

**CONTRIBUTION OF PROFESSOR AMARTYA SEN
IN THE CONTEXT OF DEVELOPING ECONOMY
LIKE INDIA***

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1. INTRODUCTION

I am grateful to The National Law University, Jodhpur and Professor N. L. Mitra, Vice-Chancellor of the University for giving me the privilege to deliver the Amartya Sen Lecture. Amartya Sen has been the role model for my generation of economists, and the subsequent ones in this country. He has been the symbol and face of the best that the Indian economists have been doing over half a century since independence.

Apart from being the role model for Indian economists, Sen has also been a great source of inspiration for economists in India. Because of his several stints of teaching in India, he is some one that many economists in India have had the benefit of interacting with and hence relating to. There are several economists in India who proudly proclaim to be Sen's students. I must confess that although Professor Sen left the Delhi School of Economics the year I joined my master's programme there, often when someone says that I have been a student of Sen, I remain quiet rather than offering a categorical contradiction.

Analyzing the contribution of Professor Amartya Sen in the context of a developing economy like India is a formidable task. For a part of his academic career, Sen has pursued the problems of

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collective choice and social welfare as well as some fundamental problems going deep into the philosophical foundations of economics. The scope of much of this work is broad enough to transcend the limits of developing and developed economies. However, starting from his early days, there has been a large portion of Sen's work that is almost custom-made for a developing country like India.

In fact, it has been argued by Majumdar (1998) that Sen's work had an underlying grand plan to study 'impurities' of one kind or another. Majumdar (1998) quotes Banerjee (1998), where he says:

His [Sen's] paper on 'Peasants and Dualism: With or Without Surplus Labour' showed that the decision problems faced by a peasant and even those faced by a peasant who has surplus labour (labour that seemingly should have been sold on the labour market but is not) can be analysed by using the standard tools of micro-economics and yield interesting insights. While this paper was important for its specific results, it was perhaps even more important for the 'space' it created for development economics within the rest of economics - it insisted that development economics does not need to be either completely disjoint from all of the rest of economics ('peasants are different: optimization theory does not apply to them') or completely subsumed by it ('peasants are just like any other entrepreneur'). As I see it, the great contribution of Amartya Sen to theoretical development economics has been the delineation of this space. He saw, perhaps before anybody else, the need for this space* and a way of defining it. In his work subsequent to the 1966 paper, he moved towards poverty as the lever that will allow him to extract such a space.

In this paper, I shall try and focus on a part of Sen's work that relates to choice of techniques and attempt to relate it to some contemporary problems in India. My focus on Choice of

Techniques, and not on say poverty and famines, does not reveal my preference ordering of the relative importance of these two topics in terms of either Sen's contributions in these two areas or their seriousness in the Indian economy. However, there is some historical significance of Choice of Techniques in the evolution of Sen's work in economics. As Bagchi (1998) has pointed out:

Sen's first professional contribution, to *the Economic Weekly (EW)*, appeared in the second half of 1956 [Sen 1956a] and he followed up with another article for the *EW* in the same year [Sen 1956b]. These maiden appearances in the *EW* at once provoked controversies, and Sen replied to his critics in his incisive style [Sen 1956c, 1956d, and 1956e]. He contributed four articles to the *EW* in 1957 (one of them in rebuttal of criticisms made by economists whose positions he had shown to be logically faulty). In the same year appeared his paper on the choice of techniques in the pages of the *Quarterly Journal of Economics* [Sen 1957], a paper which made him well known in the international community of economists—. In his very first appearance in the pages of *EW* (the direct predecessor of *EPW*), which was recognized as the journal par excellence, in which such issues were debated, Sen (1956a) tackled the problem of the choice of techniques, a subject on which he was to publish his first book [Sen 1960].

2. CHOICE OF TECHNIQUES - A SIMPLE MODEL

To relate the subject matter of Sen's "Choice of Techniques" to the present day India, consider for example the discussion about the feasibility of the average 8 per cent growth per year in the Tenth Plan. A critical component of the feasibility is the Incremental Capital-output Ratio [ICOR]. The Tenth Plan pegs the ICOR at 3.58 relative to 4.53 in the Ninth Plan, which together with an investment rate of 28.41 per cent of GDP - again higher than 24.23 per cent in the Ninth Plan - yields a growth rate of 8 per cent in the

Tenth Plan. Growth depends on how much investment we are going to have and how much extra income we are going to generate per unit of investment - the ICOR - a factor that critically depends on the technology that we are going to use.

Technology has been of considerable interest to the Indian economists for quite some time. For example, Prof. K.N.Raj, one of Sen's contemporaries, published a series of two influential articles entitled 'Small-Scale Industries: Problem of Technological Change' in the *EW* - predecessor of *the Economic and Political Weekly [EPW]* - in April, 1956. According to Raj:

The controversy regarding the policy to be adopted towards household and small-scale enterprises in the Second Plan has now gone on for over a year. In this controversy, there has been a tendency on the part of economists to take the view that the case for fostering such industries through protection depends primarily on humanitarian and political considerations. They seem to argue that on 'strict economic considerations' there is no case for such protection, and that where this policy involves preventing or regulating the introduction of improved technology (as in the standard issue of handlooms versus automatic looms), it is injurious to economic progress.' His main focus was change from cottage to factory production, and he drew attention to the necessity of subsidizing those who became jobless due to technological change. — Economic progress has been historically associated with improved technology, and so it seems logical to them that any policy which retards or slows down the pace of technological change is necessarily detrimental to development.

Raj pointed out the problems of dislocation and human misery associated with the displacement of labour from existing techniques, as well as the need for some protection, whether it involves direct subsidization or not, to those displaced by

technological change. Furthermore, he pointed out the need for clarity on the preferred objective of maximizing output and maximizing growth.

During 1955-57, Sen joined the debate and published a series of papers on the subject, which he consolidated in his classic book '*Choice of Techniques*'. This was his dissertation for a Prize Fellowship of Trinity College, subsequently submitted for a Ph. D. degree at Cambridge University and also published by Oxford University Press in 1960. Sen gave a full treatment of the problems involved in choosing the appropriate technology for the modern or advanced sector.

The choice of technique poses an associated choice problem between generating maximum employment today and maximizing growth. What is often lost sight of is that what ensures highest employment today; need not be the most growth enhancing strategy. Sen's *Choice of Technique* lucidly clarified how formulation of policies in a developing country with the problems of poverty and unemployment has to carefully balance the twin needs of generating income and employment for as many people as soon as possible, and of sustaining high growth. The choice of technology becomes an important issue in this context. While everyone in a developing country is all for technological advancement and bridging the technological divide between the 'advanced' west and a developing country, there is also the burning problem of generating as much employment as possible through the most labour-intensive techniques. Thus, simultaneously with the clamour for state- of- the- art technology, there is an emphasis on small-scale production, ban on labour-displacing technology, etc., particularly with defective telescopic psychology making future satisfaction mean less than present satisfaction in a poor developing economy.

2.1 The simple model

In Sen's formulation, there are two sectors of the economy: a pre-capitalistic family-based peasant economy - the backward (B) sector - with large-scale 'open' and/or disguised unemployment;

the other a state-owned 'advanced' (A) sector. Sector A has got two departments - I producing capital goods, and II producing corn, the only consumer good, which is also produced by sector B. The choice is between techniques L and H - low and high capital-intensive technologies. Capital intensity is defined as the number of man-years required in department I to make sufficient fixed capital to employ one man fully in department II.

The symbols used are as follows:

w = real wage per labourer per period;

a = capital intensity;

P_c = productivity per labourer per period in corn production in department II of sector A;

L_t = number of labourers employed in department I;

L_c = number of labourers employed in department II;

C = total corn production in sector A;

W_c = total wages bill in department II, sector A; and

N = surplus of corn production over wages bill ($C - W_c$) in department II, sector A.

For any variable, primed and unprimed notations are used for H and L, respectively, and numerical suffixes are used for denoting periods. If the capital intensities are a and a' for L and H, and w is the wage rate, then S amount of corn extracted from sector B can employ

$$A - Ir = S$$

in department I in the initial period. This, in turn, generates

$$L_c = \frac{S}{a}$$

of employment in department II in period 1, when technology L is used, and

$$L_c = \frac{P_c}{w} \frac{S}{a}$$

of corn, where P_c is the productivity per labourer in department I with technique L. Similarly, for technique H,

$$C'' - T' - P' - \frac{c p'}{\epsilon}$$

Technique L gives a larger, equal or smaller volume of corn output than technique H in the first period depending on whether

$$\begin{matrix} P & K \\ a & a' \\ P_c & a \end{matrix}$$

(Condition 1)

It does not, however, follow that the technique which gives a larger product in the first period must of necessity give a larger product also in later periods. This is because different amounts are reinvested under different techniques. The surplus of corn available after payment of wages - which are fully consumed - under techniques L and H are given by

$$w.a$$

and

$$w.a$$

Technique L gives a larger, equal or smaller rate of surplus than does technique H, depending upon whether

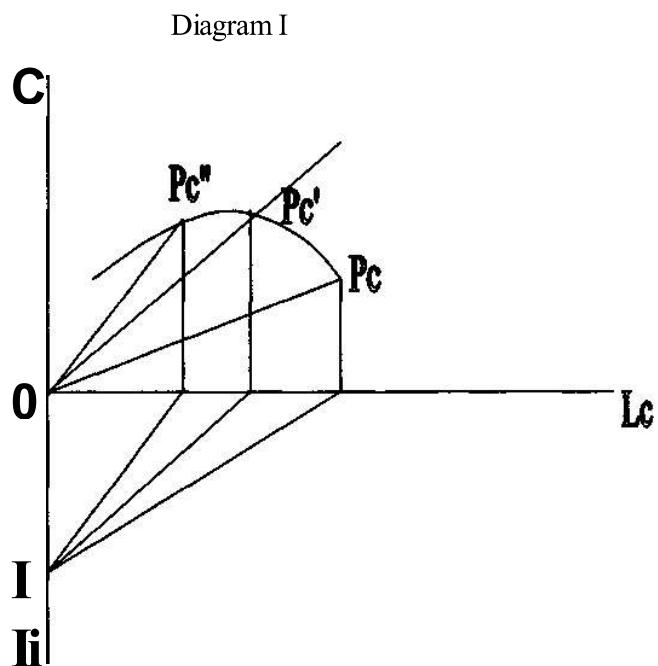
$$\frac{P_c - w}{a} > \text{or} < \frac{P'_c - w}{a}$$

or

$$\frac{P_c - w}{F_c - w} > \text{or} < \frac{a}{a'}$$

(Condition 2)

According to the standard Harrod-Domar condition, maximization of surplus (N) per unit of investment (S) leads to the maximum rate of growth. The difference between Conditions 1 and 2 starkly brings out the difference between the strategies for maximizing output or employment today and maximizing growth and hence output and employment over the medium to long run.

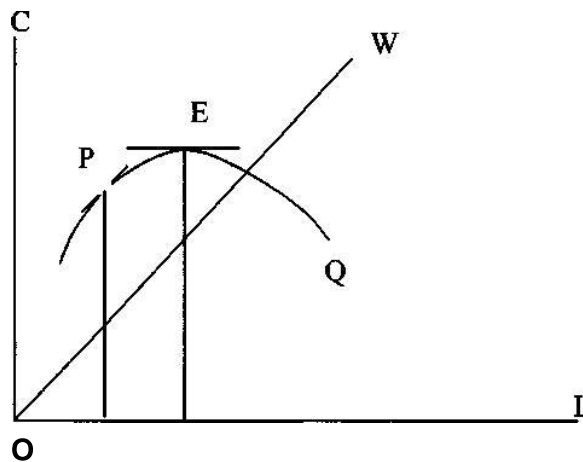


Showing employment in Department I on the southern axis, S amount of corn allows a fixed number of labourers, say I (where $S = w.I$) to be employed in Department I. Employment created in Department II by OI of real investment in Department I depends on the capital intensity a . Considering three alternative capital intensities denoted by the tangents of the angles OL_cI , OL_cI' , and OL_cI'' , respectively, and three alternative productivity of labour associated with them - given by P_cOL_c , $P_c'OL_c$, and $P_c''OL_c$, we can trace out the corn output under the three technologies. If we have many alternative technologies, we get a curve Q representing the relationship between employment in Department II and output of corn governed by technological possibilities.

If we draw the curve Q representing the relationship between employment in department II and the output of corn governed by technological possibilities, and the line W_c representing the wage bill corresponding to the levels of employment in department II, then E represents the point of maximum output which corresponds to Condition I, and P is the point of maximum surplus of corn production over corn consumption, which corresponds to Condition II.

If the future is as important as the present then P is preferable to E . Given sufficient time, a higher growth gives us more consumption goods, even if it gives us a much smaller output of consumption goods at present.

Diagram 2



Professor Francis Bator, in an influential article in the *Quarterly Journal of Economics* in 1957, had claimed that there is no conflict between maximizing present output and maximizing the growth rate. Sen points out that this is the result of his assumption that 'the rate of saving is independent of the (as if) market imputed distribution of income.' Furthermore, Sen doubted whether the implicit assumption that the real wage rate can be varied in whatever way we like, or the taxation system can give us any rate of saving, is correct.

2.2 Application to cotton weaving

In one of the appendices to the book, Sen considered the five technological possibilities: the fly-shuttle handloom (Rs. 30-50), the 'Banaras' semi-automatic hand loom (Rs. 200), the small-scale cottage power loom (Rs. 1,500), the non-automatic factory power loom (Rs. 4,000), and automatic power loom (Rs. 10,000). The fixed capital cost per loom under the different technologies is given in parentheses. By assuming one shift in the first three and two shifts in the last two technologies, and output per loom of 6, 20, 30, 80, and 80, respectively, and Rs. 0.25 (4 annas) per yard as the value of cloth per yard, Sen calculated the output to fixed capital ratio as 9.0, 7.5, 1.5, 1.5 and 0.6 for the five technologies. In terms of capital-output ratio, clearly the fly-shuttle handloom dominated the other four technologies.

Assuming labour per loom per shift to be 1, 1, 1, $\frac{1}{4}$, and $\frac{1}{16}$ for the five technologies, and the same wage rate for all the technologies, Sen showed that Banaras automatic handloom leads to a higher rate of surplus than the other four when the wage rate is below Rs. 5 per day, while non-automatic power loom is the most surplus yielding when the wage rate is between Rs. 5 and Rs. 12 per day. At a wage of Rs. 13 or above per day, the automatic power loom yielded the highest rate of surplus.

Sen with his characteristic lucidness brings in here the issue of technological change in the Indian cotton textile industry discussed by Prof. K. N. Raj. The question raised by Raj is how to subsidize those who become jobless due to technological change. Raj suggested the inclusion of cost of maintaining the displaced labour force as a part of the total cost and this makes his criterion less favourable to mechanized techniques than the surplus criterion proper.

2.3 Application to Ambar Charkha

In a separate appendix, Sen also examined the Ambar Charkha - an improved version of the hand spinning wheel consisting of a carding unit, a 'belni' and a spinning frame - as a technique of

cotton spinning. The case for its use had been championed by the All India Khadi and Village Industries Board and it had won the favour of Government of India. Assuming the output per Ambar Charkha per worker per day to be 6 hanks or 1/3 lb of yarn, value added per lb. of yarn to be 6 annas and 6 pies, two workers using the Charkha simultaneously for 300 days in a year, and maintenance and depreciation cost of the Charkha at Rs. 20 per year, Sen calculated the value added per Charkha to be Rs. 61 and 4 annas. With the cost of an Ambar Charkha at Rs. 100, the output to capital ratio turned out to be a very favourable 0.61. However. Sen also calculated that there was recurring deficit of Rs. 276 and 4 annas per Charkha, when the value added per year was adjusted for the wage cost of two workers at 9 annas per day. Sen calculated that there is a deficit as long as the wage is more than 1 anna and 8 pies per day per worker!

3. CHOICE OF TECHNIQUES - MULTIPLE GOODS AND EXTERNAL TRADE

Sen takes up various extensions of his simple model by introducing diminishing returns to scale, technological change, depreciation, varying gestation lags of different techniques, level of wage as well as efficiency wage, to show that the essential nature of the problem remains the same. Sen also points out the problem of choice involving time, and distributional aspects. Two of the extensions, however, merit special attention.

3.1 Capital goods to produce capital goods

Sen takes up the case of capital goods to produce capital goods and hence choice of capital-intensity for the capital goods sector, and shows that the choice of capital-intensity of the capital goods sector depends on the choice of capital-intensity of the consumer goods sector. As Sen concludes, "For a satisfactory solution of the problem of the choice of capital intensity in one sector we must bring the rest of the economy into the picture" (p. 48). This is an important conclusion that we shall revisit later.

3.2 External trade

In Sen's inimitable words:

— [T]he problem of technological choice for an underdeveloped economy cannot be discussed very meaningfully without bringing in international trade. This is because the underdeveloped countries, almost without exception, are characterized by the lack of a capital goods sector and in order to exploit modern technology they must import capital goods from abroad. Even to initiate a capital goods sector some import of machinery-to-make machinery is essential, unless of course the economy decides to reenact the long drama of industrial revolution scene by scene, (p. 68).

Going back to the old and simple model, let us assume technique L use machinery that can be produced with unassisted labour, while a part of the machinery for technique H is imported from abroad with the other part made in the economy by a' number of people employed for a year in department I. The original world market price of the foreign part is f and the original quantity imported is l_M . The economy pays for its imports by exporting corn, and g is the original world market price of corn. When more corn is exported to pay for higher amounts $(l_M + AI_M)$ of the imported part of the machinery for technique H, g may fall and f may rise. By how much g and f will change will depend on the arc elasticities of the foreign demand curve for corn and foreign supply curve for the imported part of the machinery under technique H. M , the extra payment for the imported part of the machinery is

$$M = (f + Af)(l_M + AI_M) - fl_{Ki}$$

which yields

$$M = \frac{1}{1 + \frac{A}{V_M + M_{MJ}} \left(\frac{\Delta f}{f} \right)}$$

where e is the arc elasticity of foreign supply of machinery purchased from abroad. Thus,

$$A_T = f \frac{M}{1 + 1}$$

Similarly, with more corn exported, the price of corn in international markets will decline, and with g , and X_c denoting the

original price and quantity of corn, for balancing external payments, we must have

$$AX_c g = \frac{7}{1 -}$$

where r_j is the arc elasticity of foreign demand for corn. Putting $AI_M = 1$, we get the quantity of corn that has to be exported to buy the 'foreign' part of a technique H machinery as

$$AX_c = \frac{1}{g} \frac{1 + -}{1 -}$$

Along with this, $(a'w)$ amount of corn must be spent in the home economy to produce the 'home' part of the technique H machine. Thus, the rate of surplus per unit of corn-investment in technique H is

$$n = \frac{1}{g \left(\frac{1}{1 + e} + a'w \right)}$$

In the case of technique L, the rate of surplus per unit of corn-investment is the same as before, that is

$$n = - \frac{P - w}{aw}$$

Assuming the same gestation lag for both the techniques, technique H gives more, equal or less surplus than technique L according as

$$r_i >, = \text{ or } < n,$$

that is

$$\frac{P' - w}{a'} >, = \text{ or } < \frac{P - w}{a} \quad \left| \quad \frac{1 + \frac{P - w}{awg}}{1 - \frac{P - w}{awg}} \right|$$

(Condition 1) In the limiting case of perfect elasticities, i.e. when $e = T = \infty$, we have

$$\frac{P' - w}{a'} >, = \text{ or } < \frac{P - w}{a} \quad \left| \quad \frac{1 + \frac{P - w}{awg}}{1 - \frac{P - w}{awg}} \right|$$

(Condition 2)

Similarly, technique H gives larger, equal or smaller immediate output than technique L depending on whether

$$a$$

$$\frac{K}{a'} >, = \text{ or } < \frac{K}{a} \quad \left| \quad \frac{1 + \frac{P - w}{awg}}{1 - \frac{P - w}{awg}} \right|$$

(Condition 3)

In case of perfect elasticities, this condition reduces to

$$\frac{K}{a'} >, = \text{ or } < \frac{K}{a} \quad \left| \quad \frac{1 + \frac{P - w}{awg}}{1 - \frac{P - w}{awg}} \right|$$

(Condition 4)

Sen pointed out that the lower the elasticity of foreign demand for our exports, and of foreign supply of machinery, the lower, ceteris paribus, should be the degree of capital-intensity chosen, assuming that a higher degree of capital intensity goes with higher import content in production.

4. CHOICE OF TECHNIQUE IN INDIA

Choice of technique has been a matter of considerable interest in India. The Incremental Capital Output Ratio (ICOR), has been monitored closely. One of the objectives of policy under plans has been to maximize output, and given a fixed amount of investment, output is maximized with the reference to Sen's Choice of Techniques.

4.1 Change in ICOR

The ICOR has fluctuated widely over the plans. For example, the ICOR, which from 3.9 in the Seventh Plan (1985-1990) had decreased to 3.43 in the Eighth Plan (1992-1997), increased to 4.53 in the Ninth Plan (1997-2002) and is targeted to decline again to 3.58 in the Tenth Plan (2002-2007). There are two primary reasons for the variations in the ICOR. First, is the variation in the sectoral composition of growth, and second, the variation in the sectoral ICORs. For example, while the growth rate of manufacturing declined by a factor of almost three from 9.77 to 3.68 per cent between the Eighth and the Ninth plans, the ICOR in manufacturing increased almost three-fold from 6.67 to 18.37.

The aggregate ICOR needs to be analysed together with the changing composition of demand, and sectoral variations in ICORs.

4.2 Choice of technique in the public sector

The performance of public sector savings may reveal some disturbing trends in the choice of techniques. As the *Economic Survey 2002-03* indicates:

The Public Sector not only continued to be a net dissaver, but it increased its dissavings by nearly Rs. 10,000 crore. The departmental enterprises became net dissaveers in 2001-02. the increased savings by non-departmental enterprises were more

than neutralized by the increased net dissavings of government administration, (p.8)

Irrespective of the fact that the Government, through its choice of techniques, has been maximizing 'output', it is clear that even the departmental and non-departmental enterprises have not been maximizing surplus. While surplus maximization alone cannot be the objective of a government, the present fiscal situation with large revenue deficits and the large wages and salaries bill of the consolidated government relative to its revenues indicate the need for a change of course of action.

The Economic Survey (p.41) points out that the revenue deficit as a proportion of gross domestic product (GDP), after rising from 4.2 per cent in 1990-91 to 6.4 per cent in 1998-99, has risen further to 6.6 per cent in 2001-02 (RE). The fiscal space for augmenting capital expenditure without compromising fiscal sustainability is narrow and consolidation is essential for establishing the foundations for sustained robust growth. This is where the choice of techniques becomes relevant. Finances of both the Central and State Governments have been severely affected by the implementation of the Fifth Central Pay Commission's' recommendations. Given the higher wage rate for government employees it is necessary to rapidly change our choice of technique for producing public goods and services. The emphasis, of late, of looking at Government more as a provider of public goods and services rather than a provider of maximum direct employment necessitates such a change in approach.

4.3 Choice of technique in the private sector

Sen's choice of technique was for the state-owned advanced sector. The choice of techniques for the private sector is quite different from the government. While the government can choose the appropriate techniques on the basis of its social welfare maximization, the private sector is motivated more by profit than anything else. The private sector chooses its techniques to maximize surplus or profit. The critical question is how to ensure the appropriate choice of techniques by the private sector.

The instrumentalities for affecting the choice of techniques by the private sector can be broken up into two parts. First, is the market-based technique such as taxes and subsidies, for example payroll taxes or capital allowances, or customs and excise duties on capital goods? Second is the direct intervention in terms of permits and industrial licenses. With the dismantling of licensing with industrial deregulation under the reforms, what has remained as a direct instrument for influencing private sector choice of techniques is the reservation policy for the small sector.

5. SMALL SCALE RESERVATION POLICY

I now want to draw some conclusions regarding the issue of choice of techniques, especially with reference to small-scale industries (SSI) reservation policy, with reference to Sen's Choice of Techniques. Sen's Choice of Techniques remains extremely relevant in the context of the reservation of products for exclusive manufacture in the small-scale sector, an important policy pursued since 1967.

5.1 Historical background

The policy for reservation of items for manufacture in the SSI sector was introduced in 1967 with the objective to tap the untapped skills, generate employment and to fulfill the basic aim of socio-economic development through proper dispersal of industry in industrially backward areas and creation of self-venture activities. Reservation got proper statutory backing in 1984 through amendment in Industries (Development and Regulation) Act, 1951, which provided for the creation of an Advisory Committee and also punishment for violation of the reservation policy.

The small-scale sector is defined under the Industries (Development and Regulation) Act, 1951 in terms of original value of investment up to a particular limit. Policies for small-scale enterprises (SSEs) in power looms, handlooms, sericulture and handicrafts are administered by the Ministry of Textiles, and in khadi and village industries and in coir fibre by Ministry of Agro

and Rural Industries. Policies for other SSEs are administered by the Ministry of Small Scale Industries. Thus, in practice, the SSI sector serves as a residual sector in the sense that all units that fall within a prescribed investment limit and are not recognized in a particular sub-sector are included in it. SSIs, power looms, handlooms, sericulture, handicrafts, khadi and village industries and coir fibre units are called village and small industries (VSI) by the Planning Commission with effect from December 24, 1999. SSIs and power looms are known as the modern segment of VSI, while handlooms, sericulture, handicrafts, khadi and village industries and coir fibre are known as traditional industries.

Between 1950 and 1960, SSIs were defined as units with original value of investment in fixed assets up to Rs. 5 lakh and employing less than 50 persons with power or less than 100 persons without power. From 1960, the condition on employment was withdrawn. The investment limit was related to only plant and machinery rather than fixed assets from 1966. The limit of investment in plant and machinery was progressively increased to Rs. 7.5 lakh in 1966, Rs. 10 lakh in 1975, Rs. 20 lakh in 1980, Rs. 35 lakh in 1985, Rs. 60 lakh in 1991, and Rs. 3 crore in 1997. While the general limit was rolled back to Rs. 1 crore from 1999, with effect from October 2001, the investment ceiling in respect of 41 items covering two broad groups of hosiery and hand tools was enhanced to Rs. 5 crore.

The definition of SSI in India is somewhat at variance with the general international practice. As noted by Small Industrial Development Bank of India (SIDBI), 2000 at the international level, the general practice for determining the size of a unit for the purposes of classifying it as an SSE, is to define it in terms of the number of employees followed by asset size. For example, Australia, Canada, Denmark, France, Germany, Greece, Indonesia, Ireland, Italy, Korea, the Netherlands, Spain, Sweden, Thailand, USA, and Vietnam define it in terms of employees alone. On the other hand, Belgium, China, Japan, Malaysia, Mexico, the Philippines, Portugal, and Taiwan define it in terms of number of employees followed by asset size. Only, Singapore, like India, defines SSEs for manufacturing in terms of asset size alone.

Three relaxations were allowed in SSI reservation over time. *First*, from 1984, a non-SSI unit was allowed to manufacture the reserved item subject to the condition that it undertakes to export 50 per cent of its production. *Second*, in case of such small units which have been manufacturing the items and attained natural growth, a provision of Carry on Business (COB), wherein the production of reserved item is pegged to the maximum of last three years of production, has been allowed since 1984. *Third*, to provide marketing back up to the small and tiny units manufacturing products reserved for manufacture in the SSI sector, trading through big companies has been allowed ever since 1967. Large companies can obtain the products from small units and use their brand name to sale them.

Initially, in 1967, only 47 items were reserved for manufacture in the SSI sector. The list, primarily because of enlargement by 73 on February 24, 1971, by 53 on February 26, 1974, and 324 on April 26, 1978, got enlarged to 504 by 1978. The recast of the list into NIC codes in 1978 converted the number of items from 504 to 807. After a rapid increase in the list of reserved items in the 1970s, further increases in the list of items were limited in the first half of the 1980s. While some items were added to the reserved list - particularly by 27 on December 30, 1978, and 35 on October 19, 1982-some items were dereserved as well - particularly by 13 on August 3, 1981. On September 3, 1983, the number of items in the reserved list reached its peak at 873.

An analysis of the 836 reserved items in December 1996 showed the number of such reserved items to be 1,045 items at the 9-digit product code level. Furthermore, as many as 325 of the items (31.1 per cent) belonged to chemical and chemical products, 138 (13.2 per cent) to metal products, 107 (10.3 per cent) to transport equipment and parts, and 112 (10.7 per cent) to rubber and plastic products. The combined share of items from these four industries in the reserved list was as much as 65.3 per cent.

A trend toward dereservation was observed after 1984. The gradual trend of de-reservation of items from the SSI sector was maintained during the 1990s, and as on date the list has come

down to 749. The list is likely to be further reduced because of the announcement made in the Union Budget 2003-04. Budget 2003-04 envisages de-reservation of 75 items from laboratory chemicals and reagents, leather and leather products, plastic products, chemical products and paper products. All additions & deletions in the reservation list are subject to the recommendation of the Advisory Committee. It has also been a conscious policy of the Government to interact with the stakeholders of the respective trades/items before submitting a comprehensive proposal for consideration of the Advisory Committee. The Advisory Committee has met 22 times so far.

To review the impact of the Reservation Policy, the policy has time and again been considered by different Committees like Bhat Committee (1972), Vijay Raghavan Committee (1995) and Abid Hussain Committee (1997).

5.2 Analytical underpinnings

The definition of SSI in terms of investment in plant and machinery does not automatically guarantee a high labour-intensity of production. Given that one of the important objectives of reservation is employment generation, this objective is achieved only if 'small' enterprises are more labour intensive. But going back to Sen's critical distinction between maximum labour-capital ratio criterion and maximum surplus-to-capital ratio criterion, even if 'small' enterprises generate maximum employment per unit of investment in the short run, they may not generate the maximum surplus per unit of investment. If internal resources are important for further growth, then maximum labour-capital ratio, while ensuring maximum employment generation in the short run, will not ensure maximum employment generation in the medium to long run. Furthermore, even if SSEs generate maximum surplus per unit of investment, such surplus cannot be reinvested in the enterprise once the specified investment limit is reached.

On the question of optimal capital-labour ratio and SSI reservation, according to the Abid Hussain Committee (1997):

There is no evidence to suggest that any detailed information was collected about the spectrum of production techniques used in the different product lines to determine if the 'optimal' capital-labour ratio in the reserved product line was indeed below the declared limit. A more fundamental point is that this type of information is impossible to collect even for an all-seeing computerized super machine with access to an infinite array of reliable input-output data. In a changing vibrant economy, production techniques are constantly evolving, often due to small changes made by enterprising entrepreneurs to their basic blueprint and the list of blues gets even more complicated and longer.

According to the Committee:

The last point suggests a reason why we have no explanation in official documents anywhere how the list of reserved items has been selected, and on what basis additional items have been added. The changes over time give the impression that the choice of products was somewhat arbitrary. Eighty per cent of the reserved items are concentrated in 11 three-digit NIC categories. The remainder are spread over 90 three-digit categories. This heavy concentration of policy incidence, together with a long tail demonstrates, to some extent, successful lobbying for reservation by special interest groups. In the absence of a well-defined and rational criterion for product selection - which, we have suggested, is impossible in practice - the scope for such action remains large, and its potential for welfare loss to the consumers and the economy increases commensurably.

The Committee also noted:

The concentration of reserved items in a narrow group of three digit industries suggests that an attempt might have been made to pick up the most promising sectors. There is no evidence of this, or if these sectors are particularly labour intensive. But two specific points might be made in this context to complement the general point made above about the near impossibility of selecting product lines on the basis of optimal labour intensity. These refer to the distinction between labour intensive enterprises and labour intensive industries, and the variations in product quality within the same product line.

Furthermore, the Committee states:

Small enterprises are generally more labour intensive than large ones, especially if size is defined in terms of fixed investment rather than employment. But it does not mean that they are concentrated in industries where the mean capital-labour ratio is particularly low. SSEs are found in most industries. There is no reason that in any economy the number employed (or the proportion of total output or investment) in SSEs would be larger in those industries which have a less than average capital-labour ratio than in those in which the ratio is above the average. This is because there is a spectrum of techniques within each industry, and enterprises of different sizes and capital intensities will be found in most of them.

5.3 SSI reservation in a multi-commodity economy

We may recall that, according to Sen, "For a satisfactory solution of the problem of the choice of capital intensity in one sector we must bring the rest of the economy into the picture". As Sen points

out, the root of the problem lies in the fact that while the worker produces one or a few goods, she spends her income on a number of goods. Thus the surplus created in a particular industry can be measured only when the relative prices are known. But the relative prices themselves will depend on the capital-intensities chosen for the other sectors. The problem is compounded when the output of the sector in question is used as inputs in other sectors. Thus, what is needed is a general equilibrium approach, and this is perhaps what the Abid Hussain Committee means when it says "A more fundamental point is that this type of information is impossible to collect even for an all-seeing computerized super machine with access to an infinite array of reliable input-output data."

5.4 SSI reservation with external trade

The historical genesis of reservation, like much of our other policies, is related to what may be termed as "elasticity pessimism". As we have seen above, according to Sen, the lower the elasticity of foreign demand for our exports, and of foreign supply of machinery, the lower, *ceteris paribus*, should be the degree of capital-intensity chosen, assuming that a higher degree of capital intensity goes with higher import content in production. From 1956 onwards, the country had endured serious foreign exchange constraints, and the share of India in global trade had continuously declined until the mid-1980s. This led to the belief that the elasticities of foreign demand for our exports and of foreign supply of machinery were low.

The dynamism of Indian exports observed since the mid 1980s, together with the strength of the balance of payments as reflected in the comfortable foreign exchange reserves of over \$ 70 billion, equivalent to more than a year's imports, necessitates a review of the reservation issue.

The policy of reservation has attracted some attention because of the opening up of imports. As noted by Montek Singh Ahluwalia Committee (2001):

— [T]he opening up to imports has made continuation of reservation an unsustainable option. With the lifting of quantitative restrictions (QRs) on imports on 1st April, 2001, a large number of consumer items which are currently reserved products have become freely importable, subject only to tariffs. While tariff rates for many of these items, especially consumer goods, are relatively high, it has been announced that within 3 years we will move to a peak tariff level of 20%. This means that imports produced abroad in economic scale units will be able to compete with Indian SSI producers in the domestic market with relatively modest tariff protection, but Indian producers will not be allowed to increase investment beyond the specified SSI ceiling level in order to become more competitive. With preferential access allowed for some SAARC countries (e.g. Sri Lanka and Nepal), producers located in these countries will be able to access our markets with zero or low tariffs. Continuing with reservation in this environment is completely illogical. It will only tempt Indian entrepreneurs to set up production facilities in neighbouring countries and import products from these locations rather than produce and generate employment at home, a trend that is already in evidence. (Para 4.32).

It is important to emphasise that even if QRs on imports had continued, the product manufactured domestically in SSI units could not have competed with the same product manufactured abroad in economic scale units, and precious export opportunities would have been lost. The permission to non-SSI units to manufacture the reserved item subject to the condition that it undertakes to export 50 percent of its production eased the constraint to some extent, but again, as noted by the Montek Singh Ahluwalia Task Force (2001):

It is now generally recognized that the policy of imposing a limit on investment in areas which have export potential has prevented India from exploiting world markets in many areas. China's dramatic success in exporting relatively simple [products such as standardized garments. Shoes, toys, etc. achieving export levels that are 40 to 80 times higher than India is well known. One major reason for China's success is that they are able to engage in large-scale production and achieve levels of quality and technology which is not possible with constraints on investment. The consequence has been a tremendous growth in income and employment in China. India could have reaped similar benefits if Indian producers had been allowed to produce on a competitive scale and received the support to achieve export orientation. (Para 4.31):

6. SOME CONCLUDING REMARKS

I have an uneasy feeling, as I have had throughout while writing this paper, that I have focused on a very narrow aspect of Sen's work. Sen has covered a wide spectrum of economics. He has initiated concepts such as rational fool, emphasized the problems of exchange entitlements, poverty and famines, and freedom, and has been one of the main architects of such fundamental concepts such as the human development index. I am tempted to quote him from his 1985 Tanner lectures:

There are many fundamentally different ways of seeing the quality of living, and quite a few of them have some immediate plausibility. You could be well off, without being well. You could be well, without being able to lead the life you wanted. You could have got the life you wanted, without being happy. You could be happy, without having much freedom. You could have a good deal of freedom, without achieving much. We can go on.

I have focused on choice of techniques, with a profound emphasis on maximizing growth. I hope this will not be construed as too narrow a view of Sen. The only defence that I have is that I have dealt with what Sen tried to tell us right at the beginning of his brilliant innings in Economics, and no matter what the other policies, appropriating choice of techniques will continue to be relevant as enabling mechanism for the pursuit of other policies.

As we have seen, the policy of reservation for SSI as has been pursued for more than thirty-five years is difficult to support on theoretical or empirical grounds. The question that remains is what is the way forward. The SSEs are critical for economic development: they provide the cradle that nurtures big businesses and billionaires of tomorrow, they choose the appropriate product designs and techniques—be it labour—or capital-intensive, and they have the flexible management capacities to respond to the fast changing market conditions.

The Abid Hussain Committee (1997) has recommended:

—[T]he policy of protection be replaced by promotion as the cornerstone of future policy. Adequate supply of credit, services, technology assistance, infrastructure and low transaction costs are the hallmarks of the proposed strategy for the promotion of SSEs. This can be achieved by developing a variety of linkages between enterprises and their support institutions, partnerships between the private sector and the government, greater information flows and by streamlining the legal and institutional framework.

The Committee recommended a cluster approach for setting up support systems. According to the Committee:

— [T]he state governments identify the existing SSE clusters and then promote new types of organizations which are joint ventures between the

state governments or the local authorities and business associations in these clusters.

The ongoing experiment in Tirupur, where a joint venture with the local textile manufactures' associations, is trying to solve the water supply and sewage disposal problem in the Coimbatore district of Tamil Nadu provides important pointers in this direction.

So what should be done with SSI reservation? The S.P. Gupta Study Group (2001), after taking into consideration the present global scenario, including the WTO regime, removal of quantitative restrictions, competition from cheap imports, and adoption of international standards, has recommended that:

- Reservation of products may continue for the present and the position may be reviewed from time to time;
- Dereservation of some selected export thrust items could be considered; and
- Investment ceiling of some identified items which are important from the export perspective could be raised to Rs. 5 crore.

The Montek Singh Ahluwalia Task Force, however, has recommended a more aggressive four year schedule for dereservation:

- All items with identified export potential should be dereserved immediately; and
- All other existing reserved items should be classified into two categories: a first category with a ceiling of Rs. 5 crore for whom reservation would end after two years, and a second category with a ceiling of Rs. 3 crore which move into the first category in two years.

What is important to note in this context is that, until; 1997, the reserved items accounted for about 12 per cent of the items produced in the small-sector. At present the proportion is less than 8.4 per cent with only 674 items on the reserved list and more than 8,000 items produced by the small-scale sector. During the last five

years, many items, such as readymade garments, leather shoes, toys, rice milling and dal milling, biscuits, ice cream, some auto components, some agricultural implements, which are important in terms of output, employment and number of units producing such goods, have been dereserved. As a result, the share of the reserved items in total production of the small-sector, which was 28 per cent in 1997, has come down to about 15 per cent.

There appears to be a broad consensus on progress on dereservation. The disagreement appears to be on the dismantling schedule. This brings us to the realm of political economy and an old question that K.N. Raj had raised in the context of the Indian cotton textile industry: how to subsidize those who become jobless due to dereservation. How many, if at all, will lose their livelihood because of dereservation is a matter of empirical investigation. As Sen had pointed out this could be incorporated in the choice of technique exercise by including the cost of maintaining the displaced labour force as a part of the total cost. When we do that, this could make immediate and rapid dereservation less attractive than a more gradual approach, but all this is a matter of empirical investigation. In this context, it is important to note that a 2002 evaluation of the impact of dereservation of 15 items in April 1997 such as ice cream, vinegar, rice and dal milling, biscuits, synthetic syrups and auto components, revealed an improvement in quality and no output or employment losses.

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