Some unsettled questions about Indian manufacturing GDP estimation

July 2017

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Abstract

We discuss some unsettled questions about the GDP estimation process in the manufacturing sector. We further the debate on the Paid-Up Capital based blow up method of GVA by showing evidence of divergence between Paid-Up Capital and GVA contribution. We also highlight problems with measures of output and cost and identification of manufacturing firms for purposes of GVA estimation. We argue that the recourse lies in finding an alternative to the Paid-Up Capital blow up factor and that identification of firms remains a crucial problem to solve.

Published as: Sapre, Amey and Sinha Pramod (2017) Some unsettled questions about Indian manufacturing GDP estimation, *Journal of Indian School of Political Economy*, Vol. XXIX, No. 1 & 2, Jan-June 2017

The views expressed in the paper are those of the authors. No responsibility for them should be attributed to IIT Kanpur or NIPFP.

Acknowledgments We are thankful to Dr. Vikas Chitre, Dr. RH Dholakia, Dr. G. C. Manna and Dr. Mahendra Dev for helpful discussions.

1 Background

In this paper, we deal with some unsettled questions on estimation of value addition in the manufacturing sector. The ongoing debate on the manufacturing sector estimates has touched various aspects, and several questions regarding data and methods have been explored. A meaningful literature on the subject can be found in Sapre and Sinha (2016), Nagaraj (2015a, 2015b), CSO (2015), Shetty (2015), Rao (2015). In a new series of papers on the subject, Shetty and Rajakumar (2017) and Manna (2017) further the debate on changes in methodologies in the new series. In particular, Manna (2017) presents brief details of the Paid-Up Capital factor based blow up of Gross Value Addition (GVA) and argues that the data coverage in MCA21 is adequate for estimation purposes and that separate blow up factors are appropriate for different size classes of Paid-Up Capital. In this paper, we explore these two aspects in the light of previous findings and also summarise some unsettled questions relating to the computation of GVA.

It has been well documented that since the release of the 2011-12 series, large and unexpected revisions in subsector and aggregate GDP led to question the reliability of the estimates and also prompted a series of commentaries and papers on decoding the growth figures in the manufacturing sector. Nevertheless, key questions about computation and data sources remained unanswered. In Sapre and Sinha (2016), we conduct a detailed analysis of the estimation process for the set of firms that file in the XBRL format in MCA21. By recreating the estimation process, we show some inconsistencies that can distort value addition, and present an inaccurate picture of the state of the sector. In doing so, we narrow the set of problems into three key questions:

1. Are output and intermediate consumption appropriately measured in the GVA formula?
2. Are output and intermediate consumption appropriately measured in the GVA formula?
3. Are manufacturing firms correctly identified in the computation process?

To further build on the questions, in this paper, we first deal with the question of blow up using the Paid-Up Capital method. In summarising the literature on this question, one has to take recourse to available information in CSO (2015b), Nagaraj (2015a, 2015b) and Rajakumar (2015). Conceptually, as is understood, blow-up of GVA is an imputation method to account for data of unavailable companies.

The existing Paid-Up Capital (PUC) based blow-up method relies on the assumption that PUC and GVA have a one-to-one, or a linear relation and that this relation is the same for companies which have filed returns in the XBRL format in MCA21 (available companies) and those which have not (unavailable companies). Therefore, in the absence of data, Paid-up Capital of available companies can be used to infer the value addition done by unavailable companies. Several variants of the method are possible, such as; blow-up for each range of Paid-up Capital, blow-up by industry group, by ownership type of company, among others. Some of these variants have been pointed out in Shetty (2015) and Manna (2017). However, details of the procedure have not been widely documented in official publications

2 Problems with Paid-Up Capital based blow-up method

To conceptualise the method and visualise its effect, one has to resort to a sample based exercise using a comparable data such that it mimics the actual process. In Sapre and Sinha (2016), we replicate the blow-up process by constructing an available and active set of XBRL companies based on random samples that give different Paid-up Capital coverage [see Note 1]. Upon replication, several inconsistencies become visible. First, the basic assumption of a linear relation between PUC and GVA does not hold as per the size distribution of Paid-Up Capital. The same cannot be inferred with certainty for any time period as levels of economic activity and value addition can vary significantly across industries. Since business activity is driven by economic conditions faced by firms across industry, one cannot draw sufficient and reliable inferences about a firms manufacturing activities by looking at its Paid-up Capital value.

In Table 1, using a sample of comparable firms, we tabulate the Paid-Up Capital and GVA of firms for various class sizes of PUC. Comparing columns 3 and 4, the distribution does not clearly establish a one-to-one correspondence between PUC and GVA, particularly for the larger companies [see Note 2]. The distribution also shows negative values of GVA for all PUC classes which rules out the case for a one-to-one correspondence between PUC and GVA.

Table 1: Distribution of Paid-Up Capital and GVA of firms (2011-12, current prices)

PUC Range (Rs. Cr.)	N Firms	PUC (Rs. Cr.)	GVA (Rs. Cr.)	Min (GVA)	Max (GVA)	Avg. (GVA)	SD (GVA)
1	2	3	4	5	6	7	8
Up to 0.01	82	0.82	23.63	-2.56	20.81	0.29	2.46
Above 0.01 - 0.05	274	13.43	1977.39	-113.89	1854.66	7.22	112.48
Above 0.05 - 0.1	86	7.18	216.18	-436.37	186.5	2.51	55.23
Above 0.1 - 0.25	156	30.97	603.32	-103.01	186.59	3.87	18.27
Above 0.25 - 0.5	182	74.74	1569.92	-4.92	133.56	8.63	18.87
Above 0.5 - 1	298	235.06	4523.46	-17.85	495.56	15.18	41.27
Above 1 - 2	328	507.71	5975.45	-29.9	585.74	18.22	47.63
Above 2 - 5	902	3287.48	23002.44	-85.37	2515.77	25.5	101.99
Above 5 - 10	835	6030.89	42062.43	-189.58	2758.8	50.37	130.38
Above 10 - 25	971	15347.17	98608.91	-514.77	2048.36	101.55	181.88
Above 25 - 50	387	13329.87	98477.74	-876.5	5008.28	254.46	521.86
Above 50 - 100	202	14464.75	97073.49	-1088.1	7019.1	480.56	890.06
Above 100 - 250	115	17381.03	102984.1	-955.91	10215.99	895.51	1750.28
Above 250 - 500	40	13252.39	112373.9	-2.53	21144.37	2809.35	4186.68
Above 500 - 750	19	11140.56	17675.16	-266.67	8392.07	930.27	1886.55
Above 750 - 1000	8	6759.58	46366.18	-15.59	20625.66	5795.77	7600.25
Above 1000	14	38449.23	113777.4	-49.82	47787	8126.95	13462.05
Total	4899	140312.9	767291				

Notes: Computed from CMIE Prowess, Source: Sapre and Sinha (2016)

A firm registers negative GVA in a loss making situation, i.e. when the intermediate costs are higher than value of output. This is a genuine concern at the firm level, but the same is not visible when GVA is aggregated for various classes of PUC. In our previous work, we have shown that firms have negative GVAs in all classes of PUC, and even if a separate blow-up factor is used for all PUC classes, it still leaves a possibility of over-estimation as the method uses PUC, instead of GVA. This is due to the fact that the Paid-Up Capital value of a firm is always positive, and in terms of blow-up, the PUC method will always contribute positively, irrespective of the actual contribution of the unavailable firm.

The extent of variation in GVA for any class size of PUC is also of importance. If we compare the extent of variation given in column 8, it indicates that a single PUC factor even within a class interval may not be representative of the value addition contributed by firms in this paid-up capital class interval. To further our understanding about the PUC based blow up, Manna (2017) presents a brief summary of PUC and GVA distribution of an active set of firms for 2012-13. Using the same analogy, we compute the cumulative distribution and shares of each size class of PUC from values given in Table 1. The values are presented in Table 2.

Table 2: Distribution and share of Paid-Up Capital and GVA of firms (2011-12, current prices)

PUC.Range (Rs. Cr.)	N Firms	PUC (Rs. Cr.)	Cum. PUC	Share PUC	GVA (Rs. Cr.)	Cum. GVA	Share GVA
1	2	3	4	5	6	7	8
Up to 0.01	82	0.82	0.82	0.001	23.63	23.63	0.003
Above 0.01 - 0.05	274	13.43	14.25	0.010	1977.39	2001.02	0.261
Above 0.05 - 0.1	86	7.18	21.43	0.015	216.18	2217.2	0.289
Above 0.1 - 0.25	156	30.97	52.4	0.037	603.32	2820.52	0.368
Above 0.25 - 0.5	182	74.74	127.14	0.091	1569.92	4390.44	0.572
Above 0.5 - 1	298	235.06	362.2	0.258	4523.46	8913.9	1.162
Above 1 - 2	328	507.71	869.91	0.620	5975.45	14889.35	1.941
Above 2 - 5	902	3287.48	4157.39	2.963	23002.44	37891.79	4.938
Above 5 - 10	835	6030.89	10188.28	7.261	42062.43	79954.22	10.420
Above 10 - 25	971	15347.17	25535.45	18.199	98608.91	178563.1	23.272
Above 25 - 50	387	13329.87	38865.32	27.699	98477.74	277040.9	36.106
Above 50 - 100	202	14464.75	53330.07	38.008	97073.49	374114.4	48.758
Above 100 - 250	115	17381.03	70711.1	50.395	102984.1	477098.4	62.180
Above 250 - 500	40	13252.39	83963.49	59.840	112373.9	589472.3	76.825
Above 500 - 750	19	11140.56	95104.05	67.780	17675.16	607147.4	79.129
Above 750 - 1000	8	6759.58	101863.6	72.598	46366.18	653513.6	85.172
Above 1000	14	38449.23	140312.9	100.000	113777.4	767291	100.000
Total	4899	140312.9			767291		

Notes: Cum. PUC is cumulative Paid-Up Capital, Cum. GVA is cumulative Gross Value Added
Share denotes the value of each class size as a proportion of the sum total value

Comparing the cumulative distributions and shares (columns 5 and 8) of PUC and GVA, we can note that they do not represent a relation that is sufficient to infer about the GVA contribution of firms [see Note 3]. As the blow up formula linearly scales GVA by the PUC factor, the method overlooks the fact that PUC and GVA distributions are not identical. Given wide variations within a class interval, the similarity of trend between PUC and GVA does not build an appropriate case for using the PUC factor for blow up [see Note 4] Manna (2017) also presents the statistics of the GVA/PUC ratio, which is declining for increasing class intervals of PUC. While this is true and expected on account of rising Paid-Up Capital in each class interval, the ratio does not provide enough evidence to conclude a systemic or identical distribution of PUC and GVA. In turn, the share or the ratio both critically depend on the number of available companies and as previously, variations in annual filings considerably limit the scope of such statistic to be used for blow up of GVA.

To visualise this limitation in detail, computationally, it has been shown in Sapre & Sinha (2016) that the blow-up factor increases as Paid-Up Capital coverage declines, and with annual variations, the extent of blow up remains unpredictable. The PUC

based method also lacks a qualitative aspect in scaling up GVA. The method is numeric in nature and does not adequately capture the economic conditions faced by the firms as the blow up factor depends only on the extent of PUC coverage of available firms, and not on the actual GVA contribution of unavailable firms. Other alternatives of using fixed assets as proposed in Manna (2017) or use of representative industry growth rate as attempted in Sapre and Sinha (2016) could be considered and modified to replace the existing method.

3 Some unsettled questions

Other than the blow up issue, we also summarise some unsettled questions about the computation process. First, under the erstwhile establishment approach, "Sales" was a measure of output. In the current enterprise approach formula, several disaggregated components of revenues from products, services, operating revenues, financial services, rental income, revenues from brokerage & commission and other non-operating incomes are part of output. In CSO (2015b), there is a limited discussion on the inclusion or exclusion of several revenue fields in GVA computation. However, it is evident from the output composition that value addition is not solely accruing from manufacturing activities, but also from several related/ancillary activities. This leads to inflated GVA levels as the component of output is now similar to the total income of the company, and not industrial sales. For instance, revenues from financial services, rents, non-operating incomes are now included in the measure of output.

Second, identifying components of intermediate consumption at the enterprise level is equally difficult. Conventionally, subtracting the cost items (related to production) from output provides a measure of value addition entirely from manufacturing activities. However, with large and diversified enterprises, identifying cost items from financial data fields can pose significant challenges. A close scrutiny of the XBRL fields shows omission of important cost components, such as; Power & Fuel expenses, advertisement and marketing related expenses [see Note 5]. These are sizeable components and their omission can underestimate costs, thereby overestimating GVA. Since diversified companies can have both manufacturing and trading incomes, it is essential to segregate them for the purpose of computing value addition solely from manufacturing activities.

The next important question is on identification of manufacturing firms. The answer available in public domain is that the CSO primarily relies on ITC-HS codes for identifying companies. The ITC-HS is an 8 digit coding system that identifies a commodity for the purpose of import/export and domestic movement of goods. In

the MCA21 forms, a company is required to furnish product codes of their three top revenue generating products. However, compliance on this requirement has been a major issue. From CSO (2015b), one can infer that in 2011-12 only 59% of the total XBRL companies reported their product codes. This deficiency prompted an alternative strategy of using the NIC digits contained in the Company Identification Number (CIN) for identification. However, in absence of the ITC-HS codes, using CIN code for identification can potentially lead to a misclassification of companies. It is known that CIN, which contains the NIC classification, does not change once it has been created for a company. Over time, a company may change the nature of its business activity or diversify into any other sector. While doing so, the change of business activity is not reflected in the CIN code of the company. Thus, using CIN can be potentially misleading for identifying the nature of business of a company since its top revenue generating activity might be different from the one mentioned in its CIN code.

Also, in the manufacturing sector, it is common to find that several companies operate as wholesale trading, financing, renting or as service providers in the name of manufacturing. Thus, registration details of a company are typically insufficient to infer the nature of its business activity. Similarly, a reverse problem could also exist, wherein companies registered in other economic activities may undertake manufacturing activities. Such instances complicate the process of identification and will require alternative solutions.

At present, the distortion in GVA due to the misclassification problem is unknown. Since ITC-HS codes identify a product and not an economic activity, it does not ensure that value addition specifically of manufacturing firms is being captured. Identification of the business activity remains a pre-requisite. It is undeniable that wrongly classified trading and manufacturing companies will show an incorrect GVA contribution of different sub-sectors. On the aggregate, both manufacturing and services sector will show a distorted picture. These difficulties are compounded while using the deflator for converting nominal to real values.

Solving the problem of identifying contribution of manufacturing activity from trading or other activities is a complex task. At present, no clear solution exists, especially when companies have to be identified on a yearly basis. As firms may have different sources of revenue and may even change their business model, their top revenue generating activity would have to be identified so as to correctly classify them as either manufacturing or service sector companies. What can be a way forward in this regard?

A possible solution can be conceived as follows. Currently, section II in theForm No. MGT 7, [pursuant to section 92(3) of the Companies Act, 2013, and Rule 12(1) of the Companies (Management and Administration) Rules, 2014] requires companies to

furnish up to tenprincipal business activities. Broadly, the information collected is; main activity group, activitieswith respective codes and their share in total turnover. Under this arrangement, the main activity has 21 different codes from A to U, each representing a particular activity. For example, a company reporting code C indicates a manufacturing concern, while code G shows trading. However, when non-reporting takes place, these codes alone will not solve the problem. A scrutiny of product schedules and financial statements is still needed.

To aid the scrutiny of the financial statements, a simple statistical analysis of ratios can help in identifying the characteristics of the manufacturing sector, and can be used to classify firms. A set of financial ratios can be applied to ascertain the highest revenue contribution on a yearly basis and at the same time allow a cross-check with reported codes and declaration under ofForm No. MGT 7. For instance, certain rules of thumb can be implemented to identify the characteristics of firms and the information can be cross-checked with reported codes of business activity. Consider two possible cases.

For a trading firm: Typically, for a trading company, from the revenue side, the income from trading to total turnover ratio would be higher than income from manufacturing. From the expenditure side, the ratio of purchase of finished goods to total expenses would be higher than the expenses on manufacturing.

For a manufacturing firm: In this case, from the revenue side, the ratio of income from sales to total turnover would be much higher than the ratio of trading income to total turnover. Similarly, from the expenditure side, the ratio of purchase of raw materials to total expenses would be much higher than expenses on trading. Also, for a manufacturing company, excise duty would form a significant part of the indirect tax payments.

The approach provides an objective mechanism to tackle the identification on a large scale. Given that several imperfections exist in identifying the nature of business activity, an objective method can be used to minimise the extent of misclassification, and at the same time builds a cross-checking mechanism to corroborate with other reported details.

4 Conclusion

The 2011-12 series has thrown up several conceptual and methodological questions. While new sources and methods have improved the coverage and quality of the national accounts, they have also changed our view about estimating and understanding value addition, particularly in the manufacturing sector. Building on our findings in Sapre &

Sinha (2016), detailed investigation into the computation process shows several areas of concerns about measuring outputs, costs, overestimation due to blow-up of GVA in case of unavailable data and identification of manufacturing companies. While there is a possibility of overestimation of GVA due to the use of blow-up factors based on coverage by the Paid-Up Capital, the issue is of finding a suitable replacement to the PUC factor. As we further the debate about problems in estimation, the remedy lies in understanding the actual MCA21 data, the annual filing process and a detailed scrutiny of the fields that are used in computation. As more qualitative information becomes available, it is surely the case that most of contentious issues can be resolved by improving on the sources and methods of GDP estimation.

Notes

1. Using data from CMIE Prowess, the blow up factor was computed by making a set of active and available set of companies that qualified for filing in the XBRL format. Based on the formula, the blow-up factor was computed as the inverse of the ratio of PUC of active to available companies, i.e. $\left[1/\left(\frac{\sum PUC_a}{\sum PUC_A}\right)\right]$, where (a) and (A) denote active and available companies.

2. The argument of a stable PUC-GVA for all PUC classes presupposes a well-defined relationship. We argue that this relation does not hold. At a firm level, GVA can be negative, while PUC will always be positive, hence using PUC at the aggregate (or for any PUC class) as a blow-up factor can be misleading and will over-state the GVA contribution for firms that have registered negative value addition. Second, if the PUC representation for larger companies is close to 100 per cent, then there is no need to blow-up for that PUC class. Since by definition, if the PUC ratio of available to active is 1 (i.e. 100%), then the GVA need not be blown up, even if there are unavailable companies. The problem, as we understand, is that there is no historic data to analyse the trend of PUC and GVA contribution of MCA21 set of firms. Thus, the stability of the relation cannot be verified. We also argue that since the blow-up is done at some level of aggregation, the method overlooks the fact that PUC and GVA contribution at the firm level can be very different from the aggregate picture.

3. It may be that these depend uponthe number of firms in each size class of PUC and it may be necessary to normalise the PUC and GVA for each class by the number of firms in each class.We had initially considered this approach, but in absence of any historical information on number of firms, their aggregate PUC and GVA, we did not pursue this approach. We believe that PUC coverage is largely determined by the number of firms in the active set. Since the active set considers firms that have filed at least once in the past three financial years, it is difficult to adopt a normalising technique for a year on year basis. We agree that number of firms in each PUC class matter, but the blow-up method only takes into account the value of PUC and not the number of firms. Thus, in any given year, a smaller number of

firms can contribute to a higher PUC coverage, hence, there is no unique way of normalising the PUC and GVA contributions.

4. We argue that a linear relation alone is not sufficient to conclude on the usability of PUC ratio as a blow-up factor. It is obvious that the blow-up factor will vary from year to year, primarily on two counts; (i) changing active set and (ii) PUC coverage. At present, there is no evidence to show that the PUC based blow-up is close to the actual contribution of the unavailable firms. In our paper, Sapre & Sinha (2016), we have shown that the addition due to blow-up is unpredictable and is much larger in some cases when compared with the actual contribution of the unavailable firms. Thus, by using any version of the PUC based blow-up, the possibility of overestimation cannot be ruled out.

5. Data on Advertisement and marketing related expenses is available in the XBRL form. However, we were unable to find the specific fields in the formula given in the Goldar Committee report.

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