Chapter I

The Economic Theory of Excess Capacity and the Importance of Capacity Utilisation in the Process of Economic Growth
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Introduction:

The presence of excess industrial capacity is an economic phenomenon which is highly relevant in the context of economic structure and policy. It has its own theoretical formulation and policies to it have a pivotal place in the planning for economic development both in the developed economies as well as in developing economies. The theoretical presence of excess capacity springs from the limits inherent in certain types of market imperfections e.g., the monopolistic competition propounded mainly by Chamberlin.1 Its welfare implication in any planned economy, has been treated as a criterion to judge the success or failure of planning. This is because of its direct and positive role in the process of economic growth.

The available literature on this subject is scanty. It is partly for this reason that the scrutiny of this important pernicious economic phenomenon has so far been taken up in a piecemeal way and not as "a whole and

integrated study of the total phenomenon." Some of the studies which have attempted to probe into this subject, and have sought to advance economic theories in this field have been caught in the cross-fire of arguments pro and against the proposed theorisation. More explicitly, the presence of excess capacity in the economic theory is circumscribed under the ceteris paribus assumptions in which the usual equilibrium criterion, found in the traditional economic theory, does not hold and therefore those who have attempted to formulate a theoretical model of excess capacity have been refuted by others by challenging basically those ceteris paribus assumptions. As a result, the State of theoretical literature of excess capacity has remained unsatisfactory.

The second type of studies on this subject which have attempted to postulate the relationship between either spare capacity and economic growth or utilisation rates and economic growth in which the former two are found to be inversely related and latter two positively, have no doubt tried to ascertain its direct either way relationship with economic growth. However, in such studies sometimes even contradictory versions have been hypothesised e.g.

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3/ Ibid., p.66.
Prof. Paish has put forward first that the level of spare capacity does not affect investment. Then his second hypothesis is that there is some level of spare capacity at which investment is maximised. Robin Harris too postulates an entirely different theoretical explanation for the prevalence of excess capacity in an industry by treating it as a deliberate action by entrepreneurs due to some psycho-sociological conditions in the society. Thus the entire phenomenon of excess capacity or utilisation of it has become like a legend of "blind men and the elephant," that is, each study has sought to make its conclusions logically convincing according to that study's interpretation or gloss of the phenomenon of excess capacity. To use Gunnar Myrdal's expression, it has become necessary to 'cleanse the theoretical biases' in the study of excess capacity phenomenon. There is of course no doubt that over and above this need for clearing the complexity in the literature of excess capacity, there is unanimous conclusion of practical policy implication that it is a


costly affair to keep the already installed capital stock idle, whether the economy is a developed economy or an underdeveloped economy. These considerations go to explain why the study of excess capacity in planning for economic development should not be undertaken.

With this background, the present Chapter intends to examine first, the place of the excess capacity in economic theories. Second, the relationship between capacity utilisation and overall economic growth, and third, the need to study capacity utilisation in the case of Indian industries. The first two sections, in this frame, deal with the review of the available literature and the third section approaches the phenomenon of excess capacity in Indian industries in the light of historical evidences. In the last section, the outline of the present study has been discussed briefly.

I

Excess Capacity - The Theory:

The theory of excess capacity is a child of free competitive forces in an imperfectly competitive market, though it has also been a prominent variable in all business cycle theories based on acceleration principle.\footnote{J.M. Clark, Competition: Static Models and Dynamic Aspects, American Economic Review, May 1955.}
The doctrine of excess capacity is a sort of "new wave" among all the other doctrines of economics of imperfect competition. Prof. Kaldor describes it as the "most intellectually striking" and as "most significant from practical point of view." He justifies his first tribute on the ground that the doctrine of excess capacity has opened up a new theoretical vista by challenging the usual laws of economics known to us since Marshall such as the law that prices decreases with an increase in supply. The theory of excess capacity showed a new situation for the system in which an increase in supply i.e. an inflow of resources in the industry increases the price of product. Kaldor's justification for his second compliment to this theory viz., its significance from practical point of view is on the ground that it creates a ground for the interference by any corrective agency commanding authority in the free play of competitive market (if the main contention of theory is found to be correct) which was not visualised by the traditional theories.


3/ In Kaldor's Words, "It is highly ingenious and one might almost say a revolutionary doctrine. It shows up free competition (i.e. the freedom of entry into any trade or industry) not in the traditional and respectable role as the eliminator of the unfit but in much more dubious role as creator of excess capacity. It offers an excellent theoretical background for the age old cry of business men about the "waste of competition" so far neglected by the economists," Ibid., p.63.
The chief author of the theory of excess capacity is Prof. Chamberlin. Of course the theory or the main theme of the theory is by no means new. It is found in Cairnes' Political Economy, and in P. Sraffa's paper, "the laws of Returns Under the Competitive Conditions". Mrs. Robinson and Prof. Chamberlin put forward this theory in their famous work viz., respectively "The Economics of Imperfect Competition" and "The Theory of Monopolistic Competition". Of course, the first systematic exposition is by Prof. Chamberlin which is discussed in the following pages.

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2/ E.H. Chamberlin, op. cit., Chapter V.

10/ Cairnes' explanation for retail prices can be compared with the major contention of the theory of Excess Capacity. He refers to the excessive amount of capital into the business which compels the retail businessmen to charge higher prices than would be necessary (if the amount of capital in the trade were less) in order to obtain their average profits. See his Political Economy, p. 115.


13/ E.H. Chamberlin, op. cit.

* The reader familiar with this well known work can skip the following 17 pages introduced for completeness.
Prof. Chamberlin in his book, "The Theory of Monopolistic Competition" discusses this theory first with reference to individual equilibrium and then with reference to the group equilibrium under three probable situations of altering either price or product and last both at a time. Chamberlin's market imperfection segregates the market for an individual production by reason of three elements viz., (i) his price (ii) the nature of his product and (iii) his advertising outlays. He considers first, first two elements and ignores in the theory the impact of advertising outlays for the time being which he discusses in a subsequent chapter. Among those two elements, product variation is defined as an alteration in quality or a technical change or new design or better materials or better services. These are the ways by which individual products differ. Chamberlin's individual equilibrium with excess capacity can first be explained by keeping the product fixed. An individual producer in this case can alter his price only. The situation can be depicted as follows:

If we consider first the individual adjustment of price with reference to average cost curve AC then the price will be fixed at MH in figure 1. The scale of production is CM and abnormal profit or monopoly profit
will be FGHR. But the individual producer is more interested to have a full stable equilibrium by equili-
sing marginal revenue with marginal cost,\(^{15}\) which is shown in figure 1 above by the curves MR and MC. The price will be MH and not MK in the above figure even in the adjustment with marginal curves. Each producer in this case will enjoy monopoly profit. This is one of the two possibilities of individual price adjustment under monopolistic competitive market. The second possible adjustment of price by keeping the product constant, is shown in figure 2 above. Though monopoly profit disappears in this new equilibrium situation, the minimum profit sets a higher price and lower level of production. This is the result of the downward sloping demand curve as compared to the horizontal one in pure competition. Chamberlin concludes that "No matter in what position the demand curve is drawn, its negative slope will define maximum profit at a point further to the left than if it were horizontal as under pure competition. This means, in general higher production costs and higher prices."\(^{15}\)

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\(^{15}\) Mrs. Joan Robinson emphasises in these words "But it is not to his (producer's) interest to choose from all possible outputs that output whose average cost is least. It is to his interest to choose output for which (in the existing conditions of demand) marginal gains to him is equal to marginal cost". *Op. cit.*, p.97.

\(^{15}\) E.H. Chamberlin, *op. cit.*, pp.77-78.
The second alternative of an individual equilibrium with fixed price and with only product alteration is subject to a qualitative rather than quantitative changes in the product which introduces also the changes in the cost of production. In this case also the individual firm will alter the product in such a way that he can maximise his profit without bothering for optimum scale of production. Since it involves qualitative changes it is difficult to produce it on a graph. Prof. Chamberlin attempts to show it with an example of only two products in the following manner:

Figure 3
In above figure AA' and BB' are two cost curves respectively of product A and product B. Now price being fixed at OE, the profit earned by product A is CRMB and by B is DQNE. The product demanded for A is OG and for B, OH. The individual producer will thus prefer to adjust with product B as it gives him more profit than product A, though the cost of production is lower in A than in B. Here too the scale of production remains less than the optimum, hence excess capacity prevails.

In the third possibility when the producer can adjust both his price and product, he will choose such price as depicted in figure 1 or 2 above and such product B as in figure 3 with the aim to maximise his profit and the result will remain the same viz. lower production and higher prices. This proves that in establishing full individual equilibrium in a monopolistically competitive market, each case leads the situation of excess capacity.

Group Equilibrium:

Chamberlin generalises his theoretical exposition from individual to the group equilibrium which he defines as the market in which many producers produce similar products which are close substitutes for each other. His theoretical derivation for group equilibrium, of course, is based on the following assumptions.
(i) There are large number of producers in the market, producing the products which are "slightly different" from other producers' products. This implies that the demand for a product is highly sensitive to the price change but the sensitivity is not so great that it may compel all the producers to sell at the same price. In technical terms it may be described that the consumer elasticity of substitution between different products is large but not infinite (such as in pure competition) or in other way the cross elasticity of the demand which is defined as the elasticity of demand for one producer's product with respect to another producer's price is considerable but not infinite.\footnote{N. Kaldor, \textit{op.cit.}, p.64.} Similarly, this means that in contrast to the purely competitive market in case of monopolistic competitive condition, a firm may lose or gain some consumers and not all by respectively either raising or lowering the price of his product.

Prof. Chamberlin assumes this to smooth the complication in the group which may arise in connection with the number of competitors within the group and the manner in which their markets overlap.
(ii) Secondly, it is assumed that consumer preferences are fairly evenly distributed among the different varieties. Again in terms of elasticity, this assumption implies that the cross elasticity of demand for the product of any producer is of the same order of magnitude with respect to the price of any of his competitors.

(iii) The cost and demand curves of all producers are identical, which means that the elasticity of the demand curve and cost curve of each producer is also assumed to be the same.

He makes the two assumptions above in order to facilitate the exposition of his group theory. The third assumption of identical demand and cost curves is defined as "heroic" assumption as he is aware of its unreality. He, therefore, relaxes it later on.

(iv) It is assumed further that no producer possesses any institutional monopoly and hence the entry into the market is free.

(v) The long run cost curves are "U" shaped which

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17/ Prof. Chamberlin explains this assumption as "any adjustment of price of product by a single producer spreads its influence over so many of his competitors that the impact felt by any one is negligible and does not lead him to any re-adjustment of his own situation", *op.cit.*, p.83.
implies that it falls first up to a certain point and then starts rising which means that there are economies of scale. 18/

With these implicit assumptions 18/ Chamberlin explains the group equilibrium theory of excess capacity firstly by keeping product fixed and allowing only price to vary and then reversing the order of variation. Let us examine the first situation.

Figure 4

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18/ There is a controversy about this assumption when it is introduced into capacity measurement. See L.R. Klein, Some Theoretical Issues in the Measurement of Capacity, Econometrica, April 1960, Vol. 28-2. Also J. Johnston, Statistical Cost Functions (McGraw Hill), 1960.

19/ The excess capacity theory has been criticised by Kaldor, op.cit., on the basis of these assumptions only and it is with this reference that the literature has been viewed in the introduction of this chapter.
As in case of individual equilibrium, here too, each producer in the group will fix price first at AR and will enjoy monopoly profit $SHRE$. Due to the free entry into the industry new competitors will enter into the field with a resulting shift of demand curve $DD$ to the left as the market will be shared by the more sellers now than the earlier. With all attempts by the producers to protect their monopoly profit, the demand curve ultimately will be tangent to the falling average cost curve and here the monopoly profit disappears. There will be a stable full equilibrium with higher price and lower scale of production than warranted under pure competition. The same equilibrium would also be achieved even if the demand curve would have been below the cost curve. Here each producer will face a loss and the solution will be reached with the exodus of firms (which implies free exit even) and again the point of tangency would be at higher price and at lower level of production. The situation will be perfectly stable as there will be no further flow of resources in or out of the field since profits are just enough to maintain the amount then invested. Now in this process of equilibrating adjustment, Chamberlin's theory keeps the cost of production constant which keeps the cost curves invariant which in fact may either be raised.
(by an increase in the price of the productive factors or it may be lowered (by external economies), Chamberlin justifies his assumption of constant cost on two grounds. Firstly that it is applicable to the facts. He puts an argument on the ground that the price of factors of production and hence the costs remain unaffected with an increase or decrease in output because in such type of market structure the factors of production employed in a partial field is small compared to the general employment. This, he adds with the emphasis that resources for production themselves are available at constant prices. Thus he rules out the possibility of raising or lowering cost curve with the free play of market. He rules out the possibility of external economies too as a reason to decrease the cost of production on a similar ground that if it accrues by the group (by improvement in the organisation of the group). It is a small part of an industry or a small part of a larger field and may have a negligible effect. Hence the cost curve will be unaffected.

There are three major features emerging from the foregoing discussion of only price adjustment (with constant cost) resulting in equilibrium with excess capacity in the monopolistically competitive market:
(i) It is a situation of market in which there is a competition with monopoly elements. This competition which consists of free inflow of resources into the industry reduces profit to the competitive level but the monopoly element keeps prices higher than the competitive prices. This means that competitive profits never mean competitive prices under monopolistic competition, for the demand curve is never tangent to the cost curve at the lowest point.

(ii) The second feature of this theory is that price is inevitably higher and the scale of production, inevitably smaller. This is because a reduction in price by any individual with the intention of producing at the most effective scale of production (at the minimum point on the average cost curve) will not be more profitable than to keep price at higher level and scale of production at lower level.

(iii) The third important feature of this theory is that the general uniformity of price which prevails in the group does not prove anything like freedom from monopoly element. This general tendency of prevalence of uniform price is rather due to the demand curve for each product being of the same elasticity in the practice.

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20/ Prof. Chamberlin concludes that "General uniformity of prices therefore, proves nothing as to the purity of competition or we might say as to the relative proportions of monopoly and competition in the admixture." Op. cit., p.89.
The group equilibrium with fixed price and allowing only product to vary is more complicated a process to explain for a group. Chamberlin therefore, concludes that the process of adjustment in the product with fixed price is characterised by the equation of cost and price and secondly, it will involve either intersection of the price line with the cost curve of production or its tangency with it as shown in a figure below:

Figure 5
Line EZ is the line along which the demand variation for each product can be measured. PP' (solid line) represents the cost of production for optimum variations of the product. Now with the fixed price OE the demand for it is OA, the group will enjoy profit PHHE. New firms will enter to share the profit and sale or demand for each will be reduced to OB, where cost being equal to the price. There will be no further movement. The dotted cost line PP' is the limit of upward shift of cost curve if any seller can increase his profit by improving his product (analogous to lowering his price), while the products of his competitors remain unaltered. Thus in this type of situation, the demand for only one variation of product is limited and it cannot be increased by price reduction under the present hypothesis and the possibility of increasing it by product alteration involves cost variation. The result may be that inferior product will be sold at higher prices. This will become more clear at the end of the present discussion.

The third situation where both price and product can be varied, each seller will choose that combination of price and product which maximise his profit and he will make re-adjustment if his competitors make the same move until a point is reached where no one in isolation can make him better with any further re-adjustment. At the same time resources will flow into the
field if profit is more than a competitive minimum which will reduce the degree of competition in the field as costs of each is exactly covered. The conclusion is that for a given product price will be higher under monopolistic competition than under pure competition, so for a given price the product is somewhat inferior. Thus, both of these resultant effects are like two sides of the same coin. The situation which allows both the price and product to be altered is depicted as follows:

Figure 6
In the above diagram, $dd'$ represents the demand when product is fixed and only price can be varied, and $EE'$ is the line along which demand can be measured when price is fixed and product is varied. It would also be an interesting comparison of the adjustment of price and product between pure and monopolistic competition. $DD'$ is the demand curve of pure competition which is tangent to the minimum point of average cost curve $CC'$ at $Q$, which shows a perfect stable equilibrium with optimum scale of production with price $BQ$, which is lower than $AR$, which is also an equilibrium price under the condition of price variation under monopolistic competition. Now fixing the price $AR$ constant and if product is allowed to vary and if any seller is allowed to dispose it off any amount he pleases at that price (as happens under pure competition) each would expand his output to approximately by $OB$ which will give extra profit. Now this extra profit would be reduced not by a fall in price (which is not possible under the present assumption), but by general improvement in the product which will shift the cost curve upward to the right as shown by dotted line $PP'$ in above diagram, whose minimum point will be equal to price $AR$. The result is that it creates a tangency not only towards higher prices but also towards an inferior product compared to that price. This is
because unlike pure competition it is impossible for producers to sell all that they please.

The conclusion is that under monopolistic situation, compared to pure competition with the condition of allowing either product or price to vary or both at a time, the price competition fails to function and waste of competition arises with higher price and inferior product in a stable long lasting equilibrium situation. The reasons for the failure of price competition to function provide the essence of the theory of excess capacity. Prof. Chamberlin gives following three major reasons for such failure.

1. The tendency of businessmen to set price with reference to costs rather than demand will create a situation of equilibrium with higher price which is set at the point of tangency between falling demand and cost curves. Now any price below it would invite competition into the field hence this possibility leads to a situation, where price ceases to be a factor of competition and it gets set at the maximum equilibrium. This outcome does not involve any sort of tacit agreement. Another factor considered in this case is that businessmen find it unethical to compete on the basis of price, so the higher price, which does not fall with the increase in the number of competitors in the field, ipso facto, results in higher cost of production and equilibrium is established by developing excess productive capacity.
(2) The second deterrent to price cutting is buyers' inertia, so if the price is associated with the quality of product a higher price would appeal to the buyers as better quality of the product and price fails to fall.

(3) The third reason is that prices may be set by custom or tradition. With the increasing importance of trade marks and brands which are the part of institutional monopoly, price is imposed by manufacturers on retailers with high margin in which case the former is least interested to give low price to the customers. Now if the price which is imposed on retailers brings extra profit to them, their number will increase which also will increase the unit cost of production which will be adjusted (price being imposed upon) with lower scale of production. Prof. Chamberlin concludes that "the common result of this assemblage of factors is excess productive capacity for which there is no automatic corrective." He agrees with the possibility of excess capacity even in the pure competition which arises temporarily, as a part of miscalculations of producers or sudden fluctuations in demand or cost conditions. But it is a peculiarity of monopolistic competition where it persists for a longer period, which is waste of monopoly element in the

monopolistic competition.\textsuperscript{22/}

Excess Capacity with Advertising Outlay (Selling Cost):

The foregoing analysis of excess capacity excludes a very important feature of market imperfection and i.e., advertising outlay incurred by each producer in the competition as a media to make an appeal to the buyers in what way his product is superior than his competitors. In Prof. Chamberlin's theory this factor plays the role as follows:

Figure 7

\textsuperscript{22/} J.M. Clark concludes, similarly, that excess capacity is a general characteristic of industry. He is concerned with the phenomenon of the business cycle as for instance the creation of plant capacity to take care of the peak demand capacity is therefore superfluous at the time when demand is less than this. \textit{Ibid.}, footnote 2, p. 109.
In the above figure PP* and FF* are respectively production cost curve with zero selling cost and production cost curve including selling cost. The point of tangency at R shows the equilibrium adjustment of curve dd' which represents the demand at various prices for the product of any seller on the assumption that prices for his rivals would remain constant. Now the another demand curve DD' is drawn with the counter assumption about price change with his rivals than dd'. Now DD' being steeper than dd' its point of tangency would be at point T, which is at the left of point R. The scale of production will be smaller than OA and number of producers will be larger.

The major feature of equilibrium outlay adjustment with advertising outlay thus is that, if the elasticity of the demand curve DD' remains the same in case of equilibrium with or without advertising outlay, the scale of production would be larger (as it is evident from the position of FF' relative to PP') than it is without advertising outlay. The general conclusion is that whenever price competition functions imperfectly it is likely that advertising outlay decreases the discrepancy between the actual and the most efficient scale of production. Of course, total costs and prices will be higher and the balance will be made up by keeping the productive capacity idle or in excess.
The foregoing theoretical discussion leads to the conclusion that the failure of price competition to function in a monopolistic competitive type of market structure generates excess capacity, but the resultant effect of such excess capacity on the overall economic growth is more important to study, particularly for underdeveloped economics where capital is scarce compared to labour. The relationship between these two has been examined by many theorists of growth and business cycle such as Winston, Harris, Schultz, Paish, Junankar, J.S. Mill, L.R. Klein.


26/ F.W. Paish, op. cit.


28/ J.S. Mill, op. cit.

Perry and many others but it is difficult to draw apart and separate out the effect of excess capacity on overall economic growth as economic growth is a complex phenomena. In the words of Marris "Economic growth is a complex technical and social process involving inter alia, the accumulation of productive capital in tangible economic form." It is even otherwise a widely accepted view among growth theorists that additions to the capital stock leads to economic growth. The development models from Marx through Harrod Domer to Chennery have described the growth as a process of accumulation investment-income-accumulation. This is based on acceleration principle. To a large extent, lack of growth in underdeveloped countries can be attributed to shortage of capital. Somewhat paradoxically, most of the underdeveloped countries suffer from idle capital stock. It is therefore vital to learn the extent to which idle capital stock hampers the overall economic growth. This is intended in the following pages under this section.


31/ Robin Marris, *op.cit.*, p.11.
Capital/Capacity Utilisation and Economic Growth:

At the outset it is worthwhile to clarify that the concept of capacity has been used in the subsequent discussion as coherminus with that of capital stock. Although the two are not the same, the distinction has not been maintained for the purpose of this discussion. 32/

The relationship between capital utilisation and economic growth has been studied mainly for the underdeveloped economies. It is explicitly discussed by Robin Marris33/ and Winston34/ while studying such relationship with reference to U.K. and Pakistan industrial capital utilisation. Winston's theorisation is influenced by Marris. 35/

32/ L.R. Klein agrees with this distinction: "We shall ultimately come to the view that capacity is not at least as hard to measure as is capital but regardless of this consideration we also see that capacity is not purely a proxy for the capital stock. It is in a sense, an index combination of fully utilised factors including others as well as the capital stock." See L.R. Klein, Econometrica, op. cit. p.275.

33/ Robin Marris, op.cit.

34/ G.C. Winston, op.cit.

35/ In one of his studies Winston expresses "Robin Marris'' work (op.cit.) heavily influenced this analysis by showing that regular day/night wage rhythms due to work-time preferences are a major reason why capital rarely will be installed with the intention that it be utilised as much as technically it could be". G.L. Winston, Capital Utilisation and Optimal Shift work, The Bangladesh Economic Review, Vol.11, April 1974, No.2, p.518.
Robin Harris postulates the relationship between rate of capital utilisation and economic growth both for the underdeveloped and for the developed economies considering it as an aspect of the process of economic growth. The crux of Harris' theory is that of the planned rate of utilisation and economic growth with reference to the design of a plant with alternatives of smaller plant with intensive utilisation (capital deepening) and of larger plant with less intensive utilisation (capital widening) to meet a given demand. He postulates that the rates of utilisation vary considerably between countries, between industries and between the periods also. Among these, some variations are cyclical and have been taken care of by the theories of trade-cycles, and others are not of a cyclical nature and therefore have been ignored by those theories. Harris gives a circular reinforcing relationship between capital utilisation and economic growth involving other factors into the process as follows:

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Capital utilisation  
\rightarrow \text{Other factors}
\downarrow \text{Economic Growth}
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Variations tending to enhance growth also encourage utilisation which in turn further stimulate growth. One

would therefore expect a positive correlation between growth rates and utilisation rates. But Harris' necessary condition for economic growth is capital accumulation (which he later designates as a sufficient condition ignoring other indirect social factors in the postulation of his theory). The necessary conditions for capital accumulation in his model are general desire to invest and corresponding desire to save. Harris' entire analysis of capital utilisation and economic growth for underdeveloped economies (which he defines as the economy which is characterised where capital is in some sense scarce relative to labour) is based on the following assumptions: First, the effective bottleneck for economic growth in such countries is solely the rate of domestic industrial capital formation. Second, the possibility of capital imports is ignored. Third, all non-wage income is saved and fourth that the technique of production is fixed.

37/ Harris says "Capital Accumulation is a necessary but not a sufficient condition for economic growth process. Some other factors may have direct effects on the rate of utilisation of the capital which is accumulated, others may be themselves significantly affected by it. This study however, is deliberately concentrated on the more conventional economic aspects of the subject and indirect social factors are ignored. We, therefore, assume that accumulation is a sufficient condition for growth or put the point more favourably, we say that our conclusion may be interpreted as statements that provided other factors permit, such and such variation in capital utilisation will have such an association with accumulation and hence with growth". Robin Harris, op.cit., p. 11.
Under these assumptions, the relationship between economic growth and capital utilisation for an under-developed economy in which the prime object of development is to transfer workers from agricultural sector to the industrial sector as quickly as possible is postulated as:

\[ r = \frac{s}{v} \]

where \( r \) is the rate of growth of capital stock, employment and output, \( s \) is the proportion of national income saved and \( v \) is the incremental output capital ratio. Since this ratio is directly related to the planned rate of utilisation (on which Harris' thesis is based) a capital saving or increase in capital productivity is beneficial to growth. Therefore, the precise relationship of Harris' model is \[ r = hsk \]

where \( h \) stands for the average rate of utilisation, \( s \) is the proportion of national income saved and \( k \) is the average hourly productivity of capital goods producing sectors. Now \( k \) demands some explanation as Harris' assumption of excluding the possibility of capital imports implies that the rate of growth at any stage in the process depends exclusively on the ratio between employment in consumer goods producing sectors on the one hand and employment in capital goods producing sectors on the other.
sectors on the other. He further clarifies that the persons employed in capital goods production should be maintained as they cannot consume their products directly hence they should be supported by the community's saving. In under-developed countries saving comes mainly from profit and other non-wage income. This presumption is also supported by Kaldor.\textsuperscript{36} Hence the increase in 's' to support the employment in capital goods producing industries is limited in such countries. Secondly, since Harris' assumes the fixed technique of production embodied in capital goods production which means that the average hourly output per man and of a typical unit of equipment is given and also the number of workers required to operate that typical unit (instantaneous employment in Harris' terminology) are provided, which inter-alia means that hourly productivity of capital goods sector is also given. The basic relationship between utilisation and economic growth expressed by \( r = hsk \) becomes more explicit by distinguishing between effects of utilisation on one hand and technical conditions in such countries on the other. Now, if the utilisation rates (in terms of average yearly working hours) in under-

\textsuperscript{36} Kaldor hypothesis with reference to his two sector model is that saving comes only from profit and wage income is generally spent in developing countries. See R.G.D. Allen, \textit{Macro-Economic Theory, A Mathematical Treatment}, Macmillan, St. Martin's Press, 1970, Chapter 11, pp. 215-217.
developed countries are conventionally fixed and 'k' is the technological constant, the only way to accelerate growth is to increase proportion of 's' in above expression. This means that real wages should be reduced in favour of increase in employment. But unfortunately in under-developed countries consumption standard is already too low and because of low labour productivity real wages are also low (money wages being high). The only way to increase rate of growth in this situation is to increase the rates of utilisation from the conventional datum i.e. to increase the total yearly working hours through increasing number of shifts particularly of night shifts which remain unutilised as Marris observed in many countries. This is especially important in underdeveloped countries under the given assumptions of Marris model that the main problem of economic policies in such countries is of capital widening (to bring more workers into industrial sectors rather than capital deepening i.e. increase in capital productivity). Thus Marris model confirms that "growth rate varies directly with the utilisation rate".32/  

Marris' rigorous theoretical model also examines the relationship between rate of utilisation and rate of economic growth in a developed economy which he

defines as the economy where capital has ceased to be scarce relative to labour. This of course does not mean that the capital is abundant. It only means that the capital stock accumulated at a point of time is sufficient to employ available labour force with the average planned rate of capital utilisation.

With reference to this stage of development, capital widening or increase in rate of utilisation is necessary in the capital goods industries to exploit the possibility of new inventions (capital deepening) in consumption goods industries. This is because Harris assumes zero technical progress (i.e. fixed technique of production) in capital goods industries under the stage of development described above in a developed economy. The fixed technique of production in capital goods industries confines it to produce goods which are scrapped by depreciation and wear and tear. Now to exploit the new inventions in consumption goods industries the reequipment and capital deepening in this group of industries requires both temporary and permanent increase in the rate of utilisation in capital goods industries. Hence in Harris' "so long as there are technical possibilities to be exploited new capital is never useless and utilisation must remain a matter of importance."

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40/ Ibid., p.15.
In the second probable stage of economic development that is of the absence of technical progress which means the total absence of knowledge of more labour intensive technique of production, the effect of capital utilisation on economic growth has been traced in two ways in Harris analysis. First, the new capital is required to employ the workers which are taken off from night shifts until they are employed in day shifts. This is for the time being until the process of development reaches to a stage of "bliss" where all the shift work other required than the technical reasons are eliminated.

Second, the effect of utilisation on economic growth with the assumption of the absence of technical progress arises from the natural rate of growth of population. Capital widening is required in this stage of development in a developed economy to support the natural reproduction of population growth.

The usual conditions for growth is

\[ s^* = gv \]

where \( s^* \) is the proportion required to be saved. "\( g \)" is the natural rate of population growth and "\( v \)" is the capital output ratio. Harris modifies this by introducing rate of utilisation (i.e. "\( h \)" in above equation) such as \( s^* = g/kh \).

Where \( s^* \) and "\( g \)" hold the same meaning as defined
above. This simply means that higher the rate of utilisation, lower is the proportion of saving required to support the additional population.

In the third case Marris examines the effect of utilisation on growth by relaxing the assumption of no technical progress and by introducing the assumption of constant population. He draws a significant conclusion with this stage of development in a developed economy that high rates of utilisation produce stimulating effects on rate of replacement which is the necessary condition of rising productivity in Marris model, produces further stimulation on progress. This proves that the higher rate of utilisation is a factor which affects the rate of economic growth through the rate of replacement in the developed economy where capital has no longer been scarce compared to labour.

G.C. Winston explains the relationship between rate of utilisation and economic growth in similar fashion studying the rate of capacity utilisation in Pakistan manufacturings. Like Marris he uses the Harrod-Domar growth model which simply defines the rate of growth as the product of marginal output-capital ratio and marginal propensity to save ignoring population growth. Symbolically

\[ g = \beta s \]

41/ G.C. Winston, op.cit.
where 'g' is the rate of growth, '6' is the marginal output-capital ratio and 's' is the marginal propensity to save. It is apparent from this relationship that given the rate of saving, an enhancement in capital productivity would raise the rate of growth. Enhancing capital productivity would imply lowering capital/output ratio. More explicitly, as explained by Winston, if 'h' (which is \( h < 1 \)) is the fraction of total capital stock of a plant, the rate of growth will be

\[
g = h \cdot 6 \cdot s
\]

where '6' and 's' are as defined above. In this situation the growth will be reduced by the fraction \( 1/h \). This shows that with no change in capital stock i.e. in a static model, an underutilisation of capital stock either reduces the growth (by the fraction of it) or it must be offset either by reducing current consumption or by increasing the capital productivity. In a developing economy these choices are extremely difficult,\(^{12}\) because current consumption is already

---

\(^{12}\) Harris analysis leads to the same conclusion that reduction in current consumption or increase in capital productivity cannot augment output in less developed countries as the former is already too low while in case of latter it is a costly affair, \textit{op cit.}
low and product mix alterations would invariably call for radical political and economic changes. The inevitable consequence of under utilisation thus is the lowering of the rate of economic growth. Contrary to this, an increase in utilisation produces more than a one shot change (increase) in output. Again in Winston's terminology the potential output in period $t$ is nothing but

$$Y_t = \phi K_t$$

where $Y_t$ is the potential output in period $t$, '$\phi$' is the marginal output-capital ratio and $K_t$ is the existing capital stock in period $t$. If this capital stock is not used fully i.e. when $h < 1$ then actual output will be:

$$Y^*_t = hK_t = hY_t$$

Now any increase in capital utilisation from $h$ to $h'$ will increase the level of output immediately since $Y_t$ is greater than $Y^*_t$ by the fraction $1/h$. Thus the higher capital utilisation will augment output immediately as a one shot increase in current output ($Y_t = h'K_t$) and with the given capital stock in all subsequent periods it will increase the rate of growth of output to $g' = h'\phi s$.

The above discussed relationship between capital utilisation and economic growth postulated by Harris and Winston leads to the same conclusion that increase
in the rate of utilisation affects the rate of economic growth positively under the given rigid characteristics of under developed economies. It is pointed out earlier that the effects of cyclical variation of capacity utilisation on economic growth have been ignored in both these models, viz. Winston and Harris. But C.L. Schultze discusses such effects considering multiplier acceleration effects on growth in the different phases of business cycles. He foresees two ways through which cyclical variation in capacity utilisation can affect the economic growth.

(i) Changes in capacity utilisation rates affect the levels of investment through distributed lags. He explains that during the phase of prosperity the back-log of profitable investment opportunities are built up which protect the economy from harmful investment responses to output changes via acceleration effects. Now if the gap between capacity and output is deep and longer lasting, it is more likely that the backlog of profitable investment will be eroded and more harmful investment in a cumulative movement will set in.

(ii) The second influence of capacity utilisation on economic growth in Schultze model is through the

\[43\] C.L. Schultze, *op.cit.*
influence on prices and productivity. Here cyclical changes in capacity utilisation rates affect the share of personal income going to profits. This shift in income-share implies that the multiplier would be relatively small compared to changes in utilisation rates to compensate the changes in output and income. The effects of changes in capacity utilisation rates on productivity and hence on profits are complicated one. Schultze explains that a persistent subnormal capacity utilisation ratio reduces employment proportionately with the decline in output. The reduction in personal income, if it is more than temporary in nature, may tend to grow the length and depth of recession. This leads to the conclusion that the changes in rates of capacity utilisation (particularly reduction in it) affects the cyclical changes adversely. In case of prosperity it affects through distributed lags and in phase of recession through reduction in profits and productivity.

**Capacity Utilisation as a Variable in Different Econometric Models:**

Having discussed the direct relationship of capacity utilisation with economic growth, an indirect use of capacity output has also been found important in the construction of econometric models. In U.S.A.
utilisation measure has been found very useful in the formulation of econometric functional relationship and forecasting models particularly as an important variable in investment function, price equations and hours worked out equation and in the production function.\textsuperscript{44/} It has operated as a significant explanatory variable in imports and exports equations and at an industry level in investment and profit function. Klein and Long conclude its importance as a variable in different models as "these are the main avenues by which the capacity utilisation variable enters the entire model. They are strongly significant from a statistical point of view in these cases."\textsuperscript{45/} Klein and Long, of course, also warn against the use of capacity variable in econometric models without specifying the other variables of the model. For example, they emphasize that while introducing capacity use in investment function with lag distribution of output and capital stock, capital rental variable

\textsuperscript{44/} For example, Capacity Utilisation is one of the most strategic variable in Wharton model. In the equation for price formation by Wharton model, the non-linear transformation of capacity utilisation has been found as serving the most significant variable. In some studies on export equations, capacity limitations on export performance have been proved significant. See L.R. Klein and Virginia Long, Capacity Utilisation Concept, Measurement and Recent Estimates, Brooking Paper No. 3, 1973, pp. 743-763.

\textsuperscript{45/} Ibid., p. 747.
should appropriately be introduced to assess correctly the marginal effects of capacity utilisation on investment.\footnote{46}

Some noteworthy models tested empirically with capacity use are by Junankar for U.K. manufacturing\footnote{47} and by Sawhney and Sawhney for Indian manufacturing.\footnote{48}

In Junankar’s model it has been attempted to test Paish’s alternative hypothesis concerning the relation between investment and spare capacity.\footnote{49} He examines the alternative models of investment viz., the distributed

\footnote{46} Another example given in Klein and Long’s study is that price equations with capacity utilisation variables should have unit labour costs instead of wage rates without appropriate productivity correction. This is with reference to comments on Perry’s model, \textit{Ibid}.

\footnote{47} P.N. Junankar, \textit{op.cit}.


\footnote{49} Paish’s two contradictory versions of his hypothesis are first, that the level of spare capacity does not affect investment and second is that there is some optimal level of spare capacity at which investment is maximised. See P.N. Junankar, \textit{op.cit}.
lag accelerator model, the modified capital stock adjustment model and the spare capacity model. All these investigated models by Junankar proved that the spare capacity affected investment, adversely in case of U.K. manufacturing. In Sawhney and Sawhney's study the relationship has been examined between price cost margin (profit rates) and capacity utilisation for some Indian industries. This model suggests that the better utilisation of capacity reduces cost of production per unit and also wastage due to under utilisation which in turn, other things remaining the same would result in a higher price cost margin i.e. higher profit per unit of output. On the other hand lower rates of utilisation show slackening of demand which keeps price cost margin low and vice versa. This also corroborates Harris' formulation that "in the absence of lower premium for shift work there is a tendency for the rate of profit in an industrial firm to rise with the rate of capital utilisation." 51/

50/ Investment has been taken in Junankar's model as the gross fixed capital formation in the U.K. Manufacturing, Ibid.

51/ Robin Harris, op.cit., p.20.
Another important use of capacity utilisation at an industry level is as the most effective criterion compared to other criteria like profitability, effective rates of protection given to the industry, import substitution and employment creation by the industry to judge industry's efficiency. Also in the absence of satisfactory information on investment in the industry, the capacity utilisation may stand as a proxy for investment as the latter is nothing but the addition to the capital/capacity stock which reflects the potential output in the industry.

To sum up, the foregoing exposition of importance of capacity use, it can be said that its direct and positive role in the process of economic growth both in

52/ Samuel Paul outrightly rejects these criteria to judge industry's efficiency and advocates capacity utilisation as a criterion with reference to the Indian industries. He rejects profitability as criterion due to the controls, disincentives and incentives given to the Indian industries and also due to the faulty accounting system. He rejects output and effective rates of protection as criteria on the ground of conceptual and measurement ambiguity and investment criterion due to data limitations. He advocates capacity utilisation as a criterion in judging industry's efficiency as he finds that it can serve as a proxy for investment criterion and also share the scope for stepping up output in the short run which the output criterion fails by reflecting only one side of the coin. See Samuel Paul, Industrial Performance and Government Control, The Indian Economy: Performance and Prospects, Edited by J.C. Sandesara, Department of Economics, Bombay University, pp.612-642.
developed and developing economies and also as an important variable in econometric model building validates its importance and that the capacity and its utilisation can serve as important statistical indications and can provide an insight into the changes in the industrial activities over time. The earlier models by Chamberlin and Joan Robinson were applicable to firm and industry level situations. Later work relates capacity utilization to economic growth but at an aggregative level. Some general formulations follow which are an interesting backdrop for empirical work.

Recent econometric work has been more pointed to the extent it concentrates on structural analysis of investment, prices or foreign trade and relates to capacity use. Also industry level emphasis is welcome. However the basic problem of structural imbalances at a disaggregated level; a peculiar problem of developing economies has been ignored. This particular aspect is the main focus of this thesis, developed subsequently.

III

The discussion in the last section sets forth a direct theoretical relationship between capacity/capital utilisation and the overall economic growth which seems more effective in case of underdeveloped countries where
capacity utilisation remains low (see Appendix Table). India is also a developing country with relative abundance of labour force compared to her capital stock. Available historical evidences on capacity utilisation in Indian industries point out a poor record of capacity utilisation by whichever method it is quantified. The following tables substantiates this evidence:

The above two tables provide proof of capacity under utilisation in Indian industries during the period before and after the inception of planning. The major studies which have probed into the problems of under-utilisation in Indian industries have emphasised the direct relevance of capacity utilisation in Indian Planning and policies. Important among them is a study by J.C. Sandesara, which emphasises the need for a detailed inquiry for the cognate issues of capacity utilisation in Indian industries. These issues are specified as:

(i) What is the extent of capacity utilisation in Indian industries at present,

(ii) How has the degree of capacity utilisation been changing over-time.

Table 1
Number of Industries Classified According to Utilisation of Capacity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 25%</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>13</td>
<td>8</td>
<td>8</td>
<td>14</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>(18)</td>
<td>(10)</td>
<td>(7)</td>
<td>(20)</td>
<td>(10)</td>
<td>(10)</td>
<td>(18)</td>
<td>(16)</td>
<td>(6)</td>
</tr>
<tr>
<td>25% to 50%</td>
<td>9</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>25</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>50% to 75%</td>
<td>9</td>
<td>9</td>
<td>19</td>
<td>18</td>
<td>27</td>
<td>18</td>
<td>22</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>(27)</td>
<td>(22)</td>
<td>(34)</td>
<td>(28)</td>
<td>(31)</td>
<td>(23)</td>
<td>(27)</td>
<td>(26)</td>
<td>(31)</td>
</tr>
<tr>
<td>75% and above</td>
<td>10</td>
<td>12</td>
<td>16</td>
<td>14</td>
<td>19</td>
<td>29</td>
<td>19</td>
<td>20</td>
<td>27</td>
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<tr>
<td></td>
<td>(30)</td>
<td>(30)</td>
<td>(26)</td>
<td>(22)</td>
<td>(24)</td>
<td>(37)</td>
<td>(24)</td>
<td>(24)</td>
<td>(33)</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>41</td>
<td>57</td>
<td>65</td>
<td>79</td>
<td>78</td>
<td>80</td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Note: Figures in the brackets give percentage.

Source: C.N. Vakil and P.R. Brahmananda, Planning for an Expanding Economy, p. 23.
### Table 2

Average Rates of Utilisation of Installed Capacity and the Peak Output Utilisation Rates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1961-65</td>
<td>1966-68</td>
<td>1969-71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer goods</td>
<td>46.3</td>
<td>88.5</td>
<td>48.6</td>
<td>83.4</td>
<td>53.0</td>
<td>84.6</td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>64.3</td>
<td>89.2</td>
<td>60.9</td>
<td>83.6</td>
<td>61.2</td>
<td>78.5</td>
</tr>
<tr>
<td>Capital goods</td>
<td>57.6</td>
<td>83.0</td>
<td>42.3</td>
<td>65.3</td>
<td>42.8</td>
<td>59.1</td>
</tr>
<tr>
<td>All Industries</td>
<td>53.6</td>
<td>87.9</td>
<td>52.1</td>
<td>81.1</td>
<td>54.5</td>
<td>79.4</td>
</tr>
</tbody>
</table>

(iii) How and how far are the changes in utilisation correlated with changes in capacity itself.

Prof. Sandesara also reasons out the significance of these issues in the context of Indian conditions by arguing that India has made massive industrialisation since her second Five Year Plan as a Kingpin in her strategy for economic growth and industrial production evaluated in terms of rates of growth has made considerable strides since then. He further argues that these gains have not been achieved in an economical or efficient manner as necessary or required for a poor country. Among the important points mentioned in support of this point is one concerning capacity utilisation.

The need for studying capacity utilisation in Indian industries has also been emphasized by the Survey of Research in Economics by the Indian Council of Social Science Research (ICSSR). The problems of utilisation and underutilisation of capacity have received little attention in India compared to the problems of underemployment and employment though we have a scarcity of capital compared to labour. Many such studies have

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emphasised the utilisation of capacity in Indian industries either focusing on quantum of excess capacity or reasons for it or on both at a point of time. Many of them have studied the capacity under utilisation in the entire industrial structure or have examined some industry cases. The review of available literature on this subject has been discussed in the next chapter on concept and measurement of capacity. Here the interest is to pinpoint the fuller utilisation of capacity in Indian industries with reference to its relation with economic growth.

The models discussed in the proceeding section postulating the relationship between rate of capital utilisation and overall economic growth in underdeveloped countries showed that to enhance the overall economic growth in such countries (in a static model when capital stock remains fixed) three alternatives are there. One is to increase the proportion of saving in the economy i.e. the increase in "S" in the model \( g = h \cdot s \). Second is to increase capital productivity i.e. increase in "\( \alpha \)" and third is to raise the rate of utilisation i.e. increase in "\( h \)" in above model. Now the first two conditions rule out in Indian case as in case of other less developed countries, because, the rate of saving in
the economy can only be increased if the current consumption is forgone. But in India it is not possible to reduce consumption as it is already low. See the following table: 3

This fact is again supported by a poor growth of per capita income in India (compared to other developed and under developed countries) upon which per capita consumption depends. This is as follows: See Table 4.

These macro indicators show that the rate of growth of per capita income, hence the rate of growth of per capita consumption expenditure in India is very poor, therefore there is a very narrow possibility of increasing growth by increasing aggregate saving via; reducing current rate of consumption. The only way in this situation, (at least for a short period) is to increase the rate of capacity utilisation of the existing capacity or capital stock which is already underutilised as evidenced by the available studies.

It is possible to raise the overall economic growth by increasing agricultural and industrial production through increase in rate of utilisation. This of course may be applicable under the assumption that supply of inputs and not demand, is the major constraint in fuller capacity utilisation in Indian industries. If this assumption is valid then the reinforcing effects
### Table 3

Per Capita Private Final Consumption Expenditure
(at 1960-61 Prices)

<table>
<thead>
<tr>
<th>Year</th>
<th>Per Capita Expenditure (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-61</td>
<td>275.3</td>
</tr>
<tr>
<td>1961-62</td>
<td>270.2</td>
</tr>
<tr>
<td>1962-63</td>
<td>269.6</td>
</tr>
<tr>
<td>1963-64</td>
<td>271.4</td>
</tr>
<tr>
<td>1964-65</td>
<td>290.3</td>
</tr>
<tr>
<td>1965-66</td>
<td>277.1</td>
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<tr>
<td>1966-67</td>
<td>280.6</td>
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<tr>
<td>1967-68</td>
<td>292.8</td>
</tr>
<tr>
<td>1968-69</td>
<td>298.0</td>
</tr>
<tr>
<td>1969-70</td>
<td>301.5</td>
</tr>
<tr>
<td>1970-71</td>
<td>309.7</td>
</tr>
<tr>
<td>1971-72</td>
<td>307.3</td>
</tr>
<tr>
<td>1972-73</td>
<td>295.9</td>
</tr>
<tr>
<td>1973-74</td>
<td>303.4</td>
</tr>
</tbody>
</table>

### Table 1

Growth of Per Capita GNP in some Major Countries 1960-1975

<table>
<thead>
<tr>
<th>Country Rich Countries</th>
<th>Average Annual Growth Rate (%)</th>
<th>Country Middle Income Countries</th>
<th>Average Annual Growth (%)</th>
<th>Country Poor Countries</th>
<th>Average Annual Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>7.7</td>
<td>Iran</td>
<td>8.1</td>
<td>Pakistan</td>
<td>3.3</td>
</tr>
<tr>
<td>Spain</td>
<td>5.7</td>
<td>South Korea</td>
<td>7.1</td>
<td>Tanzania</td>
<td>3.0</td>
</tr>
<tr>
<td>France</td>
<td>4.2</td>
<td>China</td>
<td>5.2</td>
<td>Ethiopia</td>
<td>2.0</td>
</tr>
<tr>
<td>Poland</td>
<td>4.0</td>
<td>Thailand</td>
<td>4.6</td>
<td>Zambia</td>
<td>1.6</td>
</tr>
<tr>
<td>Italy</td>
<td>3.9</td>
<td>Brazil</td>
<td>4.3</td>
<td>India</td>
<td>1.3</td>
</tr>
<tr>
<td>USSR</td>
<td>3.8</td>
<td>Nigeria</td>
<td>3.4</td>
<td>Burma</td>
<td>0.7</td>
</tr>
<tr>
<td>Canada</td>
<td>3.6</td>
<td>Mexico</td>
<td>3.2</td>
<td>Nepal</td>
<td>0.3</td>
</tr>
<tr>
<td>West Germany</td>
<td>3.5</td>
<td>Philippines</td>
<td>2.5</td>
<td>Afghanistan</td>
<td>-0.2</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>2.5</td>
<td>Indonesia</td>
<td>2.4</td>
<td>Bangladesh</td>
<td>-0.6</td>
</tr>
<tr>
<td>U.K.</td>
<td>2.2</td>
<td>Egypt</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

due to more available inputs through better utilisation will increase aggregate output which may reduce prices which again may increase the real wages in the economy and ultimately become conducive to increase the aggregate saving rate. Thus the increase in utilisation rate i.e. in \( h \) does not only increase the growth rate but indirectly it also helps in increasing the other factors of growth such as saving rate in the economy. It is therefore apparent that there is scope to increase the growth of the Indian economy by utilising the available capital stock (i.e. in a short period of time) fully.

IV

The present study aims at examining the growth possibility of the Indian economy through fuller capacity utilisation during the period 1960 to 1973 for which necessary data were available. The following are the broad objectives of the study:

(i) to estimate the capacity and utilisation at industrial sectoral level during the observed period.

(ii) to work out the cost of underutilisation of capacity in the Indian industrial sectors in terms of loss of output, loss of employment opportunities and in terms of macro imbalance in the economy during the same period.
(iii) to study the reasons for the (i.e., during the period 1960 to 1973) excess capacity at an industry level and
(iv) to suggest some remedial policy measures in a short run policy frame. The analysis in this study with these objectives, has been framed in the following six chapters.

Scheme of Chapters:

Chapter I: The first chapter has been divided into three sections. The first section studies the relationship between capacity utilisation and economic growth, the second examines the place of capacity and its utilisation in economic theory and econometric model building and the third section introduces the problem of capacity utilisation in Indian industries by giving the historical background and tracing earlier studies. Also a brief outline of the study has been given.

Chapter II: The second chapter reviews the different concepts and measurements of capacity and the suitability of an approach for estimating capacity in Indian industries. Also an attempt has been made to evaluate capacity measurements for Indian Cotton Textile industry to provide a comparative view of different measurements of capacity.
Chapter III: The third chapter presents annual estimates of sectoral capacity output, utilisation and excess capacity from 1960 to 1973 by using peak-output approach and examines the trends in capacity output and utilisation in each of the sectors and groups of sectors for different plan periods and also for the entire period under consideration.

Chapter IV: The fourth chapter studies the implications of capacity utilisation, first, by examining the structural bottlenecks which might have stood in the way of excess capacity utilisation during the period under observation by using the open Leontief Input-Output model. Second by estimating loss of employment opportunities due to excess capacity in terms of absolute levels of employment and also by designating the key sectors in terms of employment potential on the basis of their value of employment elasticities with respect to capacity utilisation which have been worked out for each sector independently. The third section of this chapter studies the implications of excess capacity with reference to macro imbalance likely to be created in the economy through fuller utilisation by working out the additional demand particularly for wage goods which may be generated with fuller utilisation of excess capacity in each
sector. The last section discusses the foreign exchange implication of fuller utilisation by estimating the additional import bill, necessary to utilise excess capacity and additional export earnings generated with fuller utilisation in each of the sectors in the study.

Chapter V: Chapter five is based on a regression analysis studying the factors which explain the interindustry variation in capacity utilisation during the period under observation. The first section of this chapter formulates the hypothesis to be tested with reference to the assumed relationship between capacity utilisation and its determinants. The second section estimates the linear regression models for each of the sectors in the study and the third section summarises the results.

Chapter VI: Chapter six, the concluding chapter, discusses the policy conclusions which emerge from the entire analysis and attempts to give some guidelines to solve the problem of capacity utilisation in Indian industries on the basis of the results.
## Appendix

### Rates of Capacity Utilisation in Industries of India and Pakistan

<table>
<thead>
<tr>
<th>1. Cigarettes</th>
<th>% 2</th>
<th>19.86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Cotton Textiles</td>
<td>50.10</td>
<td>69.73</td>
</tr>
<tr>
<td>Cotton Textiles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Plywood &amp; Cork</td>
<td>76.90</td>
<td>24.07</td>
</tr>
<tr>
<td>Wood, Cork &amp; Furniture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Leather &amp; Leather Products</td>
<td>35.60</td>
<td>62.75</td>
</tr>
<tr>
<td>Leather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Washing and Cleaning Compounds</td>
<td>36.10</td>
<td>22.85</td>
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<tr>
<td>Soaps &amp; perfumes</td>
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<td></td>
</tr>
<tr>
<td>6. Matches</td>
<td>34.40</td>
<td>36.97</td>
</tr>
<tr>
<td>Matches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Paper and Paper Products</td>
<td>80.30</td>
<td>20.37</td>
</tr>
<tr>
<td>Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Rubber Products</td>
<td>48.90</td>
<td>18.97</td>
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<td>Rubber</td>
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<tr>
<td>9. Fertilisers</td>
<td>45.70</td>
<td>79.77</td>
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<tr>
<td>10. Petroleum Refinery Products</td>
<td>92.10</td>
<td>45.41</td>
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<tr>
<td>Petroleum</td>
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<tr>
<td>11. Non-metallic Mineral Products</td>
<td>33.00</td>
<td>42.52</td>
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<td>Non-Metallic Minerals</td>
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<td>12. Metal Products</td>
<td>42.60</td>
<td>19.48</td>
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<td>Metal Products</td>
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<tr>
<td>13. Other Transport Equipment</td>
<td>39.70</td>
<td>21.35</td>
</tr>
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<td>Transport</td>
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<td><strong>contd..</strong></td>
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</table>
Both these estimates of capacity utilisation in Indian and Pakistan industries are compared because they have been estimated by similar method of assumed shifts.

Sources:


Note: Both these estimates of capacity utilisation in Indian and Pakistan industries are compared because they have been estimated by similar method of assumed shifts.