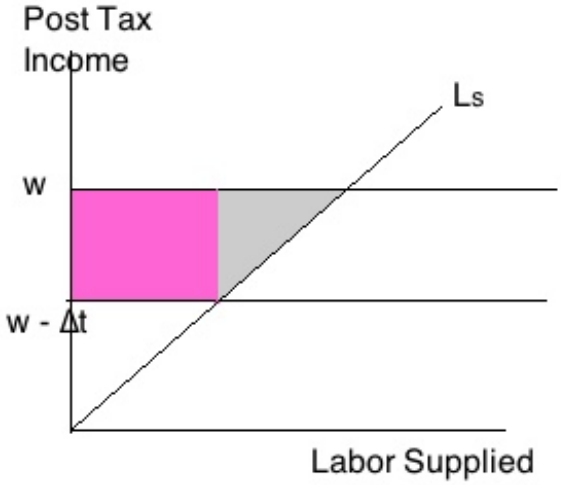
Efficiency Effects of Taxation - Choice Between 2 Products

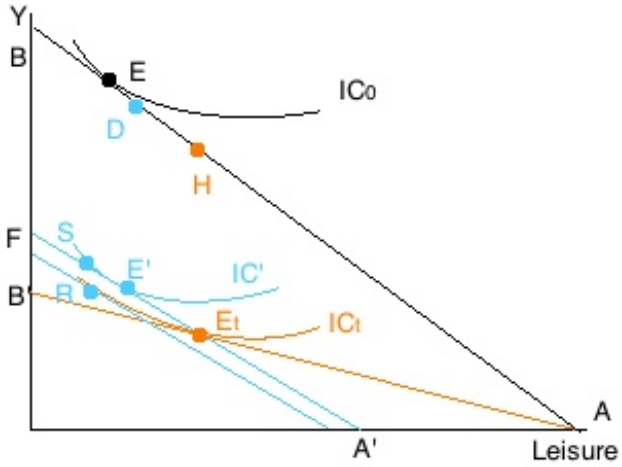




1. In the partial equilibrium figure above the amount of tax collected is in pink shaded area. Grey shaded area is the dead weight loss.
2. In the general equilibrium setting let AB be the price line under zero taxes and the community is @ E so that $MRS_{x,y} = MRTS_{x,y}$ and community is @ highest possible indifference curve (IC_0). Now if a direct tax or a lump sum tax or a general consumption tax is imposed the PPF will shift inwards, price line will shift parallely to A'B' (because head tax will not disturb relative prices). So the community is @ E_d where $MRS_{x,y} = MRTS_{x,y}$ (still). The new indifference curve is IC_d which is lower than IC_0 because total available income with society has gone down. E_dD is the revenue collected by the government from product X. If instead of a head tax, a general consumption tax is imposed situation will remain same.
3. However when a selective tax is imposed, prices will be distorted and society will reach point E_{ind}. Here $MRTS_{x,y} \neq MRS_{x,y}$. Society is @ an even lower indifference curve because distortion of prices have produced inefficiencies in consumption as well. Thus a general consumption tax is better than a special consumption tax. @ E_{ind}, the government is now collecting a revenue of $E_{ind}H$. It could have collected the same revenue E_dD by imposing a lump sum tax / direct tax / general consumption tax and yet left the consumer on a higher indifference curve. Thus excess burden is generated and is equal to RS.

Efficiency Effects of Taxation - Choice Between Goods and Leisure

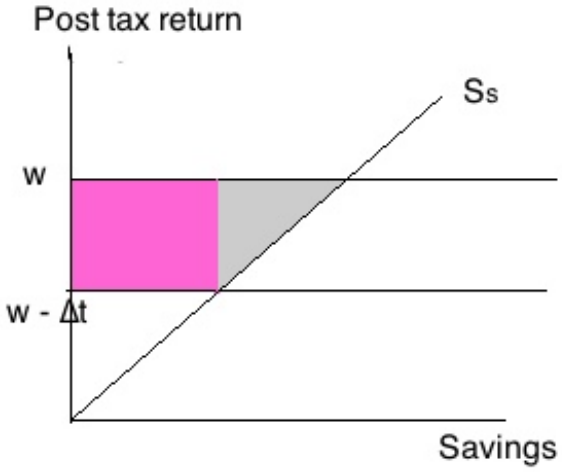


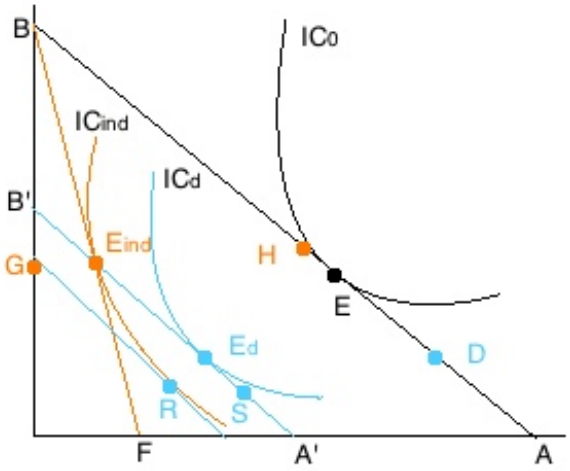


1. Imposition of tax has lead to creation of a dead weight loss (grey area) as individuals work less.
2. The general equilibrium setting shows that without tax the society was @ E and indifference curve IC_0. If a lump sum tax is imposed (or somehow it is possible to include leisure in the tax base) then the community will be @ E' and lower indifference curve IC'. However if an income tax (proportional in this case) is imposed it is equivalent to imposing a special consumption tax on income where the 2 goods are income and leisure. Thus the price of income rises and distortions arise and thus community moves to a lower indifference curve IC_t @ E_t. In this case the revenue collected by the government is E_tH which is same as E'D. Thus the government could have collected the same revenue by a lump sum tax and yet leave the individuals on a higher indifference curve. RS is the excess burden generated by the tax. Thus a lump sum tax is better than an income tax. It can be seen that a progressive tax rate structure will further distort it.

3. In the case of transfers (which may be treated as a negative case) income effect will be negative. Substitution effect may be positive or negative depending upon whether it is linked positively to work or not.

Efficiency Effects of Taxation - Choice Between Consumption and Savings



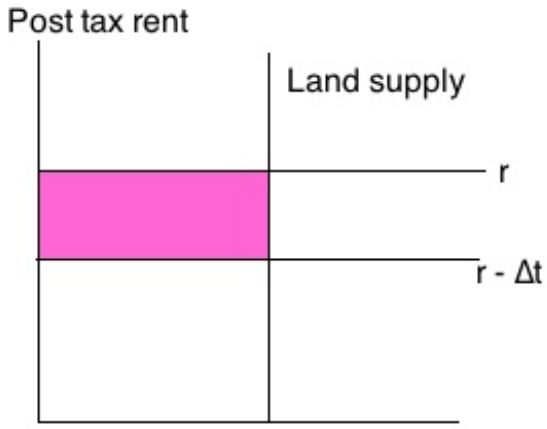


1. In the general equilibrium setting let the current consumption be on Y axis and the future consumption (i.e. savings) be on the X axis. Initially let he economy be @ E and the future consumption = (1 + i) * current consumption. This ensures efficiency and the society is @ E enjoying indifference curve IC_0. Now if a general consumption tax is imposed there will be an inward parallel shift in PPF curve because a general consumption tax doesn't change the relative prices of savings and current consumption. So community will be @ E_d running @ indifference curve of IC_d. There is no excess burden. However an income tax will distort the relative prices (as it taxes savings as well as income on savings) and the community will move @ E_{ind} and even lower indifference curve IC_{ind}. In this case $MRTS_{savings, consumption} = (1 + i_g)$ while $MRS_{savings, consumption} = (1 + i_n)$ where i_g is the pre tax rate of return on savings and i_n is the post tax return on savings. The government collects a revenue of $E_{ind}H$ in this case but the same could have been obtained via a general consumption tax E_dD and still left the individual on a higher indifference curve. RS is the excess burden of the income tax in this case. Thus a general consumption tax is better than an income tax.

Efficiency Effects of Taxation - Multiple Choices & Optimum Tax

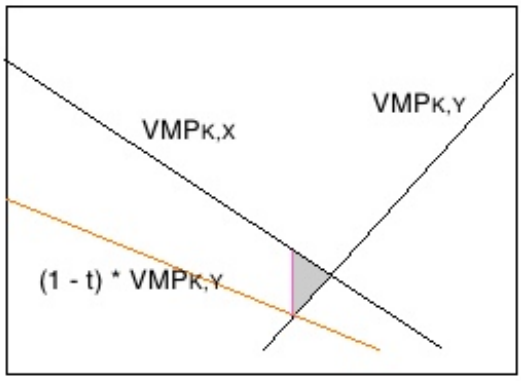
1. In the above we have only dealt with choice between individual pairs keeping other constant. However in a general setting, only a direct head tax may be free of excess burden. Also the more elastic a product's demand, the more is the excess burden on taxing it.
2. Suppose we allow multiple choices like product X, product Y and leisure are all allowed to vary. A general consumption tax will not create distortions between X and Y but will create distortions between X and L and Y and L. A special tax on X may reduce distortions between X and L but may increase those between X and Y. This is specially true of X is a leisure good so that taxing it will make leisure more expensive and turn people towards more work. Thus in a general setting there is no guarantee that a consumption tax is a superior system than a special tax.
3. Similarly if savings, current consumption and leisure are allowed to vary it is not necessary any more that consumption tax is superior than income tax.
4. Consideration for elasticities suggests that higher the elasticity and cross elasticities, lesser should be the tax. But an optimum tax rule based on minimizing excess burden will suggest higher tax on inelastic items (like bread) which are used by poor and a lower tax on elastic items (like caviar) which are used by rich.

Efficiency Effect of Taxation - Tax on Rent



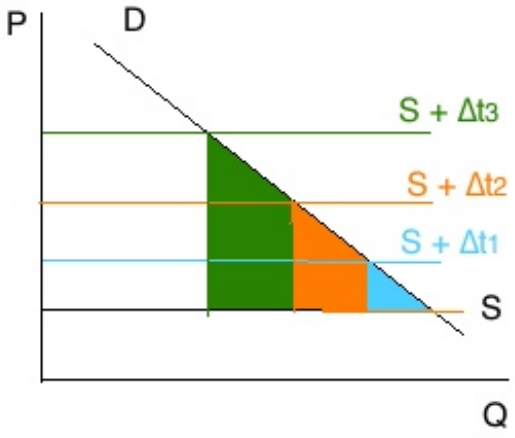
1. Supply of land in the economy is inelastic. So a tax on land rent doesn't lead to any dead weight loss.

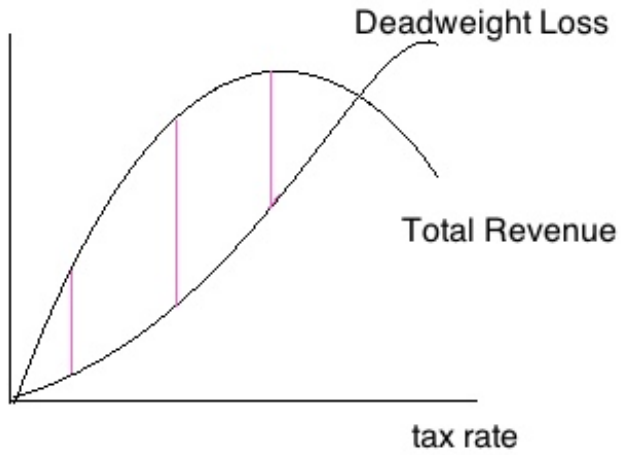
Efficiency Effect of Taxation - Choice Between Investments



1. It leads to a transfer of resources from sectors which are taxed to sectors which are not taxed. As can be seen above this leads to an excess burden equivalent to the shaded area.

Tax Rate, Revenue, Excess Burden

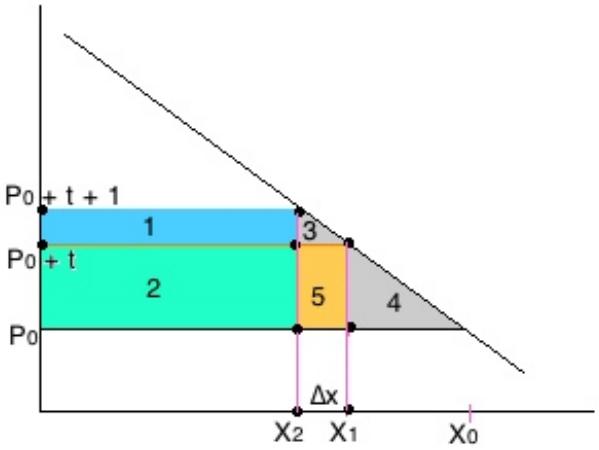




1. From above figures it may be tempting to suggest that a good tax would be the one which maximizes the distance between revenue and deadweight losses. But social welfare weights should also be considered.

Efficiency Effect of Taxation: Optimum Taxation - Ramsey Rule

1. Let us assume that the objective of the government behind the tax (on commodities) is to finance the state's expenditure fully with a minimum of excess burden and without using any lump sum taxes. Also if it is possible to tax leisure such a tax would have same effect as a lump sum tax. Since it is not possible we exclude it.
2. Ramsey argued that to minimize overall excess burden, given two unrelated commodities, the marginal excess burden of the last unit of revenue raised from each commodity must be the same. Otherwise it would be possible to tax the lower excess burden commodity and release the higher tax burden commodity. Note that the assumption of unrelatedness is necessary to avoid cross impacts. We also assume flat supply curves for simplicity.



1. Let initial price be P_0 and quantity consumed be X_0. Now a tax (t) is imposed such that the new price is $P_0 + t$ and new quantity is X_1. In such a case, area 4 represents the excess burden. Now suppose we raise the tax by 1 unit. The new price will be $P_0 + t + 1$ and new quantity will be X_2 such that $X_2 - X_1 = \Delta x$. The new excess burden is area 3 + 4 + 5 such that marginal excess burden is area 3 + 5. Area 5 = $\Delta x.t$ and area 3 = $0.5 * \Delta x$. Thus the marginal excess burden is $\Delta x.t + 0.5 * \Delta x$.
2. Note that excess burden minimization requires equal excess burden across commodities for the last unit of revenue collected from them. By imposing additional 1 unit of tax total revenue collected = area 1 + 2. Before the imposition of additional unit tax, total revenue collected was area 2 + 5. This means imposition of this unit tax has given additional revenue of area 1 - area 5. Area 1 = X_2. area 5 = $\Delta x.t = (X_1 - X_2).t$. Thus additional revenue collected (by the unit tax) = $X_2 - \Delta x.t = (X_1 - \Delta x) - \Delta x.t = X_1 - \Delta x \,.\, (1+t)$.
3. Now let $\Delta X = X_0 - X_1$. Given the demand curve is a straight line, we have $\Delta x/1 = \Delta X/t$ or $\Delta x = \Delta X/t$. Also $t >> 1$, so we can take $1 + t \sim t$ and thus additional revenue collected by the unit tax = $X_1 - \Delta x.t = X_1 - \Delta X$. Similarly marginal excess burden = $\Delta x \,.\, (0.5 + t) \sim \Delta x.t = \Delta X$.
4. Dividing the marginal excess burden by marginal revenue we get, marginal excess burden of last unit of revenue collected = $\Delta X / (X_1 - \Delta X)$. This should be equal to $\Delta Y / (Y_1 - \Delta Y)$. This means $(\Delta X/X_1) = (\Delta Y/Y_1)$ is the optimum tax condition. But $\Delta X/X$ is nothing but the % change in X. This means Ramsey rule implies that to minimize the excess burden, tax rates should be set so that the % reduction in the quantity demanded of each commodity is the same @ the given tax rate on each commodity.
5. Inverse elasticity rule: The price elasticity of demand η_d = % change in quantity for unit % change in tax or % change in quantity = η_d * % change in price. And because % change in price is nothing but the tax rate applied (assuming flat supply curves), % change in quantity = η_d * tax rate. Since % change in quantity has to be the same, this means that items which have higher price elasticity of demand should face lower tax rates. But this may not be fair from equity point of view.
6. Obviously Ramsey rule doesn't ensure vertical equity. Any departure from Ramsey rule must depend on 2 considerations. (a) How much the society values equality i.e. how much excess burden is it willing to tolerate to bring about a given change in distribution or what are the relative weights attached to the utilities of the poor in the swf? (b) How much the consumption patterns of the rich and the poor differ? If both rich and poor consume a commodity in same proportion to their income then equity can't be achieved by differential commodity taxation.
7. If we apply Ramsey rule in an income tax setting we will get that higher the elasticity of supply of labor the lower should be the income tax rate applied.

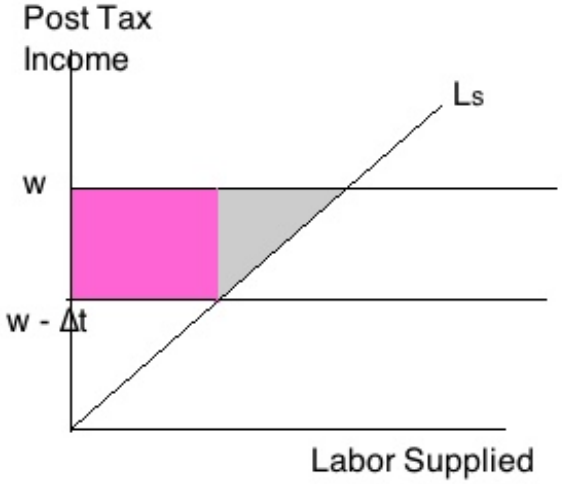
The Time Inconsistency Problem

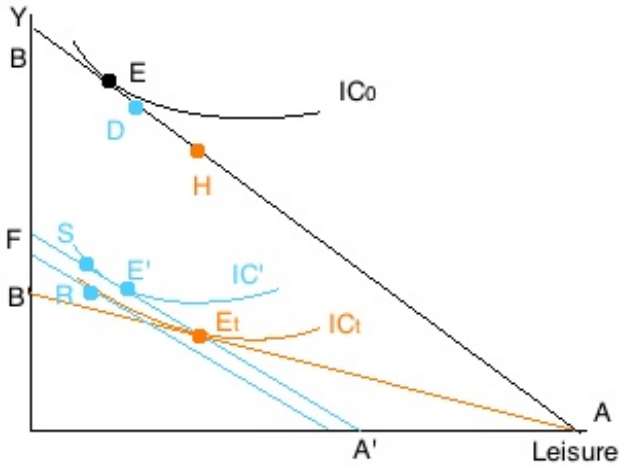
1. Assume that in a society there are only 2 commodities X and Y and that supply of labor is fixed. Further lets say its © disallows any taxation of Y and so the society taxes only X. Obviously the optimal taxation rule will dictate some taxation on Y as well and its clear system is inefficient. So we should tax Y as well and reduce taxes on X.

2. But suppose the citizens are suspicious that after taxing Y the government will not reduce taxes on X. Rather they will simply use the opportunity to increase their total revenues. So what may appear sub optimal or irrational behavior on the part of the society may actually be rational. This is called the time inconsistency problem. In another case suppose the government decides to impose a lump sum tax on capital and such lump sum tax is only one time. Then it should not alter the savings pattern or the flow of capital. But people may lack the faith in the government that it will not renege on its promise and may reimpose such a tax in future as well. So they might alter their behavior.

Supply Side Effects of Fiscal Policy

Effects on Labor Supply - Income Tax





1. Imposition of income tax leads to an 'income effect' which induces labor to work harder (so as to recoup some lost income). But it also generates 'substitution effect' which works in the opposite direction (as leisure becomes cheaper). Generally the negative substitution effect outweighs the positive income effect (since labor supply curve is positive sloping) and higher tax means fall in labor supply.
2. The general equilibrium setting shows that without tax the society was @ E_0 and indifference curve IC_0. If an income tax (proportional in this case) is imposed its equivalent to imposing a special consumption tax on income where the 2 goods are income and leisure. A person moves to a position where leisure is higher (assuming substitution effect outweighs income effect).
3. Any person will work less under a progressive tax structure than a proportional rate if the same amount of tax is to be paid in both cases. Yet work effort of the taxpayers as a group needn't be lower under a progressive schedule. The net effect depends on how the wage earners at various points on the income scale respond. Individuals @ the higher wages may be less responsive to changes in tax since other forms of motivation may dominate. Employees at lower end will be more discouraged but they may have less flexibility of work hours and they would face lower marginal tax rates.

Effects on Labor Supply - Sales Tax

1. Higher general sales taxes also reduce net income of workers and their work effort will reduce (so long as they don't suffer from money illusion). But they may also decide to save more and avoid paying the sales tax. So the question would be whether leisure is traded more readily for present or future consumption and there is no direct answer.
2. Selective sales taxes will increase leisure if they are imposed on items used in work. If imposed on items used for leisure they will increase work effort.

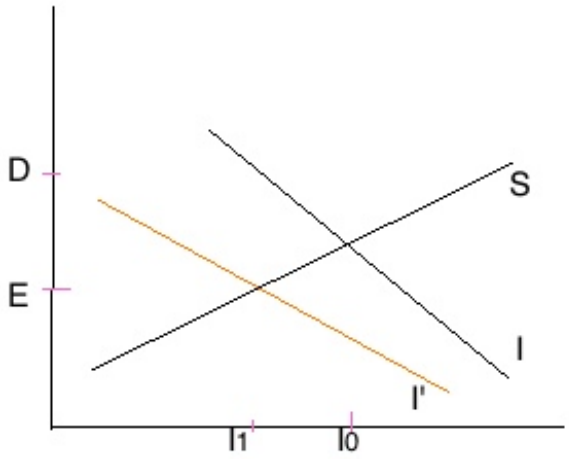
Effects on Labor Supply - Transfer Payments

1. They can be regarded as negative taxes. The income effect is now negative and goes on to reduce work effort. The direction of substitution effect depends on whether transfers rise or fall with income. If they rise with income (say wage subsidy) then substitution effect will be positive and given an upward sloping labor supply curve we would expect the work effort to increase. But if the transfers decrease with rise in wealth (say welfare payments) then the substitution effect will be negative as well and the overall policy will reduce work effort.

Effects on Labor Supply - Public Services

1. A general neutral public service will have a neutral effect. But like a specific sales tax, if the public service is leisure promoting then work effort will reduce and if the public service so provided is work promoting then work effort will increase.

Effect on Investment - Profits Tax



1. As we can see investment falls (because net profit after tax falls) and the higher the elasticity of the savings and the investment schedules, the higher the fall in investment.
2. In a tax free world, $r_g = i + d$ where r_g is the gross rate of return required to make an investment, i is the cost of borrowing and d is the depreciation rate. When we introduce taxes, $r_g.(1-t) + c = i + d$ where t is the tax rate, c is the investment credit. So to increase investments, cost of capital must be reduced. This can be done by reducing t, increasing c or increasing tax deduction on depreciation. These different approaches may appear to have same effect but it is not. A change in investment credit will be limited to new investment while change in tax rate can't be limited. Since tax relief on old investments has no fresh incentive so government may prefer giving investment credits. Alternatively giving higher deduction for depreciation encourages long term investments while investment credits favor short term investments (so that they can be availed off repeatedly).

Effect on Household Savings - Income Tax

1. One might expect that a progressive income tax will reduce the overall savings (because rich have higher savings rate). But the impact may be less than what one might assume because the difference in mps of the rich and the poor is < difference in average savings rate of the rich and the poor.
2. Income tax will reduce the return on savings and to this extent may reduce the savings rate but there is a debate whether or not savings is sensitive to interest rate at all. Even the impact of tax rebates on savings is doubted.

Canons of a Good Tax System

1. Equality: Adam Smith regarded it as every person should pay according to his ability to pay. On this basis he argued that a tax should be proportional to the income. But modern economists make a distinction. On the basis of principle of diminishing marginal utility of money income, they call for a progressive income tax. There are 2 aspects of equity - (a) horizontal equity i.e. those who are equal should pay equal, and (b) vertical equity i.e. those who are unequal should pay different.
2. Certainty: Adam Smith said that the quantity, time, manner of payment of the tax payable should be certain and known clearly beforehand and not arbitrary. If this is left to the discretion of tax authorities it will weaken the incentive to work and encourage corruption.
3. Convenience.
4. Economy: Collection costs should be minimized and no use spreading out resources thin.
5. Fiscal adequacy.
6. Elasticity of taxation: As income increase due to economic growth the government revenue from taxes should increase more. Thus progressive taxation is recommended.
7. Diversity.
8. Taxation as an instrument of growth: It should mobilize economic surplus, encourage savings.
9. It should improve income distribution.
10. Promote economic stability: Income taxes promote economic stability automatically.

Concept of Equity

Q. "Subjective approach to taxation leads to least aggressive sacrifice principle". Elucidate. Also give the limitations of this principle. (2009, I, 20)

Benefits Received Principle

1. Citizens should pay taxes in proportion to the benefits they receive from the services rendered by the government. Thus it is based on quid pro quo.
2. But its obvious limitations are - (a) Its difficult to measure the extent of benefit derived by an individual for many services. Most of the public expenditure is on non rival goods. (b) It goes against the very notion of tax. Tax is not a fee. Its only limited applicability can be when we consider the benefits and taxes at the level of whole society. But in that case it can only give us total taxes which the society should pay to the government. Or it can also be applied in the case of toll taxes, special levies on construction of local roads, sewers etc.

(a) Application of Benefits Received Principle - A General Benefit Tax

1. If the social good is not inferior, generally people with higher income will be willing to pay more for the same quantity compared to people with lower income. Thus peoples with income of $10,000 may pay $1 for each unit then people of $20,000 income are expected to pay $2 per unit (here it is assumed people have identical tastes). But if they only pay $1.50 per unit then it is a regressive taxation structure.
2. Whether such a structure is regressive / proportional / progressive depends on whether the ratio of income elasticity of demand to price elasticity of demand (η_Y/η_P) is >/ = / < 1. This is because $\eta_Y = (\Delta Q/Q) / (\Delta Y/Y)$ and $\eta_P = (\Delta Q/Q) / (\Delta P/P)$.

(b) Application of Benefits Received Principle - A Specific Benefits Tax

1. This may be the case in toll taxes, local area charges etc. It can be applied easily where the commodity provided by the government is a private good. Issuance of licenses, airport fees etc. fall in this category. This can help ease the pressure on general budget.

(c) Application of Benefits Received Principle - Taxes in Lieu of Charges

1. This is the case where imposition of direct charges is desirable but too costly, so a tax is levied on a complementary product (e.g. tax on petrol instead of charges on using roads). But its equity aspect can be doubted. While petrol use depends on the distances driven not each mile driven results in same costs, nor does it require the same capital outlay to build each mile of road. Thus a person who uses a particular road may end up subsidizing the use of the other road by another person.

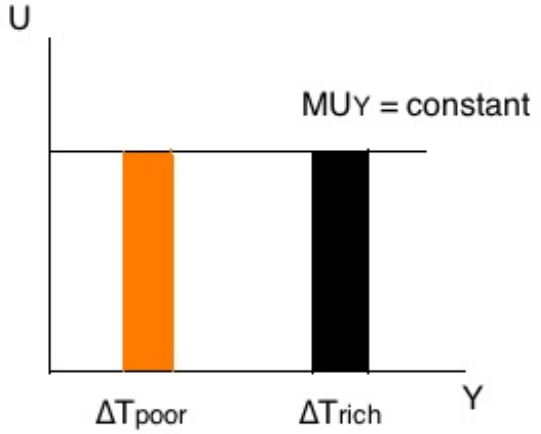
Ability to Pay Principle

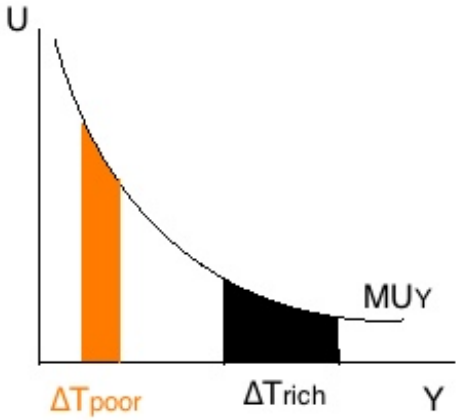
1. It asks people to pay taxes according to their ability to pay. It essentially means that the 'burden' of tax falling on everybody should be the same. But how do we objectively measure the ability to pay or the burden? Should it be the income, consumption, wealth? Income has been the most widely accepted measure of the ability to pay but theoretical framework yields more (although not unqualified) support to the consumption as a measure (overall personal consumption and not just a specific commodity consumption). But whatever base be used it has to be comprehensively defined (no leakages).
2. Progressiveness of a tax can be defined either in terms of marginal progressiveness or absolute progressiveness. Generally it is taken on the average parameter i.e. the average tax rate should increase with increase in incomes. Then to measure the degree of progressiveness, there are 2 criteria - (a) $V_1 = (t_1-t_0) / (I_1-I_0)$ where t is the average tax rate for a given income and this simply means that greater the increase in average tax rates as income increases, higher the progressiveness of the tax structure. (b) $V_2 = (\Delta T/T) / (\Delta I/I)$ or simply the income elasticity of the collected tax revenues. It says that higher the income elasticity of the collected tax revenues, higher the progressiveness of the tax structure.

Ability to Pay - Vertical Equity & Subjective Approach

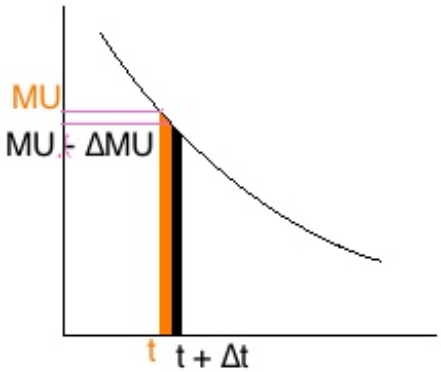
1. In this the concept of sacrifice undergone by a person in paying a tax occupies a crucial place. In paying a tax a person suffers from some disutility. This disutility is the sacrifice made by him. Thus this approach measures the ability to pay in terms of the loss of utility by the tax payers.

(a) The Principle of Equal Absolute Sacrifice



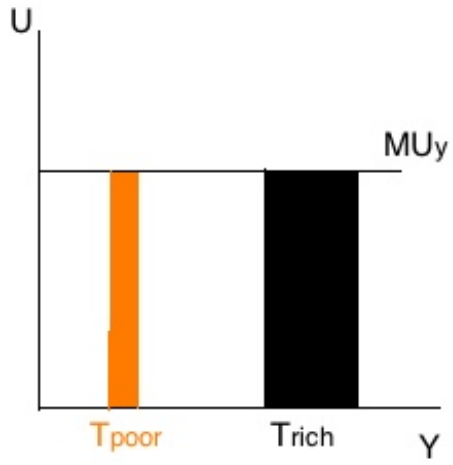


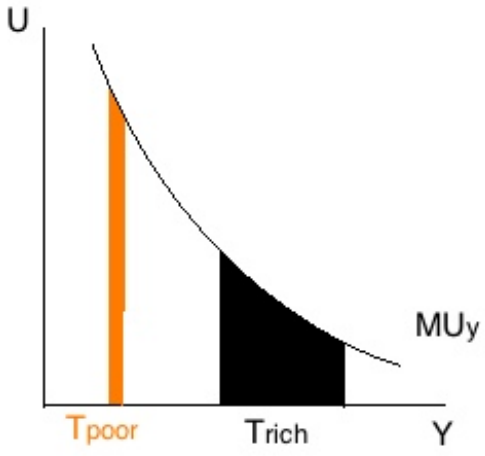
1. If U is the total utility function, Y is the pre-tax income and T is the tax paid by an individual then U(Y) - U(Y-T) should be same for all individuals because this is the sacrifice made.
2. If this principle is applied no one will be exempted.
3. Constant MU_y: Further if the marginal utility of income (MU_y) is constant and not diminishing, then it would also mean everybody pays same amount of tax.
4. Diminishing MU_y: Let the tax be very small so that the shaded areas can be considered as rectangles. Now loss of utility by poor = $MU_{poor} * T_{poor}$ and loss of utility by rich = $MU_{rich} * T_{rich}$. Both have to be equal under this principle, thus $MU_{poor} * T_{poor} = MU_{rich} * T_{rich}$. In other words, $MU_{poor}/MU_{rich} = T_{rich}/T_{poor}$. Now this is an identity under this rule. If tax rate is proportional i.e. T = c.Y where c is a constant, then $MU_{poor}/MU_{rich} = Y_{rich}/Y_{poor}$ i.e. the fall in marginal utility with income is in same proportion as rise in income. If MU_{poor}/MU_{rich} is greater than the ratio of the incomes then it will mean $T_{rich}/T_{poor} > Y_{rich}/Y_{poor}$ or $T_{rich}/Y_{rich} > T_{poor}/Y_{poor}$ or tax system is progressive. Thus tax system is progressive if the fall in MU is higher compared to rise in income. Similarly if the fall is less i.e. MU_{poor}/MU_{rich} < ratio of their incomes then it means $T_{rich}/T_{poor} < Y_{rich}/Y_{poor}$ or $T_{rich}/Y_{rich} < T_{poor}/Y_{poor}$ or tax system is regressive.



1. Income elasticity of MU_y: Let income elasticity of MU_y be η i.e. η shows the % change in MU for one % change in income. Then the tax system is regressive, proportional or progressive depending upon whether η is less than, equal to or greater than 1. Proof: Burden of tax paid by poor (in orange) = MU.t and burden of tax paid by rich (in black) = (MU - ΔMU) . (t + Δt) or MU.t - t.ΔMU + MU.Δt. Both are equal under this principle. So MU.t = MU.t -t.ΔMU + MU.Δt or t.ΔMU = MU.Δt or (ΔMU/MU) = (Δt/t) and this is an identity under this system. Thus η = (ΔMU/MU)/(ΔY/Y) can be rewritten as (Δt/t)/(ΔY/Y). Now a regressive tax system is defined as one where % change in tax < % change in income i.e. (Δt/t)/(ΔY/Y) < 1. But this is nothing but η. So if η < 1 the taxation system is regressive. Similarly cases of η = 1 and η > 1 can be proved.

(b) The Principle of Equal Proportional Sacrifice





1. This principle requires that every person should be made to pay a tax such that the % loss in utility is same for all individuals i.e. {U(Y) - U(Y-T)} / U(Y) is constant.
2. Constant MU_Y: A tax system following this principle will be proportional. Proof: The loss of sacrifice of poor = area under orange rectangle = T_{poor} * MU. Total utility of poor = Y_{poor} * MU. Thus their ratio = T_{poor}/Y_{poor}. Since this ratio has to remain same => tax system will be proportional.
3. Diminishing MUy: A tax system following this principle will be progressive.

(c) The Principle of Equal Marginal Sacrifice (Minimum Aggregate Sacrifice)

1. It means that MU_Y of each person after paying the tax should be same. This approach seeks to minimize the aggregate sacrifice of the society as a whole i.e. when all persons pay tax such that the marginal utility of income left after paying the tax is same, the overall sacrifice of the society is minimum.
2. Assuming MU_Y curve remains the same it means very high marginal rates of taxes for rich and in fact equal post tax income for all.

Ability to Pay - Objective Approach

1. It considers the question - What should be the objective base of taxation for measuring ability to pay?
2. Income: Income is generally considered to be the best measure. But the ability to pay increases more than proportionately to the amount of income (hence the justification of progressive taxation). Further distinction should be made between the earned income and unearned income and consideration should be given for the number of dependents.
3. Wealth: It is considered to be a better base since it represents the accumulated purchasing power. Ownership of assets may give a purchasing power quite different from what money income may suggest.
4. Consumption: Advocated by Kaldor, it argues that consumption is the amount of resources that a person actually withdraws from the economy for his personal use. Savings lead to increase in capital stock and hence increase in productive capacity of the economy. Hence higher the consumption, higher should be the tax. He thinks this is particularly relevant for developing countries so that they can promote savings.

Horizontal Equity - Equals Should be Taxed Equally
(a) Which is a better base?

	Income Tax	**Income Tax**	**Consumption Tax**	**Consumption Tax**	**Tax on Wage Income**	**Tax on Wage Income**
	A	**B**	**A**	**B**	**A**	**B**
Period 1						
Wage Income	100	100	100	100	100	100
Consumption	90	-	90	-	90	-
Tax	10	10	10	-	10	10
Savings	-	90	-	100	-	90
Period 2						

Interest	-	9	-	10	-	9
Tax	-	0.9	-	11	-	-
Consumption	-	98.1	-	99	-	99
Savings	-	-	-	-	-	-
Total Tax	10	10.9	10	11	10	10
PV (Total Tax)	10	10.82	10	10	10	10

1. It can be seen that consumption tax gives better horizontal equity than income tax.
2. But consumption tax can be postponed indefinitely. Also it is assumed that people with same present value of all future income are in equal position but this is difficult to estimate. Also this proposition of equal PV disregards when the income occurs. For this to happen we need to have perfect capital markets. One big drawback of consumption tax is that the more successful it is (in reducing consumption and increasing savings) the higher the tax rates needed to maintain same amount of revenues.

(b) Comprehensiveness of the Base

1. It is generally agreed that the bases should be comprehensive. This means that income tax should be levied on all accrued income irrespective of the source, time of realization and consumption tax should be levied on all consumption. A person's ability to pay is increased whether the income comes in the form of money income, or capital gains.

(c) Treatment of Bequests

1. Tax payment under a consumption tax can be postponed indefinitely (by postponing consumption) and savings can be passed on to the next generation. So a tax should be there on bequests. Leaving savings for the next generation is like using them.

(d) Wealth as Tax Base

1. Wealth can be seen as capitalized value of capital income, thus if capital yields a return of 10% a 10% tax on the return would mean a wealth tax of 1%. Wealth tax is thus a tax on capital income whereas a consumption tax would in effect exclude capital income from the income tax. Thus consumption tax runs against an wealth tax (when paid on top of income tax).
2. But savings and thus wealth generates additional utility. This gain should be taxed as well in addition to the consumption tax.
3. Income is not the sole judgement criteria for equity. Wealth also gives purchasing power.

(e) Land as a Tax Base

1. The question which arises is what should we tax on land? Should we tax actual income or potential income or value of land? In perfect markets this question would be irrelevant because value of land will reflect PV of its potential income and potential income would be equal to actual income. But in real market this differs. In the below table we can argue that a tax on the potential income of the land is better than tax on the actual income from the objective of increasing land utilization.

	100% utilization	50% utilization	0% utilization
1. Actual Income	100	50	0
2. Cost of underutilization to the owner	0	50	100
Case 1: 10% tax on actual income			
3. Tax	10	5	0
4. Post Tax Income	90	45	0
5. Cost of underutilization to the owner	0	45	90
Case 2: 10% tax on potential income			

6. Tax	10	10	10
7. Post Tax Income	90	40	-10
8. Cost of underutilization to the owner	0	50	100

1. Thus we can see that in case 1 (when we tax actual income) the cost of underutilization to the owner is less than the corresponding costs without any tax. So such a tax discourages land utilization. On the other hand a tax on the potential income (case 2) leaves the cost of underutilization unchanged and thus is better.

(f) Feldstein's Utility Criteria or the Utility Definition of Horizontal Equity

1. Feldstein gave 2 criteria which a tax must satisfy to ensure horizontal equity. (a) People with same pre-tax utilities should end up with same post tax utilities. (b) Taxes should not alter utility ordering i.e. if someone is better off than the other pre tax then he should be better off post tax as well.
2. It can be seen that income taxation doesn't satisfy Feldstein's criteria. Assume a person A who derives utility out of material consumption say food and a person B who derives utility out of spiritual pursuits. Lets say before the tax they have same utility levels and same incomes. After the income tax, the income and hence utility of A will be severely curtailed while in B's case only the income will go down but the reduction in utility will be lesser. Thus condition 1 is violated.
3. It can also be seen that any pre-existing tax will satisfy the utility definition of horizontal equity if individuals are free to chose their activities and expenditures. And further that it is only the new taxes which will lead to a violation of the horizontal equity criteria. Lets say there are 2 jobs - one with lots of perks (which don't fall under income tax net) and one without any perks (which fall under income tax). Lets also assume people have same utility functions. Before the tax is imposed the final utilities of both jobs will be equal (due to migration) so that the wage in the no perks job will be higher than the wage in the with perks job. Now if we impose any income tax that alone will lead to a change in equilibrium and violation of horizontal equity. This is because an income tax will now make people in no perks job worse off than people in with perks job. Thus, "the only good tax is an old tax".

(g) Normative Analysis of Tax Evasion

1. The usual model is that if (the penalty upon being caught * probability of getting caught) < (gains from tax evasion), then a person will evade tax. But it ignores the psychic costs (guilt feeling, conscience etc.), ignores the different natures of jobs (in some works it may be easier to evade tax, in some it may not be) and ignores the risk aversion (risk averse people are less likely to avoid tax).
2. Suppose now we have to formulate a tax policy. Generally it is assumed existence of a black economy lowers social welfare. Let us construct a social welfare function. An important consideration in constructing it would be if we should include the welfare of tax evaders as well in our swf? If we do, then under some conditions, the existence of the black economy may actually increase swf. For instance according to Ramsey rule we should tax commodities with higher elasticity at a lower tax rate. But say the government taxes gold (assumed to be highly elastic here) at a high rate. In black economy its effective taxation will be very low. Thus black economy is reducing the excess burden of the tax. On the other hand if we chose not to include the welfare of tax evaders in a swf then we will gravitate towards a rule which imposes severe penalties (limit is a death penalty) on tax evaders. Obviously in real world a middle path is followed.

Sources
Direct Taxes
(a) Merits

1. Equity: They can be structured so as to closely relate to the ability to pay principle.
2. Distribution effects: They can reduce inequalities.
3. Allocation effects: They minimize allocation distortions. Merely reduce the Y_d.
4. Stabilization effects: Act as automatic stabilizers.
5. Elasticity: High income elasticity specially if progressive.

(b) Demerits

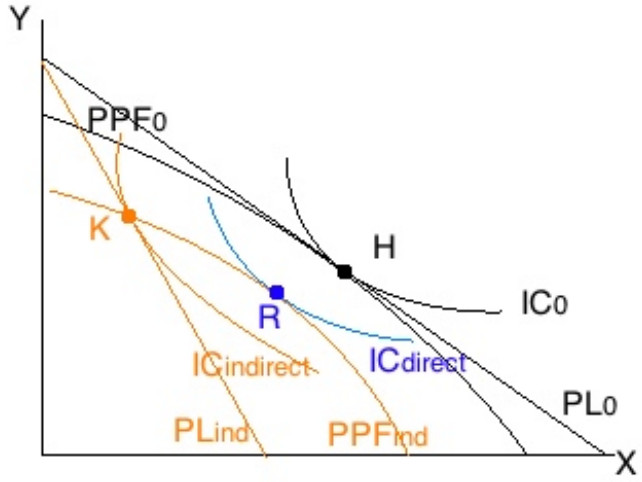
1. Reduce incentives to work, save and invest.

Indirect Taxes
(a) Merits

1. Ease in collection, huge revenue potential.
2. Can be used to influence pattern of production and demand.

(b) Demerits

1. Regressive, inflationary.

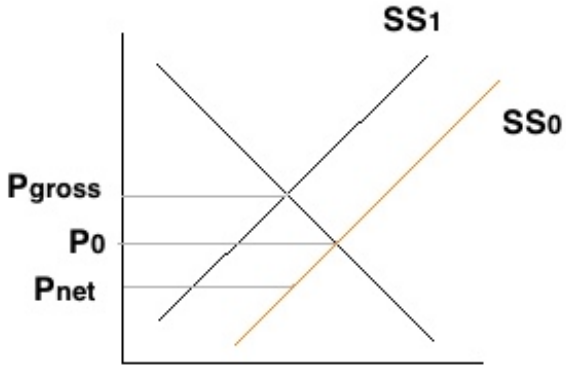


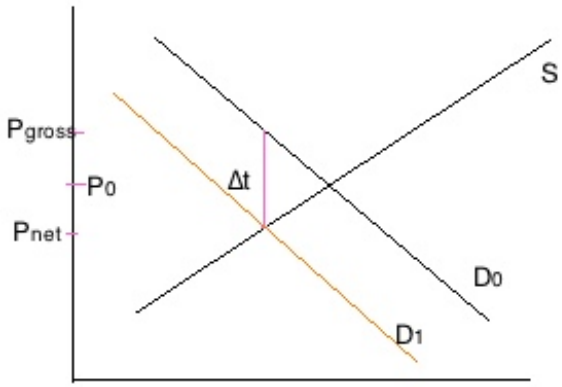
1. Resource allocation: Create inefficiencies in resource allocations by distorting relative prices and thus create excess burden. As can be seen imposing an indirect tax on commodity X distorts the price line for consumers and makes it steeper (PL_{ind} vs PL_0). Thus consumption will take place @ K where PL_{ind} is tangent to $IC_{indirect}$. Consumer loses because he is no longer @ IC_0 and production is inefficient because PL_{ind} is not a tangent to PPF_{ind}. Had a direct tax only been imposed, consumer would have been @ IC_{direct} which is better off and production would have been efficient as well.

Incidence of Taxes
Differential Incidence vs Absolute Incidence

1. Tax revenues are generally not earmarked. Thus in our analysis on incidence we will refrain from how the money so collected is used. While doing the analysis we keep in mind both the source side and the use side incidence effects of the tax.
2. In differential tax incidence we examine how the incidence differs when one tax is replaced by another, holding the total revenues (and of course total expenditures) constant. The other tax here is usually the lump sum tax. In absolute tax incidence we examine the effects of the tax when there is no change in either other taxes or the expenditure. There is another analysis called budget incidence where we also analyze the impact of the spending pattern of this tax proceeds.

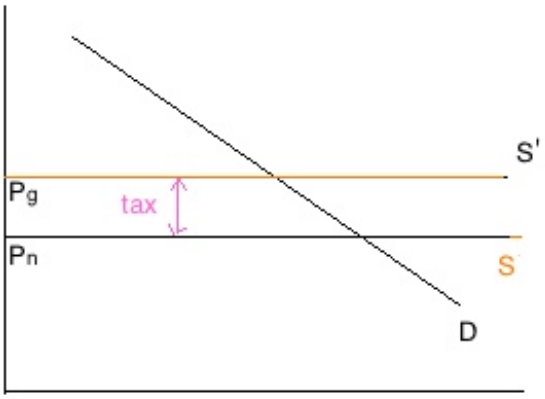
Incidence Effects of a Unit Commodity Tax - Perfect Competition
(a) General Case





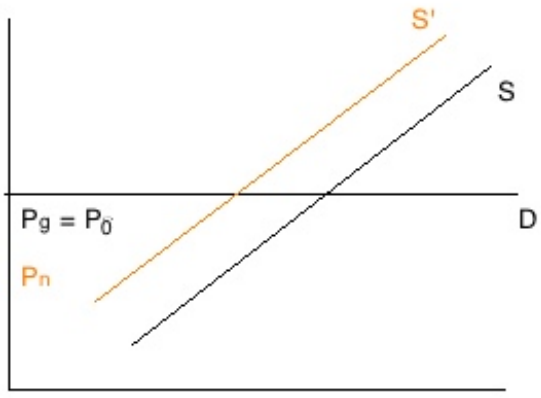
1. Burden shared by consumer = P_{gross} - P_0. Burden shared by producer = P_0 - P_{net}. Ratio of the burden shared = $|P_{gross} - P_0| / |P_0 - P_{net}|$ which is same as $(\Delta P_d/\Delta P_s)$. If we divide both numerator and denominator by ΔQ and then multiply both numerator and denominator by (Q/P), we will get (η_s/η_d). Thus the incidence tends to fall on the consumer if the demand is inelastic while the supply is elastic and it tends to fall on the producer when the demand is more elastic than the supply. This also means that taxes on a group of close substitutes will have more incidence on the consumer since the price elasticity of demand across a group of substitute is < the price elasticity of demand for a particular product only (while there is not much difference on the supply elasticities in short run at least). Similarly elasticity of demand will be higher as longer time period is involved. Similar considerations apply on the supply side.
2. Thus we see that the burden borne by the households is from the uses side. So such a tax will be progressive if the income elasticity of demand > 1. Taxes on luxuries are thus progressive in nature while those on necessities are regressive. A general sales tax on all products will be regressive because consumption as a percent of income falls while moving up the income scale.
3. To the extent the burden falls on the seller, factor earnings involved in the production of the commodity are affected. Thus if the commodity uses highly skilled labor or capital then such taxation will be progressive while if it involves unskilled labor, it would be regressive.
4. In a general equilibrium analysis framework, the substitution effect of the tax will increase the demand for the other commodity (Y). Now if say X was labor intensive and Y was capital intensive it would lead to a fall in (w/r). Similarly on the uses side if the production of Y is subject to increasing costs, it would increase Y's price as well and the uses side impact will be spread over the consumers of Y as well.
5. We can also look at the right panel where instead of bumping up the supply curve, the demand curve is lowered.

(b) Horizontal Supply Curve or η_s tends to infinity



1. Thus we can see that in such a case entire burden will be passed on to the consumer.

(c) Horizontal Demand Curve or η_d tends to infinity

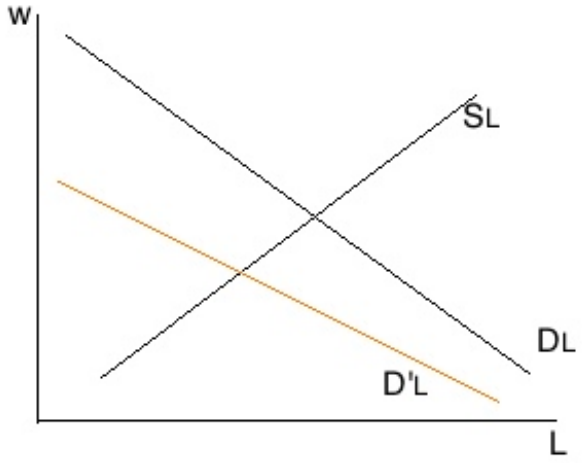


1. Here it can be easily seen that the entire burden falls on the producer.

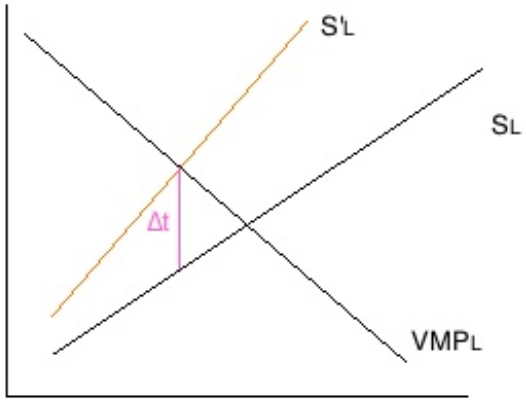
Incidence Effects of a Commodity Tax - Oligopolistic Industry

1. Like the perfect competition and monopoly, firms contract their output. But it may so happen that they were overproducing before the tax. Now they may reach closer to a cartel solution and hence be actually better off in some cases.

Incidence Effects of a Payroll Tax



1. Same as the discussion above. Similarly supply and demand elasticities will be larger if tax is selective rather than general (like a personal income tax).
2. On the uses side if the taxed factor is used more intensively in commodities which are necessities (income elasticity of demand < 1) then such a tax will be regressive otherwise it may be proportional or progressive.
3. In a general equilibrium framework, as the supply of the taxed factor (L) reduces the relative supply of the other factor (K) will increase and in this case (w/r) will increase and thus the burden is shared by the capital as well. This will lead to a switch over to more capital intensive (higher K/L) techniques. On the uses side as the prices of commodity X which uses the taxed factor (L) more intensively, its demand decreases (substitution effect) and relative demand for Y increases whose price will rise as well thus sharing the uses side burden on the consumers of Y as well.



1. In imperfect markets, question arises will not the unions be able to shift an increase in the income tax by demanding a higher pay and will not the employer be able to pass on the cost to the consumer in form of higher prices? As can be seen in the above diagram, this is certainly possible and will depend on the relative elasticities.

Incidence Effects of a Capital Gains Tax

1. Same as above. It may be noted here that in an economy with effective restrictions on capital flows (and no black economy), total supply of capital will be inelastic. Hence there will be no escape from the capital gains tax and the incidence will be on the suppliers of capital (to the extent determined by the price elasticities). But in an open economy where capital is perfectly mobile, the suppliers of capital will bear no burden of the tax whatsoever. This is

because supply curve of capital will be perfectly flat and capital has the option to flee to other countries.
2. But even though adjustments can't be made in the SR, in the LR the tax will have impact on behavior as the outworn capital may not be replaced and previously planned expansions may be canceled etc.
3. On the uses side if the taxed factor is used more intensively in commodities which are necessities (income elasticity of demand < 1) then such a tax will be regressive otherwise it may be proportional or progressive.

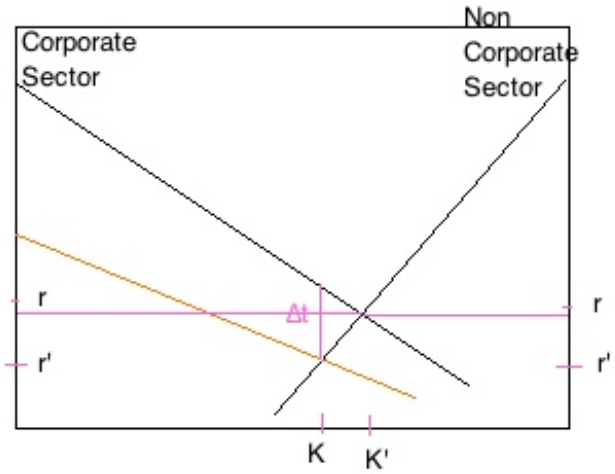
Incidence Effects of a Profits Tax

1. A profit tax doesn't change MC or MR curves. Thus no firm has any incentive to change its output decisions. So all tax incidence is on the producers only. Price, quantity, wages etc. remain same. Alternatively, it can be visualized that while the firms were earlier maximizing profit P, now they are going to maximize profit P * (1-t). Because they impose no inefficiencies, profits taxes may appear very attractive. But an obvious problem here is that for such a tax to be efficient it must be on economic profit and not financial profit. And there are obvious problems in measuring economic profits.
2. When a profits tax is imposed, surely the capitalized value of the enterprise falls (since it is PV of all future profits) and the person who is the current equity holder bears all the loss. But thats about it. Future owners are not penalized because even though they will be paying the profits tax in future, they got the equity at cheaper rate.
3. In the case of a monopoly, the monopolist has no option but to absorb the entire tax. Again this is because a profits tax doesn't change MR or MC. Earlier while he was maximizing TR - TQ, now he will maximize (1 - t) * (TR - TQ) and hence no change. He will continue to produce @ same level and price until he earns profit else he shuts down the shop.

Incidence Effects of a Land Tax

1. Supply of land is inelastic. So the entire burden of taxation will fall on the suppliers and their rent would be reduced.

Incidence Effects of Corporate Tax



1. Since in the LR the flow of capital between the corporate and the non corporate sector is highly elastic and the tax is applied on corporate sector only, so the capital will move from corporate sector to the unincorporated sector. The final net post tax returns in both sectors will be the same. The output in unincorporated sector would have increased and that in corporate sector would decrease.
2. When the tax is imposed, initially the owners of the capital in corporate sector suffer. But then capital migrates, return on capital is lowered in both the sectors (depending upon the relative elasticities of the two sectors) and thus owners of capital in both sectors suffer. It can be seen in the figure above that the burden (Δt) is shared both between the corporate and the non corporate sector.
3. If we assume that the corporate sector was more capital intensive and unincorporated sector was more labor intensive then the fall in output of the corporate sector releases more capital and less labor. This increases (w/r) in general and thus labor benefits and capitalists suffer. Moreover there is a general increase in (K/L) ratio as K becomes cheaper.
4. On the uses side the consumers of products of corporate sector would be burdened while that in the unincorporated sector will benefit. But if the production in unincorporated sector is subject to increasing costs then both consumers will share the burden.

Equivalence Between Taxes

1. Let T be a tax on capital used in production of commodity X, $T_{K,Y}$ be tax on capital used in production of commodity Y, $T_{L,X}$ be tax on labor used in production of commodity X, $T_{L,Y}$ be the tax on labor used in production of commodity Y, T_X be a commodity tax on X, T_Y be a commodity tax on Y, T_K be a general capital gains tax, T_L be a general labor tax, T be the general income tax.
2. Thus it can be seen that T_X and T_Y at same rates are equivalent to a general income tax T. Both create a parallel shift inwards. Similarly if T_K and T_L are imposed at uniform rates, it is similar to the general income tax T as well.
3. Similarly a tax on both labor and capital employed in commodity X @ same rate is equivalent to a commodity tax on X itself.
4. In an economy without savings a general income tax will have the same effect as a general consumption tax.
5. In perfect competition it makes no difference on whom the tax is imposed - both in goods and factor markets.

The Harberger Model

1. His assumptions are as follows - (a) CRS prevails. (b) Perfect competition in all factor and commodity markets. (c) Perfect mobility of the factors. (d) Total amount of each factor is fixed and is fully employed. (e) All consumers have identical tastes. (f) X is labor intensive, Y is capital intensive. (g) And we consider only differential tax incidence here.
2. Incidence of a specific commodity tax (T_X): When a specific commodity tax on say X is imposed, its relative price will increase. Consequently less of X and more of Y will be produced (as demand for X falls). As this happens factors migrate from X to Y. Now because X was labor intensive, a fall in production of X releases more L than Y can absorb at the given K/L ratio. So (w/r) falls and both X and Y become more capital intensive (K/L increases). Thus in the new equilibrium, all labor is worse off (and not just that earlier employed in sector X) and all capital is better off. Now greater the price elasticity of demand of X, the greater the fall in production of X and hence greater the decline in wages. Similarly the greater the difference in (K/L) ratios for the two sectors, the greater the decline in wages. Finally, the lower the substitutability of labor for capital in Y, the greater the decline in w needed to achieve the desired change in (K/L) to absorb additional labor. On the uses side people who spend relatively larger proportion of their incomes on X will be worse off.
3. Incidence of an income tax (T): Since factor supplies are completely fixed, this tax can't be shifted. It has to be borne by people in proportion of their initial incomes.
4. Incidence of a partial factor tax ($T_{K,Y}$): Lets say the capital used in production of Y is taxed. This will have an output effect i.e. the price of Y will tend to increase which will decrease its quantity demanded, and a factor substitution effect i.e. as capital becomes more expensive so (K/L) decreases. Due to the output effect, both K and L are released (more of K because Y is a capital intensive industry). So (w/r) will go up and (K/L) will tend to increase. If we consider the substitution effect then (w/r) will increase as demand for capital will be reduced. If the factors were immobile between commodities then in this case capital owners employed in Y suffer because the supply of the capital is inelastic. But it will also reduce the $VMP_{L,Y}$ and hence overall wages will also suffer while the capital owners in X will benefit (as their capital now has more labor to work with and hence higher productivity).

Q. How does the burden of tax distribution between buyers and sellers in the ratio of elasticity of demand and that of supply take place? (2011, I, 20)

Q. The direct money burden of the tax imposed on any object is divided between the buyers and the sellers in the proportion of the elasticity of supply of the object taxed to the elasticity of demand for it. Discuss. (2009, I, 20)

Q. "The adjustments to a tax imposition not only affect the distribution of tax burden but also bear upon the efficiency of resource use in private sector."
Substantiate the statement highlighting the role of taxation policy in improving the allocative efficiency in an economy. (2007, I, 60)

Limits to Taxes and Borrowings

Crowding Out Effects

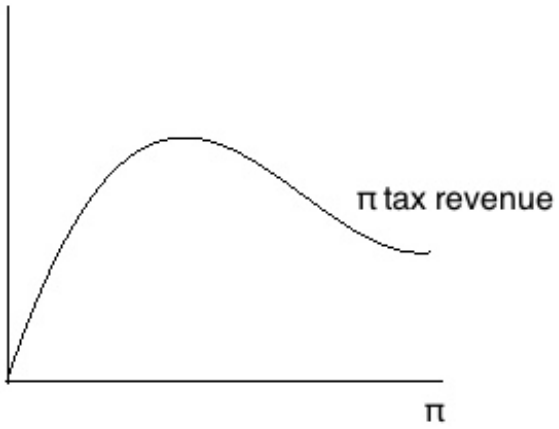
1. Increase in G leads to rise in Y which increases the transactions demand for money. This reduces the available money for speculative purposes and thus r rises. Once r rises, I will fall due to a move up on the I_d curve.

Q. If public expenditure is financed by money creation, show diagrammatically the short run and long run crowding out effect. (2010, I, 20)

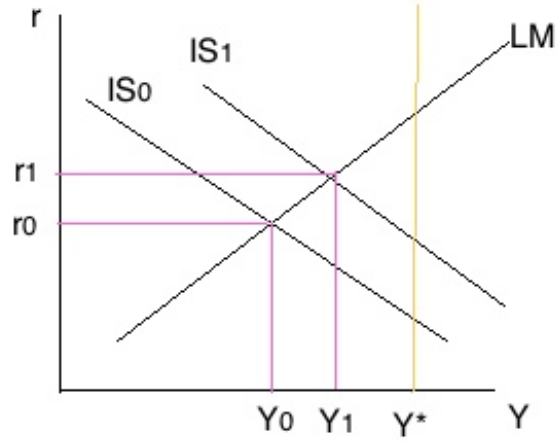
Deficit Financing

1. Keynes: The nature of unemployment prevailing in developing countries was different from that prevailing during recessions in developed countries. In developing countries it was of the type of disguised, chronic and lack of wage goods type. So raising AD via deficit financing will not be effective in developing countries. Deficit financing can only help when there are idle resources in the economy. But the development in last half a century has made AD an important factor in determination of Y and employment. It can no longer be assumed that the country will not have deficiency of demand.
2. Lewis: He agrees that when the modern sector expands and workers earn higher wages there will be a rise in prices as the workers are paid out of the new money created. But when the formed capital is put to use output of consumer goods will also increase leading to a stabilization in prices. Further with the expansion of modern sector, not only do output and employment increase but also profits. As the share of profits increase the amount of investment being financed out of the created money diminishes and ultimately the increase in voluntary savings kills inflation.
3. Deficit financing induces forced savings as due to rise in price levels purchasing power of people decreases and they are forced to consume less.
4. Structuralist theory (Myrdal): Deficit financing is done in developing countries to finance government and private sector investment needs. An important bottleneck is lack of resources for financing economic development. In developing countries governments play a vital role in planning and industrialization. This requires large resources but the structure of the economy is such that it is often not possible for the government to raise revenue via taxation or borrowings (lack of administrative structure, improper institutions, corruption, shallow financial markets, lack of surplus or purchasing power with people). So governments have to resort to deficit financing. Thus growth in M_S is only the apparent and not the real cause of п.
5. Non - inflationary deficit financing (Fischer, Easterly): The amount of revenue government can expect to obtain from printing money without stroking inflation is determined by the ratio of reserve money (H) to GDP, real growth rate of economy and income elasticity of demand of real balances. Thus if reserve money is 20% of GDP, GDP growth rate of 10% and income elasticity of demand for real balances is 1.5, then government can raise 10% * 1.5 * 20% = 3% of GDP as revenue without stroking inflation. Thus in India where growth rate of GDP is high and demand for money is increasing (as economy gets more monetized) a reasonable amount of printed money can be created.

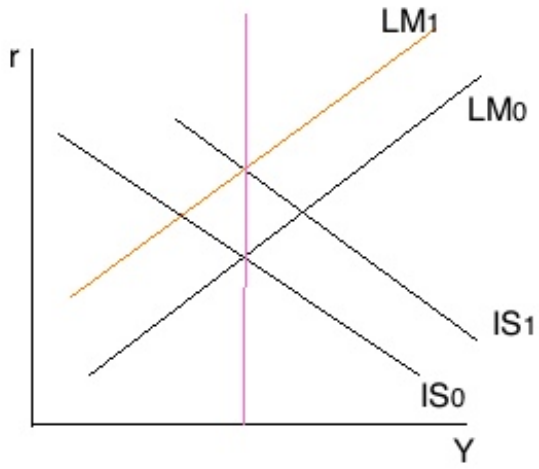
Effects of Debt Financing



1. Inflation tax revenue: When п = 0 then obviously п-tax revenues are zero. As п increases п-tax revenue also increase. But people begin to hold less and less of real cash balances with them and more in п-hedged assets as п increases. Finally at a point the holding of real cash balances with people declines to such an extent that there is a decline in overall п-tax revenue.



1. Keynesian framework: @ a fixed price level, increase in G will cause increase in AD and thus outward shift in IS curve. If the economy is @ less than full employment then an output gap exists and output will also rise in response to rise in AD. As a result for a given tax rate, tax collections will also rise and ultimately @ given tax rate tax receipts will balance out the ΔG as economy reaches Y*. But critics argues that it underestimates crowding out effect.



1. Wealth effect (Patinkin & Friedman): By financing deficit via sale of bonds, government increases the wealth of the people. This is because bonds are held as wealth by people. As a result of increased wealth, people will demand more money. This leads to leftward shift in LM curve which offsets any expansionary effect of increased G. This is the wealth effect but empirical studies suggest its not as significant.
2. Ricardian equivalence: Consumers look at not their current income but their permanent income or expected future income while making consumption decisions. This is based on Modigliani's life cycle theory of consumption and Friedman's permanent income hypothesis. Now if the government increases deficit and finances it via borrowings, a consumer will know that there is no way to finance it other than rise in future taxes. This will dampen his future income and thus will not induce him to increase his present consumption much. They will only increase the consumption if PV (future additional taxes) < current increase in deficit.

Central Bank's Dilemma

1. If the central bank doesn't monetize government's deficit then government will have to borrow from the market and hence a rise in interest rates and crowding out effect.
2. If the central bank monetizes the deficit it leads to creation of H and hence inflation. If the economy is in recession then deficit financing will not be inflationary and in fact raise output.

Q. Bring out the differences in the definition of deficit financing given by different authorities in India and examine the role of deficit financing as an instrument of monetary control. (2009, I, 20)

Disposing Budget Surplus - Effect on Inflation

1. Using surplus to retire public debt: This returns the money back to public and hence weakens the anti-inflationary impact.
2. Impounding surplus funds: This will extinguish the money and hence reduce M_s and hence will be strongly anti-inflationary.

Public Expenditure

Decision Rules

How to Allocate - Divisible Projects

1. If the budget size is fixed, it is easy to see that the optimum utilization of funds (highest possible total benefits) would be when the marginal benefits from the last dollar spent on each projects is the same (otherwise it will be possible to reallocate such that the project with higher marginal benefit gets more at the cost of project with lower marginal benefit).
2. If the budget size itself is variable (i.e. we also have to decide how much to tax) then not only should the marginal benefits of the two projects be equal but should also be equal to the marginal loss to the society as the last dollar is taken away from the private sector.

How to Allocate - Lumpy Projects & Fixed Budgets

1. We have different projects with different benefits and different costs. Let rule 1 be we arrange the projects in terms of their benefits-to-cost ratio in a descending order and then we select projects from the top until we are within the budget limit. Let rule 2 be we select a mix of projects which gives the highest net benefit. Let rule 3 be that we try to minimize the left over (residual) subject to the constraint that projects selected have a cost - benefit ratio > 1.
2. It is clear that 1 and 2 are superior to 3 since both buy more benefits at a smaller cost. Rule 2 can be preferred over rule 1 if the marginal value of the residual dollars is zero otherwise rule 1 is the best.

How to Allocate - Lumpy Projects & Variable Budgets

1. Here the problem is again to weigh the marginal benefits of the public sector projects against the cost of the marginal benefits forgone in the private sector.

Burden of Public Debt

Refunding vs Debt Repayment

1. As the debt grows larger and larger, how will it ever be possible to repay it? This question is misplaced because household debt must be repaid sooner or later. Public debt needn't be repaid, it can be refinanced since the budget and the economy are a continuing undertaking.

Tax Burden of Debt Service

1. If the debt is held domestically then it can be argued that it doesn't create any excess burden because even if we impose taxes to repay the debt, the money will remain in the economy itself. This argument is wrong because the taxes imposed will have an excess burden / dead weight loss on the society (even if the money stays in the economy).
2. Continuing expansion od the debt combined with a constant GDP will lead to an infinite debt to GDP ratio. But if there is a constant fiscal deficit to GDP ratio and the GDP is also growing at a constant rate then the debt to GDP ratio will approach a constant in the steady state.

Intergenerational Equity Aspects of Debt Finance - Reduced Capital Formation in Private Sector

1. In the classical economics, resources withdrawn from the private sector (via debt borrowings by the government) leave the private sector with fewer resources and thus the debt burden should be borne by today's generation. But the question is where those resources are coming from? If coming from the consumption then the present generation's welfare is reduced. If coming from the savings, then the future generation will have lesser consumption.
2. If we assume that the debt financing is used to create capital assets (which will benefit the future generations) then the benefits principle argues that it be financed by future generation only. Thus if we further assume that all borrowings are paid out of savings and all taxes are paid out of consumption then we should divide the budget into 2 parts - current and capital and finance the current out of taxes and capital out of borrowings.
3. But the rational expectations approach questions whether individuals will behave differently to taxes and borrowings. As rational agents they will understand that a borrowing now means heavier taxes in future. Thus their

net worth is reduced (as they will have to pay higher taxes in future). Even those who have lent to the government have their net worth reduced because of the higher taxes. Thus the current consumption will be reduced nevertheless.

Intergenerational Equity Aspects of Debt Finance - Foreign Debt

1. Borrowing from foreigners implies that there is no need for the current generation to lower its consumption. Nor is there a need to lower the investment in the capital stock for the higher consumption of the future generations. So now the future generations will have unchanged consumption capacity, but they will have to pay a part of their GDP to the foreigners.
2. The deciding rule should be where the cost of debt is lower. If it is lower for the foreign debt then one should borrow from outside.

Term Structure and Debt Management

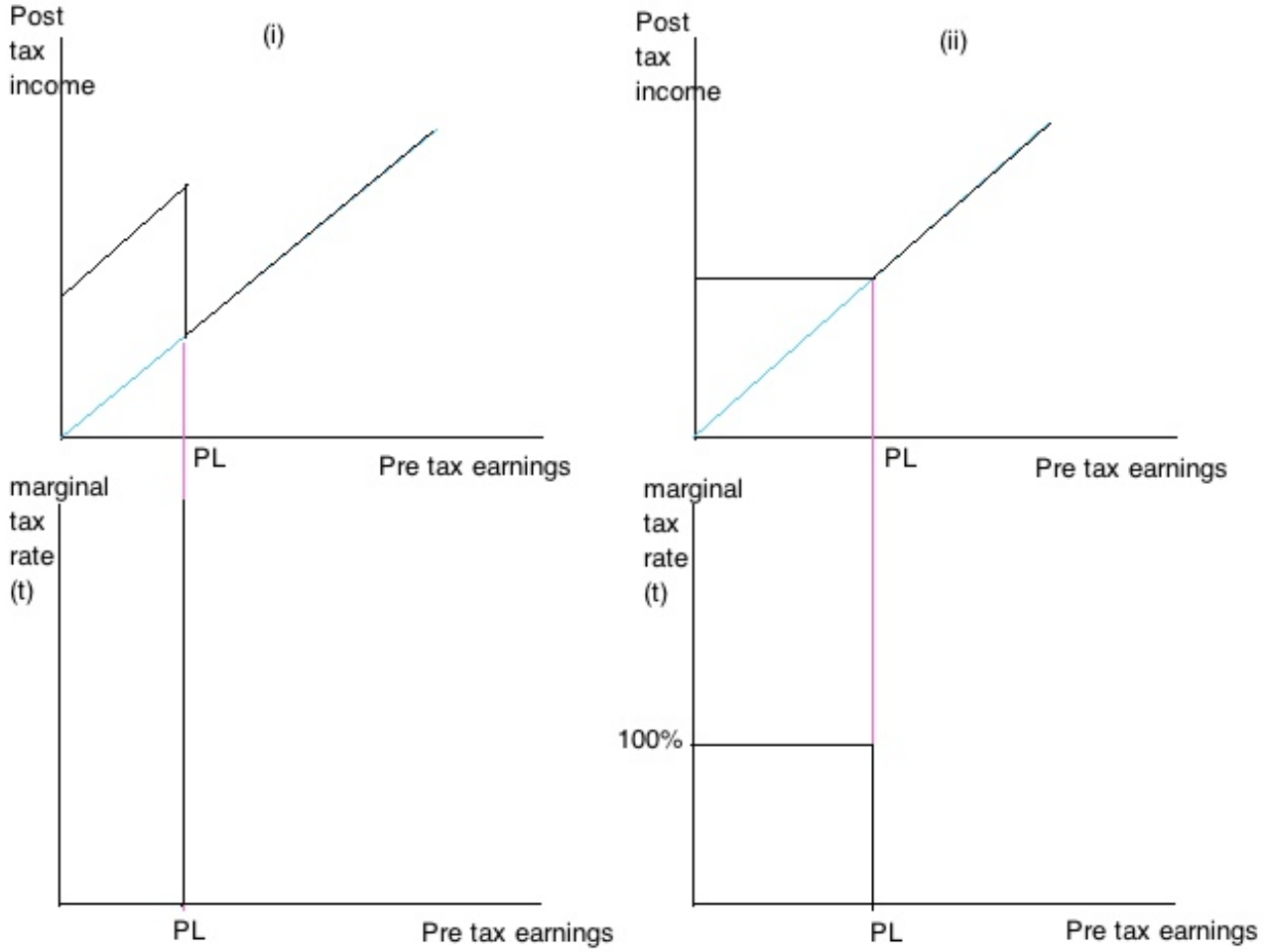
1. If the yield curve is upward sloping it doesn't mean that one should borrow in the near term only. Or if it is inverted it doesn't mean that one must borrow long term. What matters it the expectations of rate change. If the treasury expects rates to go up then it must borrow long and if it expects rates to go down then it must borrow short.
2. But treasury has control over interest rates as well and it can very well print money to service the debt. But such an action will reduce its credibility and give a shock to the economy. The treasury can always get resources from the private sector by handing them money. But the purpose of issuing debt rather than money (or replacing maturing debt with new debt rather than monetizing it) is to purchase illiquidity. Investors must be convinced to hold debt rather than money and the only way to do this is to pay them. Issuing LT debt reduces liquidity. So even if the LT rates are higher, it might pay the treasury to issue LT debt.
3. Lengthening the debt at the time of refunding tends to be restrictive while shortening it tends to be expansionary. Lengthening raises LT rates which are used in most investment decisions. So this restrictive effect of LT financing should also be kept in mind.

Excess Burden of Debt: Tax Exemption vs Direct Interest Subsidy

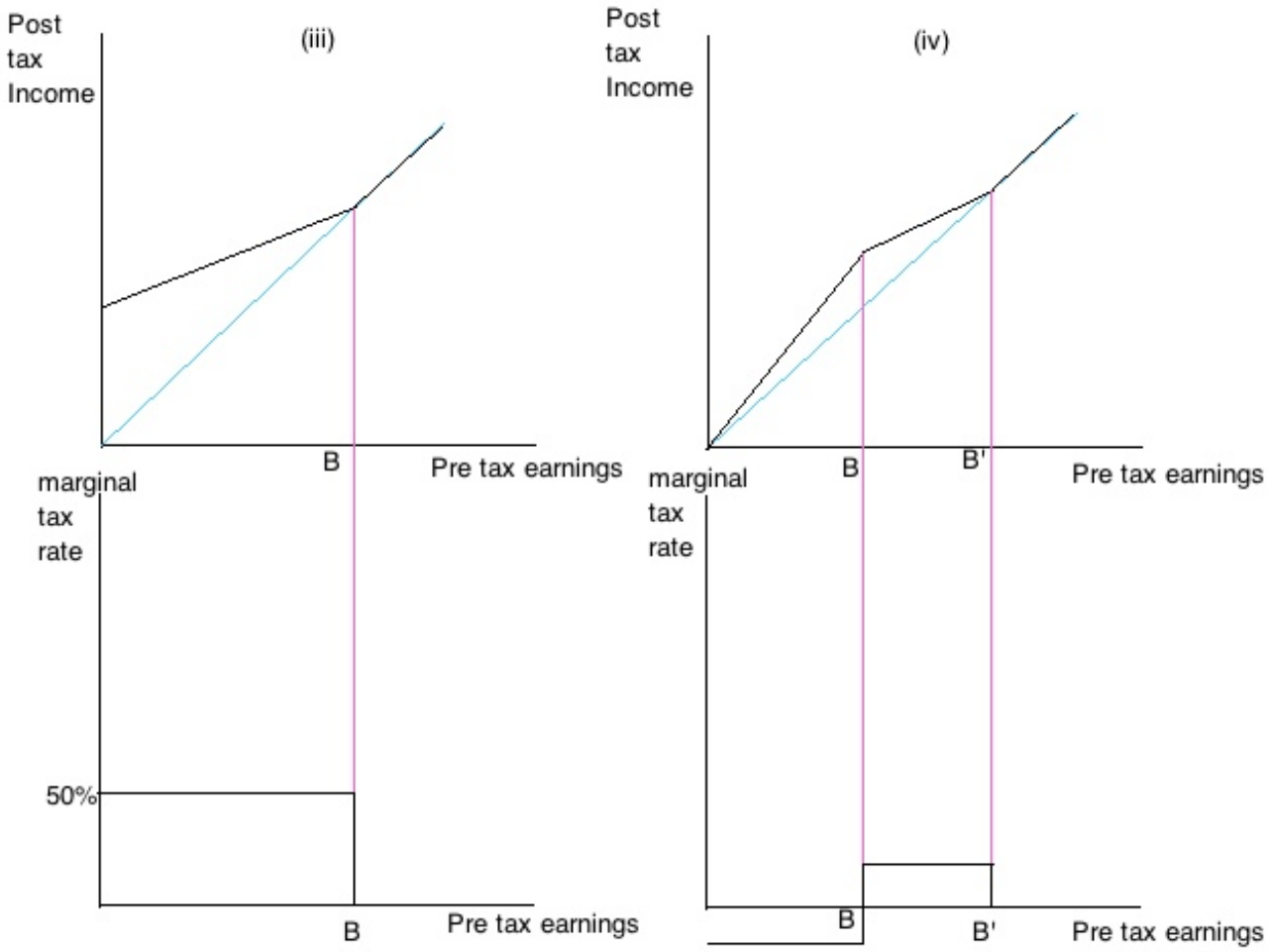
1. Tax exemption can't be justified on vertical equity grounds since the higher income slab people get higher benefits. Nor can it be justified on the horizontal equity grounds since people with equal capacity may end up paying different tax depending upon their behavior (one who invests in the tax free bond pays less). It also leads to a substitution of tax saving for other savings. Thus a general direct interest subsidy is better.

Effects

Effects on Work Incentives - Welfare Plans



1. In the left panel, we show plan (i) where we give a lump sum subsidy to all people below the poverty line (PL) and zero to all APLs. The blue line is the 45º line where there are no taxes and subsidies. In the left bottom panel, equivalent marginal tax rate is shown. It is clear that as soon a dollar is earned @ PL, the income received falls drastically and this means the marginal tax rate is very high @ PL. Thus there is no work incentive to rise above PL as one is actually worse off.
2. In plan (ii) we provide a subsidy to all BPL families so as to take their income to a minimum threshold. This means that the income received doesn't change for any additional earning (as long as one remains a BPL) and thus the marginal tax rate is 100% and there is no incentive to work.



1. In plan (iii), we vary plan (ii) such that the reduction in subsidy is not @ the same rate as increase in income so that as one earns more his total income increases. This gives an effective marginal tax rate of < 100% and creates an incentive to work as compared to plan (ii).
2. In plan (iv) we increase the subsidy as a person earns more up to a limit (B) and after that we reduce it with increasing income till a new limit (B') post which it is zero. The marginal tax rate in such a plan will be negative until B, positive till B' and 0 thereafter. It will create strongest incentive for the poor to work but is unacceptable from equity perspective.

On Production

1. Keynes' multiplier: But it can't work @ full employment level.
2. Crowd in: If expenditure is directed towards infrastructure projects, R&D and human capital.

On Distribution

1. Social security measures, subsidies / negative income tax, social infrastructure.
2. Encouragement to labor intensive industries.

Output Gap

1. When there is a lack of AD and resources lie idle government can increase its spending on consumer goods to raise AD. This will induce private players to utilize resources fully and raise output. But this will not raise investment and will not lead to higher economic growth. On the other hand public debt will rise. But a contrary view is that as AD rises private investment will increase and thus government expenditure will crowd in I.

Domar Condition

1. He argues if $r < G_Y$ i.e. if interest rate is less than GDP growth rate then deficit financing is sustainable. This is because GDP growth will increase income a part of which can be used to pay interest. When this condition is satisfied a country will not fall into debt trap.

2. He argues even if economy is working @ full capacity, an increase in government expenditure will add to income via new capacity addition as well as increased demand. Now because of this increased income, accelerator principle will ensure private investment comes in as well. Thus both public and private investments increase and there is higher growth in income. This can be sustainable if $r < G_Y$.

Q. What is internal debt trap? How do the economies of developing countries fall under this trap? (2006, I, 20)

Q. "The objective of fiscal stabilization has become difficult to be achieved in most of the developing countries due to economic compulsions and political pressures." Comment upon the statement. (2006, I, 60)