

A Normative Index of Industrial Production

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A normative index of industrial production can be constructed with a notional set of weights based on a desired or planned pattern of output. The difference between the planned and the current outputs will then give the increases in the production of different goods that are desired; and given a set of prices, weights in terms of value of output or value added can be derived. The index so calculated will permit the comparison of the actual growth of output with the target rate of growth. The present official index is useless in the context of judging the fulfilment of Plan targets.

An attempt is made here to calculate a normative index of industrial production. As compared with the official index, the normative index gives higher weights to industries for which a higher rate of growth is planned. Almost consistently it shows under-achievement of Plan targets. But the under-achievement is far less than the official index would suggest.

AN index of industrial production reflects the change in industrial production over a period and must, therefore, be a weighted average of changes in the output of particular industry. By taking an average, one expresses information about a number of magnitudes in terms of a single quantity and thereby inevitably loses a lot of information contained in the original figures. The information lost will be insignificant if the output of all industries changes at the same rate; in this case, the general index will accurately portray the output changes in each industry. The more dissimilar the proportional changes in the output of different industries, the greater will be the information lost in the general index.

Hence a general index is an unsatisfactory source of information wherever there are systematic changes in the

structure of industry. This is reflected in the fact that the Laspeyres indices that are calculated officially become "unrepresentative" within a few years and a change in weights is required. However, the unrepresentativeness has nothing to do with particular weights; it would remain whether the index used base-year weights, current-year weights, chain weights or any combination of them.

It might be thought that a chain index would take adequate care of structural change by incorporating a frequent change in weights. But movements in a chain index owe partly to changes in production and partly to changes in structure, and there is no unequivocal way of defining the latter. A forward-looking chain index, i.e., one which uses weights of the preceding year, will give different results from a

backward-looking one; if it uses the average value of output over a period as weights, a change in the length of the period will yield a different index. And where changes in industrial structure are persistent, different chain indices will give different trends. In these circumstances it is difficult to say what exactly a chain index is measuring.

A stable set of weights can in some cases be derived by classifying commodities into groups of substitutes. If rates of substitution can be established between competing commodities on the basis of their relative efficacy in use, a single index of their outputs can be derived by weighting them in proportion to the rates of substitution. If changes in relative outputs are primarily due to substitution, it may turn out that the relative outputs of groups of substitutes are fairly stable and a re-

Table 1: Index of Industrial Production

(1965 output = 100)

	Weights		Indices				
	Official	Normative	1961	1962	1963	1964	April 1965 ¹
Mining and quarrying	7.47	9.58	147.3	161.5	175.9	169.1	187.2
Food manufactures	13.99	2.77	129.3	127.4	122.3	135.6	148.1
Tobacco manufactures	1.49	0.20	150.0	156.3	154.9	175.9	235.3
Textiles	32.10	9.22	108.4	113.5	120.9	129.3	131.6
Apparel and footwear	0.28	1.31	166.0	180.4	214.4	212.2	240.2
Manufactures of wood	0.24	1.46	150.2	169.0	194.8	202.6	214.2
Paper and paper products	1.39	1.44	181.9	190.9	226.8	237.8	253.4 ²
Leather and fur products	0.18	0.94	115.6	125.2	149.1	138.4	147.0
Rubber products	3.04	1.82	157.4	169.5	187.0	198.1	224.4
Chemicals	3.56	12.60	175.3	185.9	237.2	226.3	234.2
Petroleum products	3.79	2.92	156.5	169.2	196.6	217.2	183.3
Non-metal mineral products	2.47	2.15	180.8	220.2	204.6	216.0	227.8
Basic metals	9.25	13.59	181.6	225.0	259.1	260.6	253.3
Metal products	0.99	2.58	152.3	179.1	218.5	225.8	237.8
Non-electrical machinery	1.10	12.09	268.7	293.2	364.8	414.1	453.7
Electrical machinery	2.41	7.81	183.2	211.1	237.7	284.4	288.3
Transport equipment	2.86	6.96	130.8	151.4	150.9	192.5	190.7
Electricity generated	3.68	10.56	198.8	223.4	257.9	297.2	320.6 ²
Official Indices:							
Industrial production	...	...	139.2	150.6	163.8	174.8	180.9
Manufacturing	...	...	136.1	146.6	158.9	159.7	174.6
Normative Indices:							
Industrial production	...	...	175.0	196.0	226.7	243.6	254.7
Manufacturing	...	...	177.9	199.6	232.1	251.5	261.9

¹ Not seasonally corrected.

² Figures for March 1965.

preservative set of weights for them can be derived. However, the possibility of determining *technical* rates of substitution is essential here; the supposition that⁴ subjective rates of substitution exist and are equal to relative prices is just a part of economists' folklore and does not have a strong enough empirical base to be of any use.

It is possible that this method of grouping substitutes together might enable us sometimes to obtain a satisfactory index of the output or use of consumer goods. When we come to materials and capital goods, however, their division into groups of substitutes is almost impossible. The number of purposes that they can serve simultaneously can be quite large, and patterns of substitution between them correspondingly complex. Even the theoretical problem of establishing rates of substitution in such circumstances is frightfully difficult. If we observe the fact that technical progress entails systematic substitution of goods, it becomes evident that the substitute group approach must be abandoned at least for the present.

The difficulty arises because we look for a set of weights in the actual figures of output or value added, and it can be overcome by giving up the search. In other words, the solution lies in a notional set of weights; and a notional set can be derived if we are given a desired or planned pattern of production. The difference between the planned and the current outputs will then give the increases in the production of different goods that are desired; and given a set of prices, weights in terms of value of output or value added can be derived. The index so calculated will permit the comparison of the actual growth of output with the target rate of growth. Such an index has been calculated here.

Indices of production by industries are given in the *Monthly Statistics of the Production of Selected Industries of India*.¹ Value added by them in 1960-61 and target value added in 1975-76 are given in "Notes on Perspective of Development, India: 1960-61 to 1975-75".² We have used the difference between the two, i.e., the target increase in value added from 1960-61 to 1975-76 as the basis for weights.³ The weights thus derived are given in Table 1, along with the current official weights based on value added in 1956.⁴

Use has been made of the estimates in "Notes on Perspective" because they are the only sufficiently detailed figures

of planned increases in output that are available. Differently weighted indices might become possible if other equally detailed plans become available; their significance will then depend on the quality of the underlying plans. There can be as many indices of this type as there are norms; and each such index would be meaningful only in the context of its norm.

As compared with the official index the normative index gives higher weights to industries for which a higher rate of growth is planned (Table 1). One way of describing the procedure would be that the normative index is a Laspeyres index which uses shadow prices instead of base-year prices: the shadow prices being equal in the base-year price multiplied by the ratio of the projected growth rate of the particular industry to the projected growth rate of all industry. This index, thus, incorporates a simple device to assign higher prices to those industries whose output it is planned to increase rapidly, and gives a better idea of plan achievement.

The relevance of the normative index to plan fulfilment is brought out in Table 2. This table presents annual rates of growth of output in different industries from 1956 to April 1965; besides, it gives the annual changes in

the official and in the normative index, and the exponential rates of growth envisaged in the "Notes on Perspective". Almost consistently, the normative index shows under-achievement of the perspective plan targets. But the under-achievement is far less than the official index would suggest; in fact, the official index is useless in the context of the fulfilment of the perspective or any other plan.

Looking at the detailed growth rates, it is evident that the under-achievement is common to almost all industries. The only industries that grew in 1956-61 at the rates envisaged for 1960-75 are Lohacco and electricity generation; this promises to hold in the Third Plan period also. Under-achievement is general and persistent, and in this respect there is no difference between, say, consumer goods and other industries or import-dependent and other industries.

It seems likely, therefore, that either there are some general factors retarding industrial growth in this country or there are mechanisms which spread the influence of bottlenecks widely. Further light on these issues cannot be thrown by output indices; an analysis of industrial investment and capacity utilisation is called for. It is proposed to undertake this in a further study.

Table 2: Annual Growth Rates of Output

	(Per cent)					
	Normative 1960-61 to 1975-76	1955-61	1961-62	1962-63	1963-64	1964-1 April 1965
Mining and quarrying	10.2	8.1	9.6	8.9	-3.9	-35.6
Food manufactures	5.9	5.2	-1.5	-4.0	10.9	30.2
Tobacco manufactures	4.7	8.5	4.2	0.9	13.4	140.1
Textiles	9.5	1.6	4.7	6.5	6.9	5.5
Apparel and footwear	14.82	10.7	8.7	18.8	-1.0	45.1
Manufactures of wood	13.2	8.5	12.5	15.3	4.0	18.0
Paper and paper products	13.1	12.7	4.9	18.8	4.9	21.1
Leather and fur products	... ²	2.5	8.3	19.1	-7.2	19.7
Rubber products	14.8	9.5	7.7	10.3	5.9	45.5
Chemicals	17.9	10.6	6.0	27.6	-4.6	10.8
Petroleum products	15.1	9.4	8.1	16.2	10.5	-39.5
Non-metal mineral products	11.2	12.6	21.8	-7.1	5.6	17.4
Basic metals	17.7	12.7	23.9	15.2	0.6	-9.3
Metal products	15.5	8.8	17.6	22.0	3.3	16.7
Non-electrical machinery	23.1	21.8	9.1	24.3	12.8	34.6
Electrical machinery	25.2	16.1	15.2	12.6	18.8	6.5
Transport equipment	11.9	8.7	15.7	-0.3	27.6	-2.7
Electricity generated	14.3	17.4	12.4	15.4	15.2	25.6
Official Indices:						
Industrial production	...	6.8	8.2	8.8	6.7	10.8
Manufacturing	...	6.4	7.7	8.4	0.5	8.0
Normative Indices:						
Industrial Production	12.8	11.9	12.0	15.7	10.7	14.5
Manufacturing	13.2	12.2	12.2	16.2	8.4	12.8

¹ Not seasonally adjusted.

² "Apparel and footwear" includes "leather and fur products"

Notes

- ¹ Published by the Central Statistical Organisation, Calcutta, We have used the May 1965 issue where the figures are given on pp 298-326.
- ² Published by the Perspective Planning Division of the Planning Commission, April 1964; Tables B-2 and B-3.
- ³ While the correspondence between

the industries in *Monthly Statistics* and in "Notes on Perspective" is clear in most cases, the following observations are necessary to explain what we have done. Orders 1 to 3 and 5 in the "Moles" are taken to form the food manufactures group. Orders 21 to 23 are put in the textiles group. Order 16 is taken to cover the apparel and footwear group and the leather and fur products group, and its value

added is divided between them in proportion to their weights in the official index. Orders 19 and 24 are taken for manufactures of wood, and order 31 (matches) is put into chemicals. Orders 27 and 28 are put together as petroleum products, and 25, 26 and 29 to 31 as non-metalliferous mineral products. Metal products are taken to comprise orders 89 to 95 and 60. See *Monthly Statistics*, pp 280-297.

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