A Study of Cross-validation of Growth Rates of Industrial Production Based on IIP and ASI for Some Important Item-groups

G. C. Manna[1], Central Statistics Office (NAD), New Delhi, India

Abstract

There have been growing concerns about the volatility in the growth rates of industrial production reflected through the monthly indices. Growth rates for the capital goods sector have been criticized the most. This paper cross-validates the latest annual growth rate of production of some important items emerging from the Index of Industrial Production (IIP) with those based on the Annual Survey of Industries. A way forward is suggested for the reflection of more realistic growth rates through IIP.

1. Introduction

1.1 The All-India Index of Industrial Production (IIP) released by the Central Statistics Office is an important short-time indicator for assessing the growth of industrial sector of the economy on a monthly basis. The present IIP has 2004-05 as the base year. On every month, apart from releasing the absolute values of the indices for three sectors of the economy viz. mining, manufacturing and electricity, the indices by 'use-based classification' as well as by 2-digit of National Industrial Classification (NIC) and also the corresponding monthly and cumulative growth rates of production as compared to the corresponding periods of the previous year are released.

1.2 Of late, there have been growing concerns on the volatility in the growth rates of IIP – more so for the capital goods sector. Variations in the magnitude of the indices and growth rates as per IIP vis-à-vis National Accounts Statistics (NAS) and Annual Survey of Industries (ASI) for the period 1993-94 till 2007-08 have been discussed at length by Singhi in the Working Paper titled "Index of Industrial Production & Annual survey of industries". In his analysis, Singhi studied the variations by sector (i.e. Mining, Manufacturing & Electricity) and by broad groups / activities of industry. Two important conclusions were as follows: one, growth rate as per IIP is normally lower; and two, variation in annual growth rates for the initial three or four years after the base year is less but there are huge variations in the subsequent years.

1.3 Keeping in view the fact that the IIP is derived as an weighted average of the production relatives of various item-groups (products) in the IIP basket, in this paper, we have analyzed the behavior of the annual growth rates of production during 2009-10 over 2008-09 for some important item-groups as emerging from the IIP and compared those

[1] e-mail: gc.manna1@gmail.com

with the corresponding growth rates as revealed by the ASI based on estimated production of respective item-groups.

2. Selection of Item-groups

2.1 Unfortunately there is no common code of any given product/item-group to match the production figures as per the two sources. Thus we were left with no other option but to match the two alternative production figures by looking at the descriptions of the products manually, which was rather a cumbersome and time-consuming exercise. To optimize on the labour involved, we initially concentrated to limit our study to those item-groups (after arranging them in the descending order of their weights in IIP) having a share of 75% weight in the overall weight (roughly 76%) for the manufacturing sector.

2.2 The above criterion led us to the selection of 107 item-groups (having a total weight of 57.1%) out of a total number of 399 item-groups in the IIP basket. But unfortunately only 56 of these item-groups with a total weight of 24.4% could be identified by exact name in the ASI database. In the remaining cases, either the descriptions in the ASI database did not exactly match with those in the IIP database or the said item-groups/products were missing in the ASI database (due to zero production or some other reasons).

2.3 To achieve a higher overall weight, we expanded the coverage of the study by considering the remaining item-groups with a minimum weight of '0.75' (out of 1,000) in the weighting diagram of IIP. This resulted in netting another 100 item-groups of which only 49 item-groups could be identified by exact description in the ASI database. Thus, ultimately 105 item-groups with a total weight of about 30.5% (as against 76% weight of the manufacturing sector) were selected study. Details are given in Tables 1 and 2.

3. Ultimate Domain of Study

3.1 Of the 105 item-groups so selected, 5 item-groups show abnormally high growth rates of production based on ASI. These item-groups with corresponding growth rates in production during 2009-10 over 2008-09 are: BOPP film (16306.3%), Polyester chips (39202.4%), Railway sleeper (1672.5%), Cashew kernels (1928.8%), and Maida (2289.5%). Because of this abnormal situation, we have dropped these item-groups from our analysis ultimately leading us to 100 item-groups which comprised our domain of study.

4. Details of Study and Findings

4.1 While calculating the annual growth rate (GR) of production, for the item-groups for which IIP database is in value (monetary) terms, first we have deflated ASI 2009-10 production figures for both IIP and ASI by the corresponding WPI deflators so that they are at constant (2008-09) price. For the item-groups for which WPI deflator specific to the item-group is not available, we have used the deflator for all commodities combined. Item-group wise production figures as per IIP and ASI for the years 2008-09 and 2009-10 along with respective weights and units of different item-groups are presented in Statement A-1 and the item-group wise alternative GRs are indicated in Statement A-2. Disturbingly

enough, for majority of the item-groups two alternative GRs differ widely and in many cases two alternative GRs even show different signs. The findings seem to indicate poor quality of data of GR at the item-group level, even with regard to ASI which is based on a large sample size.

4.2 Major findings by use-based classification are summarized in Tables 3 and 4. For all item-groups taken together, annual GR as per ASI (Table 3) is much higher (17.0%) than that based on IIP (4.7%). This finding is consistent with that of Singhi. However, for item-groups pertaining to basic goods and consumer durables, GR as per ASI is found to be lower.

4.3 It is quite disturbing to note that for about a half of the item-groups studied (51 out 100), two alternative GRs show different signs altogether (Table 4). Correlation coefficient of two alternative GRs is also very small (0.01). This is true for all use-based categories. Absolute difference of two alternative GRs at the item-group level varies between 0.2% to as high as 343.5%. Variation in GRs at the item-group level is much higher in case of ASI (-100% to 331%) than that of IIP (-67% to 65%). As an illustration alternative GRs (expressed in percentages) for the item-groups studied with regard to the capital goods sector are presented in Charts 1A and 1B. It is rather difficult to comment as to which source may be reflecting the better GR. Both sources have certain advantages and disadvantages. The positive side of IIP is that it is based on panel data and for quite a few item-groups the total value of production of the reporting units is substantially high. But the IIP based GR for a number of item-groups seem to be suffering from its inadequacy in terms of number of reporting units. As regards the ASI, although sample size is quite large, it does not seem to be equipped to give robust estimates of production for many item-groups as per the existing methodology. Given the extent of divergence in the alternative GRs, it is high time to address the methodological issues of deriving the estimates based on both the sources. This includes review of sample design adopted in ASI.

4.4 For 8 out of 100 item-groups, quantity of reporting of data is different in the two sources. Interestingly, a study of the production behavior of the remaining 92 item-groups (see Table 5) reveals that for as many as 39 item-groups total reported production of sample units for the year 2009-10 as per IIP is higher than that of estimated total production of the item-group based on ASI. This can probably only happen due to two reasons: one, owing to incompleteness of the ASI frame and two, due to the limitation of the sample design adopted in ASI. Respective production behavior as per two alternative sources for a sample of 6 out of the above stated 39 item-groups (Table 6) is supportive of the same. Out of these 6 item-groups, IIP data for 4 item-groups flow from DIPP. An investigation into the unit-level database as per Department of Industrial Policy and Promotion (DIPP) confirms the incompleteness of the ASI frame (Table 7) and also supports the need for further refining the sampling methodology of ASI.

5. Concluding Observations

5.1 We observe huge divergence in the alternative growth rates of production emerging from the two sources namely IIP and ASI. Given the importance of the IIP and ASI database for policy formulations, there is an urgent need to address the methodological issues leading

to such wide divergence. We suggest a few remedial measures. While undertaking the upcoming base revision exercise of IIP, having seen the volatility in the annual production figures at the item level based on ASI, it would be desirable that the item basket is finalized not by considering only the base year production data (as is the practice) but by taking into account the average production based on three years including the previous year and the subsequent year to the base year. This is likely to eliminate the extent of volatility to a large extent. The use of three-year data would also be useful for finalization of the weighting diagram. Further, due care needs to be taken while selecting factories so that for any given item-group the factories having major productions are included in the list of selected units. Given the limitation of the ASI frame, this would involve inclusion of the units based on sources other than ASI like DIPP, Ministry of Corporate Affairs (MCA) and Economic Census. Also for each item-group, a minimum threshold in terms of both number of units/factories and percentage share in the total production must be fixed to ensure representativeness of the selected units in reflecting realistic growth rate of production. It is also important that the item descriptions in the IIP basket exactly match with those as per the ASI database so that studies of similar nature can be undertaken easily. Finally, given the divergence in the magnitude of growth rates of production as per the two alternative sources, we strongly feel the need for exploring alternative methodology of compilation of IIP where we may directly select major units based on ASI frame to be supplemented with the list of units based on other sources mentioned already. For each industry 2-digit code, it may be worth considering top units in terms of number of employees so that selected units take care of at least 80% of the total output at the 2-digit level of industry. As per ASI 2009-10, there are 44,793 units at the all-India level contributing to about 86% of the total output. From the selected units, we may collect information on total value of output rather than quantity every month through web-portal and derive the alternative IIP after deflating output values by appropriate price index, preferably the Producer Price Index (PPI), failing which by the Wholesale Price Index (WPI).

5.2 As regards the ASI, steps should be taken to improve upon its frame by tapping database as per other sources like DIPP, MCA and Economic Census. It is also high time to reconsider whether we continue with units having 100+ workers as forming the 'census sector' or expand its domain by considering units with 50+ workers. In case this is difficult to implement due to the limitation of sample size, efforts be made at least to form separate strata of units with 50 to 100 workers at district x 4-digit level of National Industrial Classification within the 'sample sector' and select a sample of them from each stratum. This is likely to improve the precision of the estimates. Lastly, given the extent of variations in annual growth rates of production at the item-group level in ASI, it is worth exploring the introduction of panel/rotational panel survey in the sample sector to improve the estimates of change parameters.

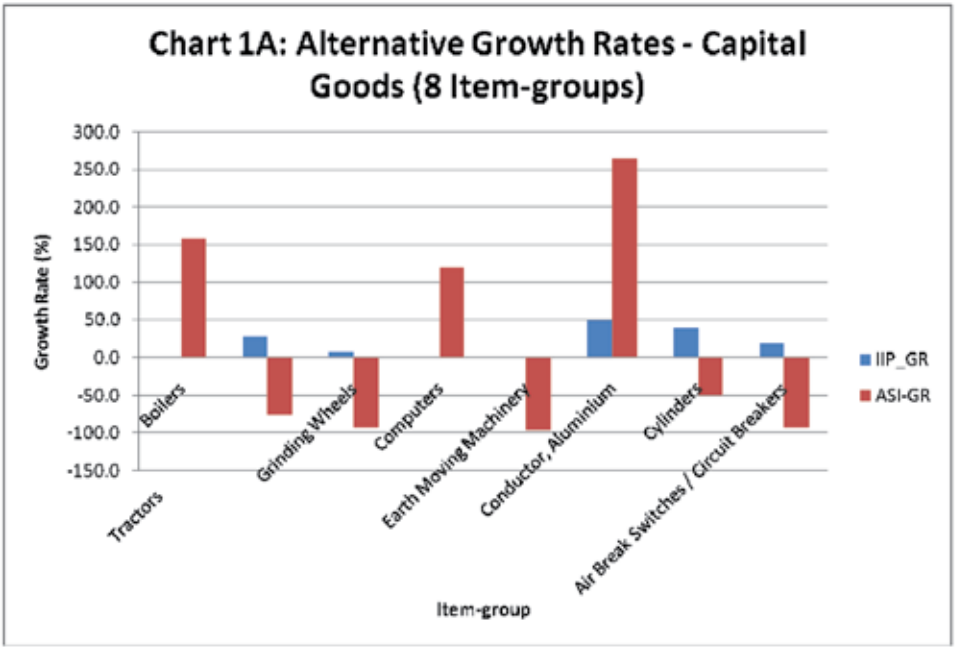
Chart 1A: Alternative Growth Rates - Capital Goods (8 Item-groups)
Growth Rate (%)
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
Boilers
Tractors
Grinding Wheels
Computers
Earth Moving Machinery
Conductor, Aluminium
Cylinders
Air Break Switches / Circuit Breakers
Item-group
IIP_GR
ASI-GR

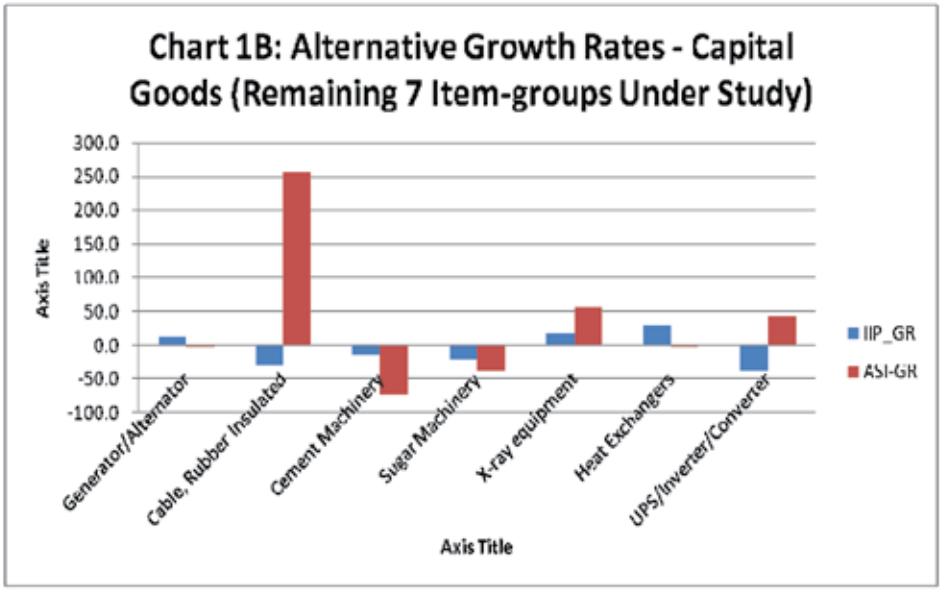
Chart 1B: Alternative Growth Rates - Capital Goods (Remaining 7 Item-groups Under Study)
Axis Title
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
Generator/Alternator
Cable, Rubber Insulated
Cement Machinery
Sugar Machinery
X-ray equipment
Heat Exchangers
UPS/Inverter/Converter
Axis Title
IIP_GR
ASI-GR

Table 1: Initial Target Population

Use-based category	No. of item-groups	Total weight (out of 1000)	75% of the weight	Target population / No. of top item-groups in terms of weight contributing to 75% of the weight
(1)	(2)	(3)	(4)	(5)
1. Basic goods	88	456.8 (212.1)	159.1	20
2. Capital goods	73	88.3	66.2	23
3. Intermediate goods	106	156.9	117.7	33
4. Consumer durables	43	84.6	63.5	9
5. Consumer non-durables	89	213.5	160.1	22
All	**399**	**1000.0 (755.3)**	**568.6**	**107 [571.3]**

( ) indicates weight excluding the weights for mining & electricity sectors not considered for the study

[ ] Total weight of the targeted item-groups

Table 2: Ultimate Domain of Study

Use-based category	No. of item-groups achieved* in the first target	Second target**				Ultimate domain of study	
		No. of item-gr. identified	Total weight (out of 1000)	No. achieved*	Weight	No. of item-groups	Weight
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Basic goods	11	27	42.3	14	20.8	25	83.5
Capital goods	12	12	11.2	3	3.0	15	27.9
Intermediate goods	18	21	21.7	10	9.0	28	73.6
Consumer durables	5	9	14.7	6	9.4	11	31.7
Consumer non-dur.	10	31	39.1	16	18.1	26	87.9
All	**56 (244.4)**	**100**	**129.0**	**49**	**60.3**	**105#**	**304.7**

* Achieved means those for which item/product description could be located in the ASI database

** Remaining item-groups of IIP basket with value of the weight being at least 0.75 out of 1,000

( ) Total weight of the achieved item-groups as per initial target # Of the 105 item-groups identified, 5 item-groups ignored for further study due to the observed abnormal growth rates in production during 2009-10 over 2008-09 based on the ASI.

Statement A-1: Production Figures as per IIP and ASI after Adjusting by WPI Deflators in Case of Value

Item group	Weight	Unit	IIP_ 08-09	IIP_Adj_ 09-10	ASI_ 08-09	ASI_Adj_ 09-10
sponge iron	9.9512	Th.tonnes	21091	20738	12050	14527
Bars & Rods	9.7746	Th.tonnes	22224	23863	11226	14407
Carbon steel	7.8075	Th. tonnes	21367	22657	1699	179
Urea	6.4322	Th. MT	19922	21112	19193	19882
Ferro manganese	6.3869	Th. tonnes	529	513	247	240
Kerosene	4.4625	TMT	8223	8547	134629391	178338984
Propylene	4.0923	MT	1887457	1858755	644518	291520
Ethylene	4.0019	MT	2638784	2515488	3794005	0
Ferro chrome	3.4280	Th. tonnes	958	922	1869	417
Ferro silicon	3.1885	Th. tonnes	76	81	78	191
Di Ammonium Phosphate(DAP)	3.1858	Th. MT	2993	4247	1856	2086
Fuel, Aviation Turbine	2.7097	TMT	7631	8074	8366	5722
Aluminium	2.5860	Tonnes	934521	1045149	3564973	1574622
Caustic soda	2.2336	MT	2050030	2102539	1286016	1828525
Steel Castings	2.1462	Tonnes	191494	186059	3454243	7178999
coal, washed	1.7045	Th.tonnes	7307	6904	8619	9249
Soda ash	1.4539	MT	1989045	2050912	2591432	1994778
Granites	1.1197	Sq. feet	19539157	19195284	7351215	5736715
coke, hard	1.0961	Th.tonnes	10577	10443	3209	2350
Aluminium Foils	1.0858	Tonnes	47405	49158	53840	57504
Molasses	1.0831	Tonnes	2690152	2164280	8673099	18197674
Other Ferro alloys	1.0212	Th. tonnes	525	550	361	322
Butadiene	0.8738	MT	213721	205427	163514	186821
Benzene	0.8732	MT	879669	822723	221112	807891
pig iron	0.7650	Th. tonnes	6206	5796	7229	6247
Boilers	4.0111	Rs.Crore	14894	15189	11309	29073
Tractors (complete)	3.7665	Numbers	293606	373700	18950025	4593516
Grinding Wheels	2.9205	Th. No.	17694	19109	12832	1017
Computers	2.3317	Rs.Crore	2993	3027	2796	6156
Earth Moving Machinery	2.2868	Numbers	9075	9314	1446239	68432
Conductor, Aluminium	2.0043	Tonnes	75582	112572	3053762	11083839
Cylinders	1.3742	Numbers	3637774	5062678	25270309	12879828
Air Break Switches / Circuit Breakers	1.3579	Th. No.	55357	65628	47275	3868
Generator/Alternator	1.3179	Rs.Crore	2787	3152	3406	3356
Cable, Rubber Insulated	1.2276	Kilo metres	41550	29351	3886906	13840632
Cement Machinery	1.2150	Rs.Crore	1000	854	664	178

Statement A-1: Production Figures as per IIP and ASI after Adjusting by WPI Deflators in Case of Value (Contd.)

Item group	Weight	Unit	IIP_ 08-09	IIP_Adj_ 09-10	ASI_ 08-09	ASI_Adj_ 09-10
Sugar Machinery	1.1399	Rs.Crore	420	334	1340	837
X-ray equipment	1.0298	Numbers	1193	1401	410829	639983
Heat Exchangers	1.0215	Rs.Crore	1221	1581	1799	1753
UPS/Inverter/ Converter	0.9285	Numbers	1900377	1186420	2616384	3753189
Gas, Liquidified Petroleum	11.1964	TMT	9158	8661	3697	10513
Fasteners (Excl. Zip-Fastener)	5.6948	Tonnes	75669	77712	1573691	1607817
Petrol (Motor Spirit)	5.6067	TMT	16020	15970	250771548	604078289
Steel Structures	5.4773	Tonnes	542799	612544	15170223	1666893
Naphtha	5.4323	TMT	14827	14811	19300	13451
Purified terephthalic acid	4.2279	MT	2154021	2985327	522308	433810
Furnace Oil	3.8649	TMT	14749	15038	116304	192903
Bearings (Ball/Roller)	3.3536	Th. No.	496355	613830	3151247	251480
Glass Bottles	2.5584	Tonnes	1094526	1120538	10841012	8217237
Plywood	2.3251	Th. Sq. Mt.	44546	47809	158722	220379
Plastic Film Excl. Bopp Film	1.9795	Tonnes	274375	298581	64491	87540
Craft Paper(Kraft Paper)	1.8564	Tonnes	1059509	1183669	4780412	2466661
Linear alkyl benzene	1.7213	MT	434348	463846	230176	214811
Printed Circuit Board/Plate	1.7157	Rs.Crore	367	352	703	1861
Colour TV Picture Tubes	1.6102	Th. No.	7018	9206	7807	13532
twine, jute (sutli)	1.4791	Th. tonnes	54	26	91	56
Adhesives	1.2891	Tonnes	46227	51022	349252	222935
Synthetic Resins	0.9583	Tonnes	122545	139027	1033808	435488
Shoe Uppers(Leather)	0.9282	Th.Pairs	19113	16696	22574	14067
Straw And Paper Boards of All Kinds	0.8398	Tonnes	1715167	1717590	4941706	1568277
Caprolactum	0.8176	MT	84461	123157	53501	377
Printing Ink	0.8070	Tonnes	155253	182129	147948	130529
Bitumen	0.7920	TMT	4713	4889	3237	3804
Hose Pipe	0.7801	Rs.Crore	357	398	705	1491
Wood Veneer	0.7533	Th. Sq. Mt.	165726	154422	314861	141642
Motor Cycles	9.5225	Numbers	6801964	8444852	59453800	7982381
Colour TV Sets	3.8056	Numbers	9330640	10015431	9967937	8778313
Glazed Tiles / Ceramic Tiles	3.5800	Tonnes	1356565	1419445	93455937	114532874

Statement A-1: Production Figures as per IIP and ASI after Adjusting by WPI Deflators in Case of Value (Contd.)

Item group	Weight	Unit	IIP_ 08-09	IIP_Adj_ 09-10	ASI_ 08-09	ASI_Adj_ 09-10
Air Conditioner (Room)	2.8741	Numbers	886417	1457770	258074461	324565887
Woollen Carpets	2.5812	Sq. metre	95608	79815	7445504	15363690
Scooter and Mopeds	2.1398	Numbers	1559447	2065479	1105825	1293882
Pressure Cooker	2.1342	Numbers	5249860	6951678	7164936	9165419
Tyre, Car/Cab	2.0075	Th.No.	13996	15864	11367	8017
Mono ethylene glycol	1.1662	MT	783203	738292	247981	55603
Refrigerators	0.9705	Th. No.	6715	8002	6598	7328
Bicycles	0.9603	Th. No.	11607	13251	10786	15030
sugar(including sugar cubes)	15.2456	Lakh tonnes	184	173	204	271
Newspapers	10.0865	Lakh Copies	56533	52936	3328596	8642839
grey cloth (bleached / unbleached)	9.0908	Mn.sq.mtr	54966	59573	523141787	473728682
Cigarettes	8.6849	Lakh No.	932061	917261	1279129	891826
Leather Garments	7.5051	Rs.Crore	409	382	1817	1131
Pens of All Kind	5.9101	Th. No.	1038284	911221	3199184	4134865
Biri	5.0706	Lakh No.	298101	295299	2925344	2390397
Vitamins	3.0131	Rs.Crore	43	56	4571	14595
Terry Towel	2.3763	Tonnes	63191	76334	65119	58064
Biscuits	2.3732	Tonnes	611426	674829	27117704	84322323
Coir Mats & Mattings	2.3521	Sq. metres	848499	952733	16925961	24117419
Milk Powder all kind	1.1491	Tonnes	168735	148046	1817654	7838390
Soyabean oil	1.0839	MT	1064201	683259	39500738	1794901
Beer	0.9935	K.Litre.	954887	1017201	7884701	967823
Tooth Brush	0.9900	Th. No.	194751	209569	65824062	4657961
Atta	0.9392	Tonnes	473665	511353	10440907	7929725
Fluorescent Tubes	0.9012	Th. No.	159103	194988	199636	92513
Groundnut Oil	0.8830	MT	45360	15013	10223439	497553
Ghee	0.8461	Tonnes	77105	74654	179458	189461
Rice bran Oil	0.8370	MT	751799	643112	11660727	1614893
Zarda/ Chewing Tobacco	0.8362	Kg.	1424890	959263	66158948	60089165
Dry Cells	0.8030	Th. No.	1863461	1985848	1079444	742646
Safety Matches	0.7892	Th. boxes	8801360	7756452	201531	256401
Mustard/ Rapeseed Oil	0.7779	MT	85442	74167	112200505	762239

Statement A-2: Alternative Annual Growth Rates of Production: 2009-10 Over 2008-09

Item-group	Growth Rate (%)		Item-group	Growth Rate (%)		Item-group	Growth Rate (%)	
	IIP	ASI		IIP	ASI		IIP	ASI
Basic Goods			**Intermediate Goods**			**Consumer Non-durables**		
Sponge iron	-1.7	20.6	Gas,Liqidified Petroleum	-5.4	184.4	Sugar(incl. its cubes)	6.0	32.8
Bars & Rods	7.4	28.3	Fasteners (excl. Zip-Fastnr)	2.7	2.2	Newspapers	-6.4	159.7
Carbon steel	6.0	-89.5	Petrol (Motor Spirit)	-0.3	140.9	Grey cloth (bleached / unbleached)	8.4	-9.4
Urea	6.0	3.6	Steel Structures	12.8	-89.0	Cigarettes	-1.6	-30.3
Ferro manganese	-3.0	-2.8	Naphtha	-0.1	-30.3	Leather Garments	-6.6	-37.8
Kerosene	3.9	32.5	Purified tereph thalic acid	38.6	-16.9	Pens of All Kind	-12.2	29.2
Propylene	-1.5	-54.8	Furnace Oil	2.0	65.9	Biri	-0.9	-18.3
Ethylene	-4.7	-100.0	Bearings (Ball/Roller)	23.7	-92.0	Vitamins	31.3	219.3
Ferro chrome	-3.8	-77.7	Glass Bottles	2.4	-24.2	Terry Towel	20.8	-10.8
Ferro silicon	6.6	144.9	Plywood	7.3	38.8	Biscuits	10.4	210.9
Di Ammonium Phosphate (DAP)	41.9	12.4	Plastic Film Excl. Bopp Film	8.8	35.7	Coir Mats & Mattings	12.3	42.5
Fuel, Aviation Turbine	5.8	-31.6	Craft Paper	11.7	-48.4	Milk Powder all kind	-12.3	331.2
Aluminium	11.8	-55.8	Linear alkyl benzene	6.8	-6.7	Soyabean oil	-35.8	-95.5
Caustic soda	2.6	42.2	Printed Circuit Board/Plate	-4.0	164.8	Beer	6.5	-87.7
Steel Castings	-2.8	107.8	Colour TV Picture Tubes	31.2	73.3	Tooth Brush	7.6	-92.9
Coal, washed	-5.5	7.3	twine, jute (sutli)	-52.4	-38.5	Atta	8.0	-24.1
Soda ash	3.1	-23.0	Adhesives	10.4	-36.2	Fluorescent Tubes	22.6	-53.7
Granites	-1.8	-22.0	Synthetic Resins	13.4	-57.9	Groundnut Oil	-66.9	-95.1
Coke, hard	-1.3	-26.8	Shoe Uppers (Leather)	-12.6	-37.7	Ghee	-3.2	5.6
Aluminium Foils	3.7	6.8	Straw And Paper Boards of All Kinds	0.1	-68.3	Rice bran Oil	-14.5	-86.2
Molasses	-19.5	109.8	Caprolactum	45.8	-99.3	Zarda/Chewing Tobacco	-32.7	-9.2

Statement A-2: Alternative Annual Growth Rates of Production: 2009-10 Over 2008-09 (Contd.)

Item-group	Growth Rate (%)		Item-group	Growth Rate (%)		Item-group	Growth Rate (%)	
	IIP	ASI		IIP	ASI		IIP	ASI
Basic Goods			**Intermediate Goods**			**Consumer Non-durables**		
Other Ferro alloys	4.8	-10.8	Printing Ink	17.3	-11.8	Dry Cells	6.6	-31.2
Butadiene	-3.9	14.3	Bitumen	3.7	17.5	Safety Matches	-11.9	27.2
Benzene	-6.5	265.4	Hose Pipe	11.4	111.5	Mustard/ Rapeseed Oil	-13.2	-99.3
Pig iron	-6.6	-13.6	Wood Veneer	-6.8	-55.0			
Capital Goods			**Consumer Durables**					
Boilers	2.0	157.1	Motor Cycles	24.2	-86.6			
Tractors	27.3	-75.8	Colour TV Sets	7.3	-11.9			
Grinding Wheels	8.0	-92.1	Glazed Tiles / Ceramic Tiles	4.6	22.6			
Computers	1.1	120.2	Air Conditioner (Room)	64.5	25.8			
Earth Moving Machinery	2.6	-95.3	Woollen Carpets	-16.5	106.3			
Conductor, Aluminium	48.9	263.0	Scooter and Mopeds	32.4	17.0			
Cylinders	39.2	-49.0	Pressure Cooker	32.4	27.9			
Air Break Switches / Circuit Breakers	18.6	-91.8	Tyre, Car/Cab	13.3	-29.5			
Generator/ Alternator	13.1	-1.5	Mono ethylene glycol	-5.7	-77.6			
Cable, Rubber Insulated	-29.4	256.1	Refrigerators	19.2	11.1			
Cement Machinery	-14.6	-73.2	Bicycles	14.2	39.3			
Sugar Machinery	-20.5	-37.5						
X-ray equipment	17.4	55.8						
Heat Exchangers	29.4	-2.6						
UPS/Inv/ Converter	-37.6	43.4						

Table 3: Alternative Growth Rates as per IIP and ASI

Use-based category	Domain of study/ No. of item-groups	Weight	Annual growth rate (GR) of production during 2009-10 over 2008-09			
			Simple Average		Weighted Average	
			IIP	ASI	IIP	ASI
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basic goods (1)	25	83.5	1.6	11.5	3.2	-1.0
Capital goods (2)	15	27.9	7.0	25.1	9.8	26.8
Intermediate goods (3)	25	68.1	6.7	4.9	5.7	32.4
Consumer durables (4)	11	31.7	17.3	4.0	19.2	-14.0
Consumer Non-durables (5)	24	83.5	-3.7	11.5	-1.8	30.9
All	**100**	**294.7**	**4.2**	**11.1**	**4.7**	**17.0**

Table 4: Relationship of Two Alternative Growth Rates

Use-based category	Target population/ No. of item-groups of the study	No. of item-groups with two alternative GRs showing different signs	Correlation Coefficient of two alternative GRs	Growth rate as per IIP at the item-group level		Growth rate as per ASI at the item-group level		Absolute difference of two alternative GRs		
				Minimum value	Maximum value	Minimum value	Maximum value	Min.	Max.	Av.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	25	11	-0.17	-19.5	41.9	-100	265.4	0.2	271.8	53.8
2	15	9	-0.06	-37.6	48.9	-95.3	263.0	14.6	285.4	101.1
3	25	14	-0.17	-52.4	45.8	-99.3	184.4	0.5	189.8	65.2
4	11	4	-0.06	-16.5	64.5	-86.6	106.3	4.5	122.9	43.4
5	24	13	0.27	-66.9	31.3	-99.3	331.2	8.8	343.5	74.7
All	**100**	**51**	**0.01**	**-66.9**	**64.5**	**-100**	**331.2**	**0.2**	**343.5**	**67.6**

Table 5: Frequency Distribution of Total Number of Item-groups by Value of Output Ratio of IIP and ASI for the Year 2009-10

Output Ratio (R)	No. of item-groups	Output Ratio (R)	No. of item-groups
< 0.01	7	0.5 – 1.0	12
0.01 – 0.05	8	1.0 – 2.0	22
0.05 – 0.1	4	2.0 – 5.0	10
0.1 – 0.2	4	5.0 & above	7
0.2 – 0.5	18	**All**	**92**

R = (Total value of output of reporting units as per IIP item basket) / (Total estimated output as per ASI)

Table 6: Value of Output as per Two Alternative Sources for Selected Item-groups

Item-group	Weight	Unit	Value of R	Value of output		
				IIP:2009-10	ASI:2009-10	ASI:2008-09
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Color TV Sets	3.8056	No.	1.14	10015431	8778313	9967937
Bars and rods	9.7746	Th. Ton	1.66	23863	14407	11226
Fluorescent tubes	0.9012	Th. No.	2.11	194988	92513	199636
Cement machinery	1.2150	Rs. Cr.	4.79	887	185	664
Mono ethylene glycol	1.1662	MT	13.3	738292	55603	247981
Grinding wheels	2.9205	Th. No.	18.8	19109	1017	12832

Table 7: Results of Further Investigation Based on Unit Level Data of DIPP

Item-group	Total no. of units as per unit level data	No. of units not having PSL number	No. of top units meeting ASI: 2009-10 production	Remarks
(1)	(2)	(3)	(4)	(5)
Color TV Sets	16	3	7	All the units mentioned in col.4 have permanent serial (PSL) no. in DIPP database. Thus the sampling issue in ASI is responsible for underestimation of ASI production.
Fluorescent tubes	12	1	3	
Cement machinery	7	1	1	
Grinding wheels	6	5	1	