Measurement Issues in State Income from Registered Manufacturing Sector – Case of Gujarat

Ravindra H. Dholakia
Manish B. Pandya
Payal M. Pateria

विद्याविनियोगाद्विकासः

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD-380 015
INDIA

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Ravindra H. Dholakia
Indian Institute of Management Ahmedabad

Manish B. Pandya
DES Govt. of Gujarat, Gandhinagar

Payal M. Pateria
DES Govt. of Gujarat, Gandhinagar

Abstract

The present paper discusses some important issues involved in estimation of state income originating in the registered manufacturing sector with illustrations drawn from Gujarat. It highlights the present practices in preparing quick estimates for latest years when results from the regular data source of Annual Survey of Industries is not finalized. It also argues that the current practice of following single deflation method is inadequate and misleading for deriving estimates of value addition at constant prices in this sector. When the industrial structure and technology are rapidly changing with substantial differences in price trends of inputs and outputs, double deflation is the right method to serve the purpose. The paper also draws attention to micro-level inconsistencies and unexplained jumps in annual estimates of input – output ratios obtained from the ASI results. Finally, the paper points out the serious flaw of gathering information in ASI without updating regularly the Census sector frame at the state level. It results in ignoring new large and medium manufacturing units from the ASI results. It is shown for Gujarat state that more than 1000 such units remain uncovered by ASI resulting in the serious underestimation of vale addition of about 23%. This is likely to be a widespread phenomenon not confined only to Gujarat. Urgent action to address these problems will go a long way to improve quality and credibility of the estimates.

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1. *Introduction*

Manufacturing sector has started contributing more than the agricultural sector to the nation's Gross Domestic Product (GDP) in recent years (GoI, 2014). Finance Ministers in their budget speeches have emphasized the role of manufacturing activities in generating employment and promoting industrialization by fixing a specific target for the sector's contribution to GDP within the next five years. Currently it contributes hardly 15% to GDP. However, since revival of economic growth in India depends critically on the manufacturing activities, on margin the sector will be playing a very dominant role during the recovery.

In this context, it is pertinent to examine several measurement related issues involved in estimation of income originating in the manufacturing sector. This is because, the signals provided by estimates of GDP from this sector can be vital for the market sentiments and investments in the economy. Regional dimension in this regard is also very relevant as a few states dominate the manufacturing activities in the nation. In this note, we are raising some critical issues in estimation of income from the manufacturing sector by considering the case of Gujarat state, which is one of the leading states in the sector in the country.

We have selected Gujarat state for two reasons: a) the authors are familiar with minutest details of preparing the estimates of state income in general and the manufacturing income in particular in the state; and b) Gujarat has the highest share of manufacturing in the state income (25%) followed by Maharashtra (19%), Tamil Nadu (18%) and Haryana (17%) among the major state economies in the country in the year 2011-12 (see, Table 1). Gujarat's manufacturing also contributes 12% in the national manufacturing income, and about 17% in national industrial output.

Table 1: GSDP in Manufacturing Sector at Current Prices (2011-12)

(Rs. crores)

States	Manufacturing		Total GSDP
	In Values	% Share	
Andhra Pradesh	84374	12.73	662592
Assam	11569	9.19	125820
Bihar	10818	4.45	243269
Gujarat	**150559**	**25.32**	**594563**
Haryana	52128	17.45	298786
Karnataka	70009	15.38	455212
Kerala	23618	7.67	307906
Madhya Pradesh	34127	10.95	311670
Maharashtra	228339	19.43	1175419
Orissa	28376	13.22	214583
Punjab	42078	16.41	256374
Rajasthan	40788	10.11	403422
Tamil Nadu	122719	18.39	667202
Uttar Pradesh	79890	11.66	685292
West Bengal	48673	9.21	528316
India	1236182	14.73	8391691
Source: CSO and Directorate of Economics and Statistics of respective state governments. http://www.mospi.nic.in/Mospi_New/Admin/publication.aspx, , State data series - 2004-05 base year			

In the following four sections, we discuss issues in estimation of manufacturing income at the state level with reference to Gujarat. The first one pertains to the source used for preparing quick estimates and advanced estimates of Gross State Domestic Product (GSDP) originating in the manufacturing sector and consequent problems arising while revising the estimates. The third section discusses the methodological issue creating problems in preparing the constant price estimates of value added from the sector. The fourth section raises the issue about unexplained jumps in annual estimates of income from the sector in some states. The fifth section draws attention to a major limitation of the estimates of income originating from manufacturing sector based on the annual Survey of Industries (ASI) data. The last section concludes the note.

2. *Index of Industrial Production Vs Annual Survey of Industries*

The estimation of Registered Manufacturing sector of Gross State Domestic Product is based on the results of Annual Survey of Industries (ASI), CSO, Kolkata, annually released for all states of India. The estimates of Net Value Added is considered for estimation of GSDP in manufacturing sector after making all necessary adjustments for non-reporting census sector units and closed units. The results of ASI are released with a time lag of minimum two years. In absence of availability of ASI results for the latest years' manufacturing sector, All India Index of Industrial production (IIP) is used as per the methodology prescribed by Central Statistics Office (CSO) GoI, New Delhi for estimating state income from manufacturing. It would be ideal to have the State's own IIP, but hardly any state has its own IIP. Under such circumstances, All India IIP is prescribed to be used for estimating states' income from manufacturing sector for the latest years.

When, ASI results are released, the estimates based on All India IIP will have to be replaced with ASI results. This practice of revision of estimates has been uniformly followed across the states of India to have a robust time series estimates.

Under this practice, as shown in Table 2 below, there are large differences in the annual changes in both the indicators. Sometimes, the growth in IIP is substantially higher than that given by Net Value Added (NVA) as released by ASI, Kolkata and sometimes it is considerably lower. The simple correlation coefficient between the two series of five observations works out to only 0.3424, which is statistically not different from zero. Now, the growth rate estimated though IIP would undergo revision on availability of ASI results. On account of substantial share of manufacturing sector to State GSDP in Gujarat as seen from Table 1 , such a substantial revision in manufacturing income leads to major revision in aggregate GSDP and hence in annual growth rates. Such revisions, therefore, become the target of serious criticism by media and doubts are raised on the integrity of the estimation of GSDP as a whole. In other states, such revisions do not create serious problems because the weight of manufacturing sector is much less than in Gujarat (Table 1).

If we look at the data of past few years, the net value added at current prices in manufacturing declined in the state during the years 2008-09, 2010-11 and 2011-12, and yet the IIP showed positive growth for the same years (Table 2). For instance, in the year, 2010-11, the All India IIP growth was 8.93 %, which was taken to derive the quick estimates for the year as per the CSO methodology. However, later while revising to actual and more reliable estimates using the ASI results, the nominal growth rate turned out to be – 0.64% for the year. When we deflated these figures with the wholesale price index for manufacturing[1], it led to a downward revision of about 15%, resulting into a decline in overall GSDP growth since the share of this sector is substantial in Gujarat. Such revisions on account of one of the most organized sectors of the economy, viz. manufacturing, puts big question marks on the credibility of the state income estimation and hence on the Directorate of Economics and Statistics in the state.

The state is in the process of the preparing state level IIP to address this problem, but it will take time to test it out for stability and reliability. It may also be pointed out that IIP is an output indicator, whereas ASI provides Net Value Added (NVA) indicator which is net of intermediate consumption or input and depreciation. This is crucial for all those states like Gujarat where the industrial structure and patterns are changing rapidly and so also the technology. State income or GSDP is based on NVA and hence IIP is not the right indicator to use. Even as a proxy it could be highly misleading as we have seen in the case of Gujarat in recent years.

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[1] Even the WPI for manufacturing used for deflating the nominal values at the state level uses the all India weights and hence is strictly speaking irrelevant. Gujarat and many other states are very different from the average for the nation in terms of industrial structure and pattern. As a result, the WPI for manufacturing relevant for Gujarat would be different from the national one.

Table 2 : Annual Growth in Registered Manufacturing in Gujarat: Net Value Added Vs All India IIP

Year	Net Value Added (ASI) (Rs Crore)	% Change	All India IIP	% Change	Difference (in % pts)
1.	2.	3.	4.	5.	6=3 – 5.
2006-07	47952		126.8		
2007-08	62108	29.52	150.1	18.38	+ 9.14
2008-09	60417	-2.72	153.8	2.47	- 5.19
2009-10	90028	49.01	161.3	4.88	+ 44.13
2010-11	89448	-0.64	175.7	8.93	- 9.57
2011-12	87691	-1.96	181.0	3.02	- 4.98

Source: CSO and ASI.

Thus, this issue of different data sources used in Estimation of Quick and Revised estimates of income from the manufacturing sector in the state economies like Gujarat, needs urgent attention and some amicable solution prior to shifting to new base year of 2011-12 for the GSDP series.

3. High Input Rates and Real NVA

Unlike in agriculture sector, the inputs are not separately deflated in registered manufacturing sector. In the recent years, the input-output ratio in Gujarat is increasing (Table 3). As a result, although, the growth in value of output is significant, say 15 - 20%, the growth in gross value added becomes marginal or even negative on account of high input growth. For instance for the year 2010-11, the growth in output is about 25 %, while in input is about 30% leading to an increase in Net Value Added by mere 1.2 % at current prices. It results into negative growth in the sector at constant prices.

Table 3: Input output ratio in Registered Manufacturing - Major Manufacturing States

Year	Gujarat	Maharashtra	Tamil Nadu	Karnataka	All India
2004-05	0.8289	0.8317	0.8311	0.7789	0.8149
2005-06	0.8127	0.7750	0.8222	0.8137	0.8089
2006-07	0.8374	0.8389	0.8240	0.7795	0.8089
2007-08	0.8322	0.7642	0.8235	0.7854	0.8009
2008-09	0.8529	0.7874	0.8377	0.7840	0.8132
2009-10	0.8315	0.7837	0.8087	0.8134	0.8132
2010-11	0.8641	0.7854	0.8189	0.8288	0.8235
2011-12	0.8893	0.8217	0.8489	0.7150	0.8307

Source: ASI, Kolkata

This happens because in the manufacturing sector, we continue to follow the single deflation method to derive NVA at constant prices, although the CSO (2007) and UNSC(2008) clearly recommend double deflation method for the purpose. If the inputs are deflated separately as in the case of agriculture sector, which amounts to double deflation, such distortions in the NVA growth can be avoided. Since the state bureaus are not likely to have sufficient details on the inputs used in manufacturing at disaggregated level, both the problems about the quality of disaggregated input-output data and distortions in NVA estimation can be solved if CSO asks the ASI at Kolkata to provide NVA estimates at current prices as well as constant prices duly deflated by the double deflation method. This would moreover enhance the quality of estimation not only at state level but also at the national level.

Another serious data issue arises when we consider the ASI data at micro-level. At the macro-level, when we consider only two digit level industry groups or the nation as a whole, such data problems do not surface because of aggregation. However, at the state level, there are sub-industry groups at three digit levels and below where negative gross value added at current prices is obtained. This is economically meaningless and hard to explain particularly because any private sector unit would not operate under such conditions. Only if the industry groups are

dominated by the public sector units, existence of negative nominal value added can be explained.

Table 4: 3-Digit Industry Groups Showing Negative GVA in Gujarat, ASI 2011-12.

NIC 2 Digit level Industry Group			NIC 3 Digit level Industry group		
Industry Group	Name of the Group	GVA (Rs Lakh)	Industry Group	Name of the Group	GVA (Rs Lakh)
14	Manufacturing of Wearing Apparel	23817	142	Manufacturing of Articles of Fur	-9482
26	Manufacture of computer, electronic and optical products	91992	262	Manufacture of Computer & Peripheral	-2262
30	Manufacture of other transport equipment	122741	302	Manufacture of railway locomotives and rolling stock	-16117

In order to probe further into the micro-level inconsistency in reporting value added data, we have identified three digit level industry groups in Gujarat from the ASI, 2010-11 where GVA at current prices is negative (Table 4). As we can be seen from the table, not all the three digit level industry groups showing negative GVA in nominal terms in Gujarat are having dominance of public sector units. For instance, the industry groups # 142 and 262 do not have any public sector unit in Gujarat and yet shows negative GVA. This raises doubts about the quality of reported data in ASI.

Primary intention of posing this problem is that while estimating the Net Value Added at macro-level, such micro-level inconsistencies and counter-intuitive estimates of value added are invariably overlooked. Correcting for such inconsistencies at micro-level can definitely improve quality of estimates even at the macro-level.

4. *Unexplained Jumps in the Annual Estimates*

One more dimension emerging from Table 3 is the behavior of the input-output ratio in the manufacturing sector in all the key manufacturing states under comparison. It has either increased or stagnated in most States during the last decade. On the other hand, in Karnataka it has substantially declined during 2011-12 compared to 2010-11. Such a distinguished trend in case of Karnataka needs some explanation, which is not provided. If the ratio has indeed improved in Karnataka, it should be treated as a role model for the states like Gujarat, Maharashtra, Tamil Nadu and the few other states where this ratio is worsening over the period of time[2]. Since the increased input costs have direct bearing on Net Value Addition, the policy makers at both the state and the center should examine the matter closely.

An interesting implication of such trends in the input-output ratio in the manufacturing sector is on the annual growth in NVA in the sector of the states. As per the final results of ASI 2011-12, the NVA in manufacturing of Karnataka rose substantially from Rs 40,861 crore to Rs 1,03,165 crore indicating a rise of more than 152.5 per cent in only one year (Table 5)! This resulted in Karnataka surpassing the states like Tamil Nadu and Gujarat, consistently at third and second position after Maharashtra. Such steep jumps in estimates merit a close scrutiny and require thorough inquiry prior to their release. If such a rise is indeed observed, an explanatory note on the same needs to be provided for the benefits of other states.

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[2] Further, the increasing Input-Output ratio of Gujarat poses threats to the overall efficiency of the sector. The same is alarmingly high or highest among the major four manufacturing state economies, particularly after 2007-08. Unlike others, the state manufacturing sector is incurring more input costs year by year. The I-O ratio of Gujarat has gone up from 0.8289 in 2004-05 to 0.8893 in 2011-12 as per the ASI estimates.

Table 5: NVA Growth in Registered Manufacturing for Four Major States (2010-11 to 2011-12)

States	Net Value Added (Rs Crore)		% Change
	2010-11	2011-12	
Maharashtra	149696	156766	4.7
Gujarat	89448	87691	-2.0
Tamil Nadu	71993	76956	6.9
Karnataka	40861	103165	152.5
Source: ASI, 2010-11 & 2011-12. http://www.mospi.nic.in/Mospi_New/upload/asi/ASI_main.htm?status=1&menu_id=88, ASI summary Result 2011-12----- Table 3: Principal Characterstics By Major States for the year 2011-2012 .			

It is intriguing, however, that this estimate of NVA in the ASI manufacturing sector is also on the same website of MOSPI where the other estimate of GSDP originating in total manufacturing sector in Karnataka is also reported. Surprisingly, the latter estimate is substantially lower than the former, which is simply inconsistent and not possible unless one of the two estimates is rejected or is not accepted by the state bureau. In all probability, DES of Karnataka might have refused to accept the NVA estimate from the ASI sector, which appears to be implausible. In any case, if these estimates are published and put on the official website, they may create confusion in the first instant and lead to loss of credibility of both the estimates ultimately.

5. *Incomplete Frame for the Census Sector in ASI*

Another issue noticed in recent time is of updating the ASI frame. There are about 3068 census sector factories as per the list of State Industrial Extension Bureau (INDEXTb) in Gujarat, while, as per the ASI frame of Census sector as used by the Industrial Statistical Wing of CSO, Kolkata, there are about 1950 census sector factories surveyed during 2011-12. Thus, about 1118 factories consisting of nearly 780 large industries and 338 medium industries having

more than 100 workers are left uncovered by the ASI in the state. If the frame is updated with this large number of uncovered factories, the net value added in the industrial sector in Gujarat may rise substantially. This is also likely to be the case in other states.

An attempt has been made to estimate the Net Value Added from uncovered industries in Gujarat to get an idea about the seriousness of the issue. For estimation of Net Value Added from the uncovered industries, an income approach is followed because the only data available for such units is on employment. Incidentally, the same approach is prescribed by CSO for estimation of the unorganized sector of the economy.

The NIC group wise data on employment are available for the left out factories. The same is multiplied with the NIC group wise value added per worker (NAPW) obtained from the reported ASI data for the year 2011-12 to arrive at the estimates of NVA for the left out factories (Table 6).

Table 6: Estimates of NAV from Large & Medium Factories Uncovered in the Existing ASI Frame in Gujarat, 2011-12.

NIC 2008	Description (Industry Group NIC 2008- 2 digit)	2011-12 Reported from ASI		Estimated NVA from Uncovered Units in ASI		
		NVA (in Rs. lakh)	Employment (in No.)	NIC wise Employees not covered (in No.)	NVA per Employee (in Rs. lakh)	NVA from Uncovered Units (in Rs. lakh)
01-10-11-12	Manufacturing of Food Products	934561	117693	25362	7.9407	201391
	Manufacturing of Beverages & Tobacco					
13-14	Manufacturing to Cotton Textiles	551206	264607	58803	2.0831	122493
	Manufacting of Wool Silk and manmaid fibre textiles					
	Manufacturing of Jute and other vegetable fibre textiles (Except Cotton)					
	Manufactuing of Textile					

	Products					
16-31	Manufacturing of wood and wood products, furniture and fixtures	29096	10601	--	2.7446	--
17-18	Manufacturing of Paper and paper products, printing, publishing and allied activites	103359	34039	8801	3.0365	26724
15	Manufacturing of leather and products of leather, fur substitutes of leathers	3978	553	899	7.1935	6467
08-20-21	Manufacturing of Chemicals and Chemical products (Except products of petroleum and coal)	2745211	247620	48672	11.0864	539597
19-22	Manufacturing of Rubber,Plastic,Petroleum and Coal Products	1521165	71856	16645	21.1696	352369
23	Manufacturing of Non metallic mineral products	554219	137127	24649	4.0416	99623
24	Basic metals and industrial alloys	415141	99618	16223	4.1673	67607
25	Manufacturing of metal products and parts Except Machinary and Equipment	293940	74503	1386	3.9453	5468
26-27-28	Manufactuing of Machinaries and Equipment except Transport Equipment	928720	170881	36295	5.4349	197259
29-30	Manufacturing of Transport Equipment	139911	34244	4156	4.0857	16980
32	Other Manufacturing Industries	268189	85954	44671	3.1201	139380
33	Repair of Capital Goods	17048	3954	--	4.3116	--
38-58-others	Others	263381	30524	4450	8.6287	38398
	Total	8769125	1383774	291012		**1813755**

Source: ASI, 2011-12 and INDEXTb, Govt. of Gujarat.

The details available for 338 medium industries did not have classification as per the NIC group or otherwise broad industries groups, though it was possible to identify the industry groups for 187 out of 338 medium industries. These were chemical industries, textile industries, paper industries, gems & jewelry and metal industries and hence they were classified and included in

the calculations in Table 6. However, the remaining 151 industries, where the nomenclature was either as "exports units" or as "processors units" were not classified accordingly to any specific group. The value added per worker for these industries was worked out from the reported data in ASI 2011-12, excluding the above-mentioned industry groups for the sake of conservatism. As a result, the VAPW worked out at Rs 4.55 lakh, which is far less than the average VAPW of more than Rs. 6 lakhs. By multiplying Rs. 4.55 lakh of VAPW with the workforce of 36377 in the 151 industries, the NVA is estimated at Rs 165515 lakh.

Thus, in the aggregate, the Net Value Added estimated from the uncovered factories on a conservative side amounts to Rs 19792.70 crores and remains uncaptured for Gujarat under the present frame of ASI, Kolkata. As a proportion of the Reported NVA in the ASI, 2011-12, the uncovered NVA works out to 23%. Thus, proper reporting and estimation would raise the GSDP in the manufacturing sector by *at least 23%* in Gujarat.

In this context, it may be recognized that the primary responsibility of updating the frame of ASI census sector rests with the office of the Chief Inspector of Factories in the respective state governments, who provides it to the state based Field Operations Division of National Sample Survey Office. Better co-ordination and communication between both the center and state agencies engaged in such critical data collection activities of Annual Survey of Industries is urgently needed in the interest of providing accurate and reliable estimates of income originating in the industrial sector in the country.

6. Concluding Remarks

In this short paper, we have discussed some serious issues in the estimation of state income originating in the registered manufacturing sector with illustrations from Gujarat that have been affecting the quality and reliability of the estimates of the state income. The preparation of quick estimates for most recent years for the manufacturing sector has been dependent on the All India Index of Industrial Production (IIP) in the face of non-availability of the regular source of Annual Survey of Industries (ASI). Use of IIP is shown to be thoroughly

inadequate and highly misleading for preparing the quick estimates of state income. Some reasonable and efficient solution to this problem is urgently needed to gain confidence of the users of these estimates. Otherwise the credibility of the estimates and their revision later is at stake.

Another issue is about the methodology followed to derive the constant price estimates of the income originating in the registered manufacturing sector. Instead of the recommended method of double deflation, the estimates are prepared on the basis of single deflation. When the industrial structure and technology undergo substantial changes, and when the input and output prices show significantly different behavior, this can result in serious distortions in the estimates. Since states do not have access to details on inputs and outputs by industry groups available in time, the CSO should carry out the exercise of applying double deflation method and provide the estimates of real NVA in the ASI sector to the states to improve the quality of estimation.

Wide annual fluctuations without adequate explanation in the estimates of NVA in the registered manufacturing sector at the state level do undermine the credibility of the exercise. Users of such estimates over time can be baffled by the implications and can be driven to very undesirable conclusions. The issue of micro-level consistency and plausibility of estimates of GVA and data collection under ASI also merits attention. Checking only macro-level consistency of the estimates can hide some uncomfortable inconsistencies at micro-level and can be highly misleading for the users.

Finally, the state level ASI frame to collect data needs to be regularly updated, which is not done for one or the other reason. This results in the estimates of the most organized economic activity like registered manufacturing to be unreliable and outdated. In Gujarat alone, more than 1000 units remain uncovered by the Annual Survey of Industries. They account for almost 23% of the NVA in the sector reported by the ASI. Thus, the official estimates seriously under-report the NVA from the registered manufacturing sector. There is an urgent need to correct this situation.

It is important to realize that as we grow as a nation putting more and more emphasis on the manufacturing sector, such drawbacks and limitation in estimating the correct income from the sector can thoroughly mislead the policies and efforts in the sector. The case of Gujarat shows that an economy with high proportion of manufacturing activities would suffer more by such issues and limitations of the income estimation in the manufacturing sector. These problems have to be fixed sooner than later.

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