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Four years after the Base-Year Revision:Taking stock of the debate surrounding India's National Accounts Estimates

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JEL Code: E01, E11

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1 Introduction

Gross Domestic Product or GDP is one of the most important macroeconomic indicators of the level of economic activity in the country.[1] It drives economic policies, is a crucial input in the fiscal calculations of the government, affects investor confidence and conveys a comprehensive picture about the health of the economy to the rest of the world. In India, while policy outcomes and performance of the economy are debated extensively using GDP growth numbers, evaluation of the quality of data and assessment of soundness of the methodology used for making the GDP estimates, does not get as much attention. The last few years have been an exception in this regard. In January 2015, the Central Statistical Office (CSO) released the 2011-12 base year series of the National Accounts Statistics (NAS) to replace the earlier 2004-05 series.[2] Since then, issues in the measurement of GDP have been at the centre–stage of academic and policy debates.

The 2011-12 series apart from changing the base year of the NAS, also introduced several methodological changes in GDP computation. These changes were done primarily to align the methods with the most recent international guidelines of the UN System of National Accounts, 2008 (SNA 2008). New data sources particularly for the private corporate sector (which includes organized manufacturing as well as service sector enterprises) were also introduced. As a result of these changes, the growth rates at the aggregate level as well as for some sectors changed significantly under the 2011-12 series as compared to the 2004-05 series, particularly for the years for which data were available in both the series.

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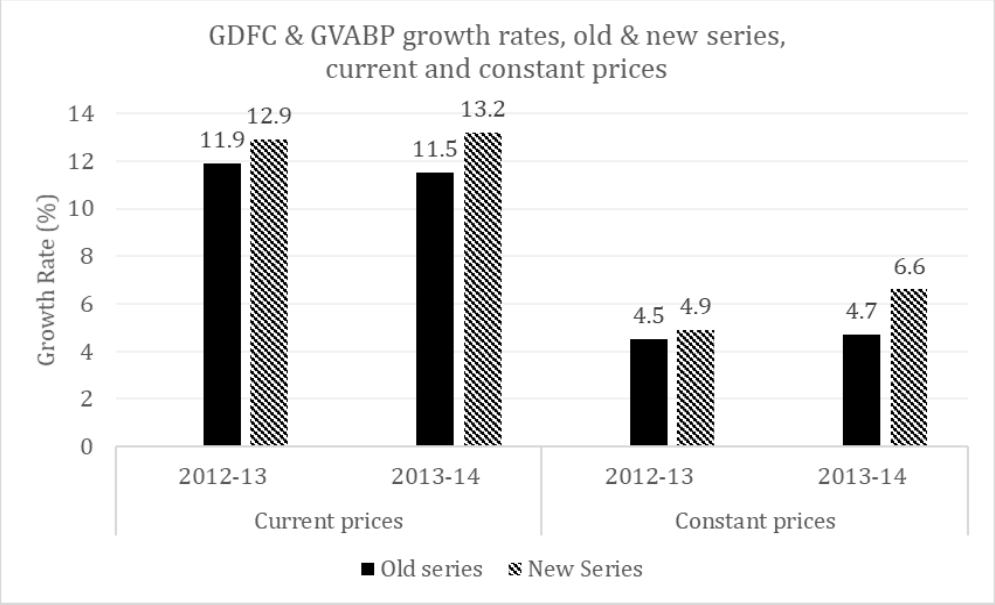
[1] GDP, or gross value added (GVA), is a measure of goods and services produced in an economy in a

[2] GDP is re-based regularly to account for changing production structure, relative prices and better recording of economic activities. Crucially, the re-basing also allows for introducing newer methodologies and improved databases. Such changes often expand the absolute GDP size because we are able to more accurately capture output. However, annual growth rates usually do not vary too much with re-basing of GDP – implying that the underlying pace of economic expansion has remained the same.

In a paper presented at the India Policy Forum 2016, Nagaraj and Srinivasan (henceforth NS, 2017) highlighted some of the core issues in the measurement of the 2011-12 series. They summarised the arguments made in studies published after the release of the NAS in 2015. According to NS (2017), while a base year revision usually leads to a marginal rise in the absolute size of the economy owing to better representation, it does not cause a big change in the annual growth rates of GDP estimates. However the latest base year revision significantly changed growth rates. It resulted in 2.3 percentage point *shrinkage* of the absolute size of GDP in the base year (2011-12), and *raised* aggregate GDP growth rates in the subsequent years.

Since the new NAS was released the biggest doubt has been about the increase in GDP growth rates for the overlapping years for which data on both old and new NAS were available. This led to suspicion of overestimated growth rates for the subsequent years. Changes took place in both real and nominal GDP growth rates, as shown in Figure 1.

Figure 1: GDP growth rates under the old and new series for overlapping years.



Changes in the sectoral real growth rates are presented in Table 1 for the overlapping set of years before the 2004-05 series was discontinued. For instance,

the changes in the manufacturing sector led to a revision in growth rates from 1.14% to 5.45% in 2012-13 and from –0.71% to 4.9% in 2013-14. Similarly, growth rates for the trade, hotels and transport sector were significantly revised from 3.02% to 6.51% for 2013-14 as compared to the 2004-05 series. The revision also altered the institutional composition of India's GDP. In particular, the size of the private corporate sector (PCS) was enlarged while the unorganised/informal/household sector got contracted, with public sector's share remaining the same.

The methodological changes responsible for these comprehensive revisions have since then been questioned by a number of academic experts and continue to capture the attention of mainstream media, both domestic and international. Over the last four years, a large number of analytical studies have identified and analysed specific problems in the data and methodology used in the 2011-12 GDP series, over and above those highlighted by NS (2017). The common question in these studies has been about the extent to which the revised growth rates paint a true picture of the economy as opposed to being an outcome of problems in the underlying methodology and data used for estimation.

In addition, new controversies related to the 2011-12 series have cropped up in recent times such as (i) release of two contradictory back series that paint diametrically opposite pictures of the historical performance of the economy, (ii) release of first revised estimates for 2016-17 which showed a staggering 8.2% growth rate in the year of demonetisation when more than 80% of the cash in the economy was removed from circulation overnight dealing a severe blow to the unorganised segment of the population and (iii) release of an NSS service sector survey report (74th round) in May 2019, that showed several gaps in the sample of firms used for GDP estimation by the CSO.

Despite growing scepticism and the wide range of questions raised by the academic community following the release of the new series, the CSO has defended

the series (see for instance CSO, 2015f and CSO, 2018) citing reasons such as adoption of international best practices, improvements in methods of estimation, and wider coverage of the economy through new datasets.

TABLE 1: GROWTH RATES OF GDP AT FACTOR COST (2004-05 SERIES) AND GVA AT BASIC PRICES (2011-12 SERIES), CONSTANT PRICES FOR COMPARABLE YEARS

	2004-05 Series Constant Prices			2011-12 Series Constant Prices		
	GDP at Factor Cost			GVA at Basic Prices		
Sector	**2011-12**	**2012-13**	**2013-14**	**2011-12**	**2012-13**	**2013-14**
Agriculture, forestry and fishing	5.02	1.42	4.71	6.4	1.49	5.57
Mining & quarrying	0.1	–2.16	–1.38	–17.53	0.60	0.19
Manufacturing	7.41	1.14	–0.71	3.13	5.45	4.97
Electricity, gas & water supply	8.38	2.26	5.92	8.56	2.66	4.16
Construction	10.8	1.11	1.64	13.14	0.35	2.66
Trade, hotels, transport, storage, communication	4.33	5.07	3.02	6.36	9.77	6.51
Financing, insurance, real estate & business services	11.35	10.92	12.87	4.49	9.74	11.15
Community, social & personal services	4.9	5.31	5.55	7.28	4.26	3.85
Total	**6.69**	**4.47**	**4.74**	**5.22**	**5.42**	**6.05**

Source: *National Accounts Statistics*, various years

The findings of the research studies put out in public domain since June 2016 have raised new questions about the quality of the underlying data sources used in computing the new GDP series, the accuracy of the methods applied and hence about the credibility of the estimates. It is perhaps time to take stock of all the issues that have been raised in various research studies, and explore plausible solutions to the problem. That is what we aim to achieve in our current paper.

We approach the issue in a two-step manner. First we describe the basic changes brought about in the size and composition of various sectors by the new GDP series. Some of these issues were also discussed by NS (2017) and we take off from where

they had left. We attempt to understand the repercussions of these changes on the sectoral as well as aggregate GDP growth rates. We conclude that majority of the changes affect the estimates for the Private Corporate Sector (PCS).[3]

Next, we undertake an examination of the changes in data and methodology used to compute the PCS estimates and discuss the problems therein. Most of these problems seem to stem from the usage of the MCA21 database. In particular, there are three main issues all of which are related to the way sampling is done by the CSO for estimating the output of the PCS: (i) which companies are included in the sample? (ii) how to deal with companies that are outside the sample but form a part of the larger universe of companies? (iii) how to deal with companies that cannot be sampled but are included in PCS? It appears that there are problems in each of these aspects of sampling and we present a detailed discussion of these issues. In addition we also analyse the problems in GDP growth estimation arising from deflator related issues, problems in the regional accounts and issues with the release of two contradictory back series.

We base our analysis largely on the findings of academic experts who have written extensively on these problems. We also take stock of the findings of different committee reports that have dealt with various issues regarding GDP estimation. Our goal here is to present a comprehensive summary of major issues in the new NAS in order to provide deeper insights into the GDP debate, assess the severity of the problem at hand and discuss a way forward.

The rest of the paper is organised as follows. In section 2 we discuss the changes in the shares of various sectors and in the institutional composition of GDP under the new series. In section 3 we present a detailed analysis of the problems affecting the estimates of the Private Corporate Sector. In section 4 we discuss issues related

[3] The PCS includes companies (both financial and non-financial) from the manufacturing and services sectors.

to the deflators. In sections 5 and 6 we talk about the issues with the estimation of the regional accounts and issues with the release of the two back series, respectively. Finally in section 7 we summarise the main points and provide recommendations for the way forward.

2. Size, structure and evaluation of the economy, as seen through NAS

The new NAS has brought about many changes that have altered our image (or understanding) of the structure of the economy. Below we describe some of the prominent changes with regard to the institutional and sectoral composition of GDP.

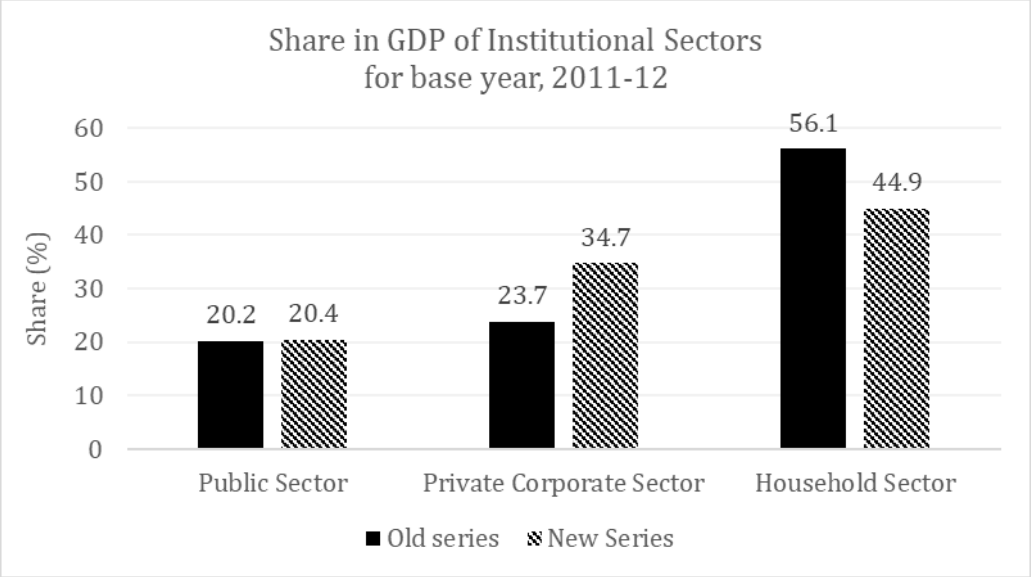
1. In terms of institutions, the share of Private Corporate Sector (PCS) increased by about 11-12 percentage points of GDP (as of 2011-12), with a corresponding decline in the share of household (HH)/unorganised sector. This was mostly on account of shifting the proprietary/partnership enterprises from the HH sector to PCS, under a new category, Quasi Corporations (or QCs, defined as those maintaining accounts). The share of public sector – defined as general government, public financial enterprises, public non-financial enterprises – in GDP remained the same across the old and new NAS. This is shown in figure 2.
2. Within the PCS, the share of private financial enterprises in GDP remained roughly the same in the new NAS, whereas the share of non-financial PCS went up significantly from 21.9% to 31.9%.[4]
3. In terms of output sectors or industries, in 2011-12, the share in GDP of industry (consisting of mining, manufacturing, electricity, gas and water, and construction) went up somewhat, with a corresponding decline in the share of

[4] PCS constituted 34-35 percent of GDP in 2015-16. Financial PCS accounts for 2-3 percent of GDP. Non-financial PCS consists of (i) public limited companies (13.4 percent), (ii) private limited companies (11.9 percent) and (iii) quasi corporations (QCs) (9.6 percent) (Their GDP shares are mentioned in parentheses). Roughly speaking, public limited companies represent larger companies, private limited companies are smaller companies, representing medium sized enterprises, and QCs are smaller enterprises, mostly partnership and proprietary concerns.

the services sector. Increase in industry's share was mainly on account of manufacturing (figure 4).

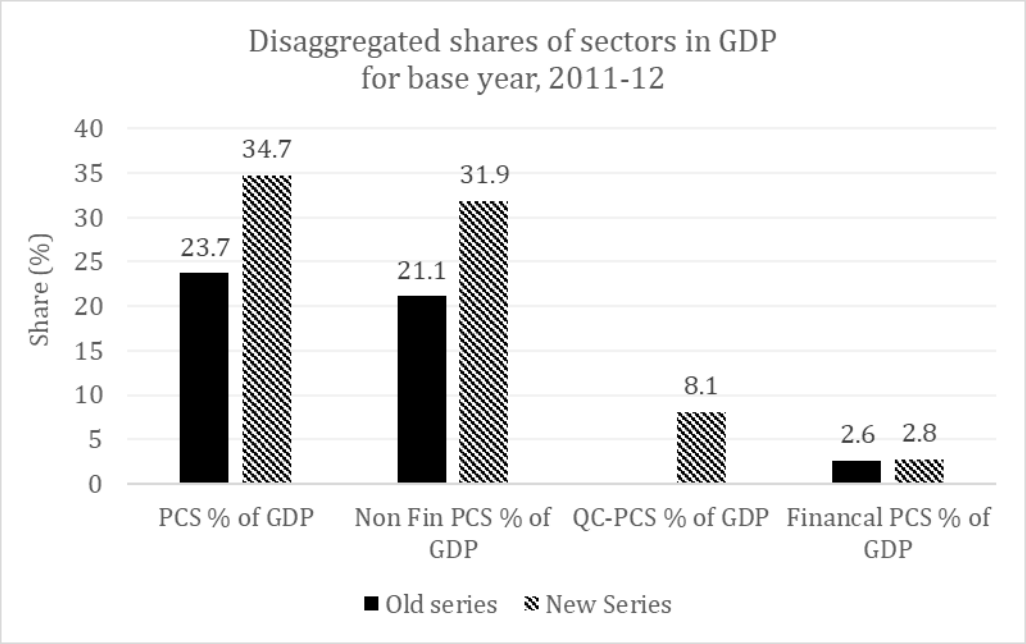
4. How has the economy evolved over the six years since the new NAS was introduced? In terms of institutions, as shown in figure 5, the only sector that has gained share is PCS, within which the share of QCs in GDP has gone up from 8.1 per cent in 2011-12 to 9.6 per cent in 2015-16 (the latest year for which we have the information from RBI's analysis of MCA data). In terms of output, as shown in figure 6, the shares of agriculture and industry have declined slightly, with a compensating rise in services sector share.

FIGURE 2: GDP BY INSTITUTIONS FOR 2011-12 IN OLD AND NEW NAS



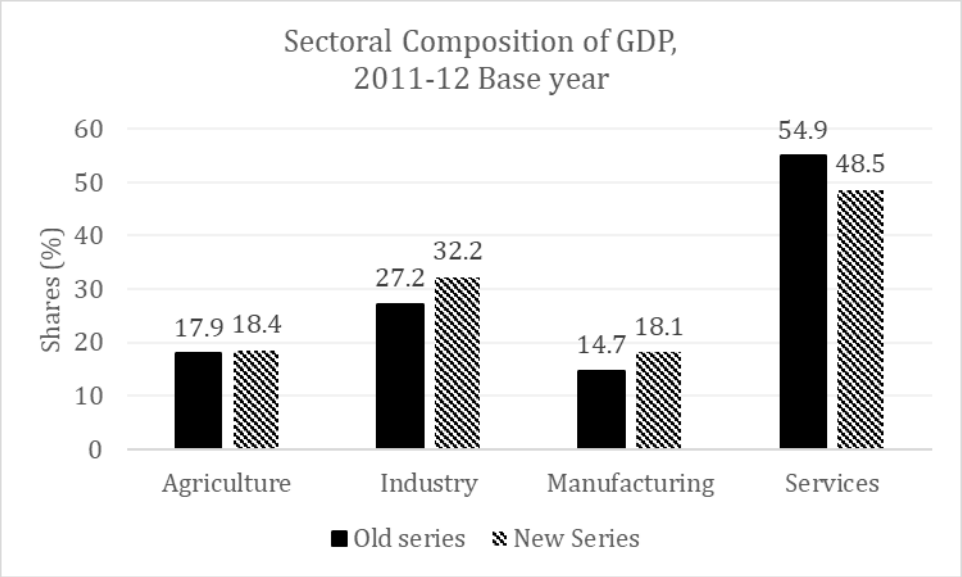
Source: *National Accounts Statistics*, various years

FIGURE 3: DISAGGREGATED SHARE OF GDP IN 2011-12 IN OLD AND NEW NAS



Source: *National Accounts Statistics*, various issues

FIGURE 4: SECTORAL COMPOSITION OF GDP IN 2011-12 IN OLD AND NEW NAS

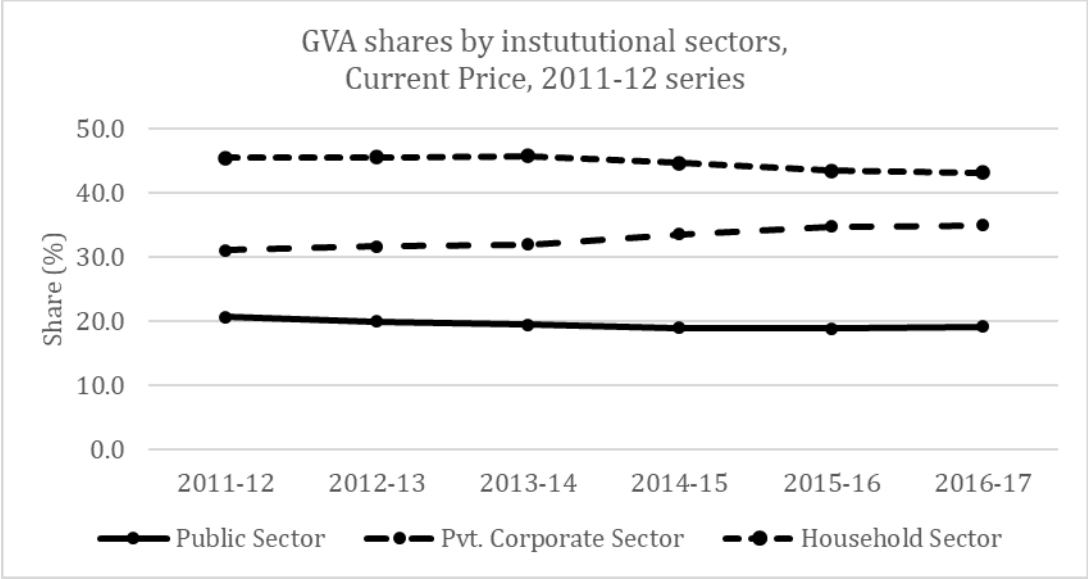


Source: *National Accounts Statistics*, various issues

FIGURE 5: GVA SHARES BY INSTITUTIONS OVER TIME

Source: *National Accounts Statistics*, various issues

FIGURE 6: GVA SHARES BY MAJOR SECTORS OVER TIME



Source: *National Accounts Statistics*, various issues

The two big changes introduced in the new NAS are as follows:

(i) Shifting the QCs from the HH sector to the PCS

(ii) Use of a new database (MCA 21) to compute GVA estimates for the PCS

If the changes in the shares of sectors and institutions in the aggregate output in the new NAS are an outcome of a mere reshuffling of economic activities, then these

should not affect aggregate growth rates. For example, the shifting of QCs to PCS should not increase the aggregate GDP growth rates, given that QCs were already accounted for in the old NAS as part of the HH sector. Yet as we see from Table 1, in the overlapping years for which data on both the old and new NAS are available, the aggregate GDP growth rates were revised upwards in the new series. In terms of coverage, no new sector was captured by the new NAS either which could have potentially explained the increase in growth rates.

The very fact that the new series reported significantly higher growth rates at the aggregate level for the overlapping years, points to the possibility that the changes in methodology and data played a role. Since there has been no substantial change in the methodology used to measure GVA of the Public sector and the Household sector, it maybe concluded that the increase in the growth rate of aggregate GDP is mainly due to changes in the PCS, primarily non-financial PCS since financial PCS constitutes a small fraction of overall GDP (see footnote 3).

As shown above, PCS consists of non-financial companies, financial companies and QCs. Net of QCs and financial companies, the size of the PCS in the new GDP series is higher by 2.9 percentage of GDP. This can be attributed to the changes in methodology and introduction of the MCA21 database. The main question here is: Is it a case of more comprehensive capture of the contribution of PCS, or does it represent an over-estimation?

A number of academic experts have identified and documented multiple problems with the MCA21 database which under some scenarios might lead to overestimation of the growth rate of the PCS and of the aggregate GDP growth rate, given the high share of PCS in overall GDP. Moreover given the infirmities in the estimation of output of QCs under the new NAS, shifting these entities to the PCS could have potentially contributed to boosting the level and growth rate of PCS GVA and hence aggregate GDP. We discuss these problems in detail in the next section.

3. Issues with estimates of the Private Corporate Sector (PCS)

The private corporate sector especially the manufacturing sector continues to be at the heart of the GDP measurement debate. Since NS (2016), a number of new issues concerning the PCS have come up in public debates and these have been chronicled by several academic scholars over the last few years. The bulk of the problem in estimation seems to stem from the shift to the MCA 21 database from the Annual Survey of Industries (ASI) database. In what follows we discuss three major issues with regard to the PCS estimates that have surfaced after the introduction of the MCA21 database. These issues are primarily related to the manner in which sampling is done by the CSO for the PCS-GVA estimation.

1. What companies are included in the sample?
2. What method is used to account for companies not in the sample but in the larger universe of all companies?
3. What about the companies that cannot be sampled but are included in PCS?

Below we discuss these issues in detail. In addition, we also analyse the validity of the rationale behind the shift from ASI to MCA21 database, issues of misclassification of companies in the PCS and the problems associated with the shift from an `establishment' to an `enterprise' approach.

3.1 Sample of companies used for estimation

Companies (belonging to PCS i.e. manufacturing as well as services sector companies) file their financial returns in the MCA 21 database but not all companies file in every year. The set of companies that files returns at least once in three years is called an `active' set[5]. This is regarded by the CSO as the `universe' of companies for estimating the GVA of PCS. Within the `active' set, only a fraction of the

[5] We do not know the exact definition of 'active' companies in the MCA database. When the MCA passes on the `active' list to the CSO, as per the official documents, the latter considers this `active' set to consist of companies that have filed returns at least once in the last three years. This may not necessarily be the case and there does not seem to be any verification process in place to ensure that this definition indeed correctly identifies the `active' companies given to CSO by the MCA. This itself introduces a layer of uncertainty about the universe of companies that is being considered for the estimation of GVA.

companies file returns in any given year. For the GVA estimation of any given year, the CSO first considers those companies that have filed their returns in that specific year. This is the `filing' set which constitutes the sample for that year[6]. They then use a blow-up factor to estimate the GVA of the non-filing, active companies.

Tables 4A and 4B show the numbers of registered, active and filing companies for the years for which data is available. The first big question with regard to sampling is whether the sample of companies considered by the CSO are working companies. It would be problematic if the `filing' set consisted of say shell companies that engage in fictitious transactions for the purpose of evading laws and falsely report their returns. The GVA estimates computed on the basis of the returns of these companies are likely to be erroneous. In this context there are two key issues that are worth looking into and we discuss them sequentially.

3.1.1 Doubts about the universe and sample of companies

In 2016-17, the NSSO (National Sample Survey Office) in its 74th round conducted a survey of services sector enterprises, on its way to launch an annual survey of services (on the line of Annual Survey of Industries). With the release of the NSSO's technical report on the services sector survey (hereafter, NSS report) in May 2019, new questions arose regarding the quality and reliability of MCA 21 database, in particular about the soundness of the sample of companies used by the CSO for its estimation. Official press notes of May 10, 2019 (issued by MOF), and May 30, 2019 (issued by MOSPI) have sought to dismiss the doubts, claiming that the MCA database is in fine order for GDP estimation but if anything these have raised further doubts about the sample of companies.

[6] The 'filing' companies which constitute the sample set used by the CSO for GVA estimation, vary from year to year because they self-select to file returns. As shown in table 4b, the absolute number of `filing' companies changes every year and so does the ratio of `filing' and `active companies. This implies that the sample used by the CSO for GVA estimation changes every year. This raises doubts about the comparability of the sectoral GVA estimates over multiple years and the statistical soundness and stability of the estimates obtained.

One of the three list frames (or, universes of enterprises) used for the NSS survey was the list of `active' companies – companies that are said to have filed their statutory returns at least once during previous three years – obtained from the CSO (called the MCA frame). After due verification of a sample of about 35,000 non-financial companies, the non-response to the survey was found to be as high as 45.5 per cent. 21.3 per cent of the sampled companies were found to be misclassified, and 24.2 per cent of the companies refused to provide information, or were found closed, or were non-traceable. Considering the severity of non-response, NSSO abandoned its project of bringing out two-volumes of survey results, and instead settled for a modest technical report. NSSO cautioned data users that "The estimates from the sample are therefore, not likely to be robust over the domains" (NSSO, 2019: 16).

Arguing that the non-responding companies could be shell/ fake/ dubious/ non-existent companies that do not produce goods and services on a regular basis, but perhaps serve as conduits to hide profits or circumvent regulations, critics contended that such companies represent non-working companies. MOSPI defended their GDP estimation procedure (May 30 press note) saying that every year MCA has been weeding out an increasingly larger number of companies that are not operating, implying that `active' companies in MCA's register represent genuinely working companies. Further, the missing/fake/shell companies are outside the set of `active' companies, and hence the database and methodology used by the CSO are correct. MOSPI's May 30 press release also said the following:

> "...from the 35,456 companies included in the NSS 74th Round, around 34,834 (86.5%) companies had filed their returns in the MCA database and only 622 were untraceable in MCA. In the context of GVA estimation in respect of private corporate sector (PCS), out of the 4,235 units categorised as not traceable at the given address in the 74th Round, around 3,154 units had actually filed returns on-line on the MCA portal.....For the purposes of National Accounts Estimates, the returns actually filed by the corporates under MCA is duly taken into account and the scaling up factor for the Paid-Up-Capital for the non-response is low."

MOSPI is therefore implying that the above record of filing of returns holds for the PCS as a whole too. This would imply that say out of about 10.9 lakh `active'

companies (as of 2015-16), majority are filing returns. Non-filing companies form a small fraction of `active' companies whose output is estimated by blowing-up the parameters prepared for majority of the companies. Hence MOSPI claims that the GDP estimates and its growth rates are valid.

Shortcomings of MOPSI's contention:

The May 30 press note classifies MCA database into (i) active companies, and (ii) others. An `active' company is taken to mean a working company as it files its financial return once at least in 3 years. So, by definition, `others' are non-working companies, whose status, as per the press release, could be `amalgamated', `converted', `unclassified', `under process', `under liquidation', `dissolved', 'dormant' etc. There are several problems with MOSPI's claims.

First, contrary to the May 30 press release, the NSS report clearly states that its sample is drawn from the list of *active companies* obtained from the CSO. To quote it, "From the MCA frame *active* private non-financial companies of 2013-14, as available from National Accounts Division (NAD) was taken into consideration." (P. 3) (emphasis added). Hence all the non-responding/untraceable companies in the sample must also be `active' companies. It means that the active list includes non-working or `others' as well, and hence CSO's list of `active' companies is not watertight, as claimed.

Second, as per MOSPI's note, there are missing companies *within* the set of `active' companies as well as in the set of `filing' companies. Table 2 (abridged from the press note) shows that 2242 `active' companies belonged to the `casualty' category and 1845 of these were filing returns. Likewise 1357 `active' companies were found closed and of these 990 were filing returns. 3928 `active' companies were non-traceable and 3141 of these were filing returns. In other words, both the universe (`active') and the sample (`filing') of companies used by the CSO for PCS-GVA estimation appear to be faulty.

Third, as pointed out by MOSPI in the press note, the companies in the `others' category are also filing returns. Yet by definition `others' are non-active

companies, as explained earlier. This implies that for obtaining sample GVA estimates (even before blowing-up for the universe of `active' companies) the CSO is using financial data of non-active companies, which is theoretically incorrect.

Fourth, Mospi's (May 30) press release claimed, "In the last few years, nearly 6.3 lakh entities have been de-registered". However we do not know the distribution of such companies between (i) `filing' companies, (ii) `active' companies and (iii) `others'. There is no a priori reason to believe that the act of de-registering companies would remove the unresponsive companies (as highlighted by the NSSO report) from the sample.

TABLE 2: STATUS OF COMPANIES IN NSS 74TH ROUND SURVEY

Category	Number of companies in NSS survey	In MCA in 2016-17, Active companies	
		Active companies	Companies filing returns
Surveyed	19317 (54.5)	18818 (55.5)	17612 (57.6)
Casualty (i.e. refused information)	2428 (6.9)	2242 (6.6)	1845 (6.0)
Closed during survey	1579 (4.5)	1357 (4.0)	990 (3.2)
Out of coverage i.e. misclassified	7573 (21.4)	7291 (21.5)	6755 (22.0)
Non-traceable units at the address provided	4235 (12.0)	3928 (11.6)	3141 (10.3)
Total	35456	33912	30583

Note: Figures in brackets refer to percentage of column total.
Source: NSSO's *Technical Report of Services Sector Enterprises in India*, 2019

Generalising from the NSS services sector survey results, we now present a fuller picture of the shortcomings of the MCA database for the entire PCS, with the help of table 3 and a Venn diagram given in figure 7, using the MCA data for 2015-16. Out of 15.5 lakh companies registered with the MCA, 10.9 lakh or 70 per cent were `active' companies (see table 3) and the rest were `others' (belonging to categories mentioned above). Legally, all `active' companies are said to be working companies. Only 58 per cent of the `active' companies filed in 2015-16 (i.e. these constitute the `filing' companies). The `filing' companies constitute 85-87 per cent of the Paid Up

Capital (PUC) of `active' companies, and hence MOSPI claims that GDP estimates for the PCS are reliable.

TABLE 3: DETAILS OF MCA DATABASE FOR 2015-16

Number of registered companies	15.5 lakh
Number of active companies	10.9 lakh
Number of companies filing returns	6.3 lakh
Ratio of active to registered companies	70.1%
Ratio of filing to active companies	58.3%
Ratio of filing to registered companies	40.7%

Source: Press Information Bureau (2019)

However, as described above, the sets of 'active' as well as 'filing' companies i.e. the universe as well as the sample of companies appear defective. While the boundaries of various categories of companies in the MCA database are claimed to be watertight, as shown in figure 7 below, there seems to be a grey area consisting of shell/fake/dubious/non-existent companies (shaded portion in the diagram) whose contours and quantitative dimensions are unknown.

Given that the sample of companies used by the CSO for GVA estimation appears to contain shell companies that engage in fictitious transactions, the sectoral as well as aggregate growth estimates obtained from such a sample are likely to be biased upwards.

3.1.2 Filing vs. working companies

As reported by the CSO (2015b, 2015d) close to 5 lakh `active' companies were a part of the sample used for estimation in the NAS for the initial years of the 2011-12 series. Over the last few years, the number of `active' companies has increased more than 11 lakh (See MCA, 2019 for details) while the number of `filing' companies has increased to more than 7 lakh. Table 4a tabulates the figures of total registered and active companies available in the MCA21 database and table 4b shows the number of `filing' companies in each year. The tables show a steady rise in the numbers of

`active' companies and those filing returns. The reality however may be different as gleaned from various official documents.

TABLE 4A: DETAILS OF THE MCA 21 DATABASE: NUMBER OF REGISTERED AND ACTIVE COMPANIES

Year	Total Registered Companies (in lakhs)	Active Companies (in lakhs)	% Active of Total Registered Companies
2013 (Oct)	13.45	9.06	67.37
2014 (Apr)	13.95	9.51	68.20
2015 (Apr)	14.65	10.26	70.04
2016 (Apr)	15.47	10.85	70.14
2017 (Apr)	16.50	13.15	79.73
2018 (Apr)	17.59	11.76	66.82
2019 (Jan)	18.50	11.34	61.27

Source: *Monthly Information Bulletin*, Ministry of Corporate Affairs

TABLE 4B: NUMBER OF ACTIVE AND FILING COMPANIES IN THE MCA21 DATABASE

Year	Active companies (in lakhs)	Number of companies that filed returns (in lakhs)	% Filed of Active
2012-13	8.8	5.6	63.64
2013-14	9.5	6.1	64.21
2014-15	10.1	6.0	59.41
2015-16	10.8	6.3	58.33
2016-17	11.6	7.1	61.21

Source: Press Information Bureau (2019)

It appears that the CSO uses a set of 'common' companies instead of the entire `filing' set, for preparing the sample estimates. Common companies are those that have data on returns for the previous year and the current year. This set has remained stable at around 3 lakh companies, a figure just around one-half of the companies touted to be the number of companies filing returns. Ramana Murthy (2018) mentioned,

"Accounts of about 5.5 lakh companies (covering both the manufacturing, mining and services sectors) have been analysed and incorporated in the estimation

of national accounts series for the above mentioned sectors whereas there are some 11 lakh active companies. The estimates based on the available data were blown up to cover all companies using the active population and ratio of Paid-up capital for them. A common company growth based on over three lakh companies was used when the data on the whole complement of 5.5 lakh companies were not available."

Therefore it seems that even though the set of 'filing' companies was 5.5 lakh, CSO uses a common set of 3 lakh companies for GVA estimation. It is not clear why this is the case and what happened to the remaining companies. Similarly, the set of companies used by the Reserve Bank of India (as obtained from the MCA) for estimating savings has also remained stable at around 3 lakh companies, as shown in table 5 (all figures for 2015-16).[7]

TABLE 5: RBI DATABASE OF COMPANIES (OBTAINED FROM MCA)

No. of NGNF public limited companies	19,602 with 39.9% of PUC
No. of NGNF private limited companies	2.92 lakh with 32.9% of PUC
Total	3.11 lakh companies (whose PUC would be weighted average of the PUCs mentioned above).

Note: NGNF- non government, non-financial, Source: *Reserve Bank of India Bulletin, various issues*

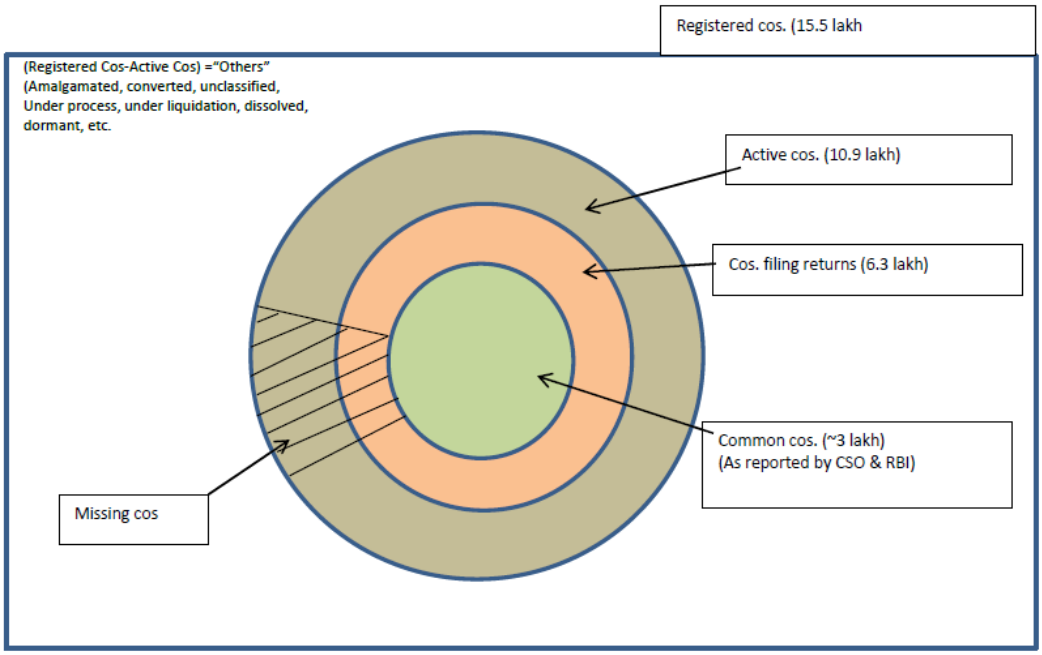
From the foregoing, we are inclined to infer that an `active' company is merely a legal definition. It does not represent the *economic concept of a working company*, which produces goods and services on a regular basis. Our contention is that the working companies form a subset of (i) `active' companies, and (ii) `filing' companies and perhaps are only 3 lakh in number (the RBI set as well as the set of `common' companies as mentioned by Murthy, 2018). This is what we show in figure 7. This anomaly also raises the question as to whether the remaining companies in

[7] MCA shares the corporate database in its entirety with RBI, as per an agreement in 2015. RBI has been publishing summary results of the MCA data analysis for non-government non-financial public and private limited companies separately.

the `filing' set are shell/fake/dubious/non-existent companies. Moreover if the actual set used by the CSO for PCS-GVA estimation is only 3 lakh companies then the reasoning offered by the CSO to defend the use of MCA21 database based on comprehensive capture of a larger number of companies is also doubtful.

Until we have a reasonable estimate of the size and composition of working companies, there is no meaningful way of drawing a sample and preparing the GVA estimates. If one claims that the difference between the GVA estimates based on the set of working companies and the set of `active' companies is a mere level difference, it would be a leap of faith to say that this does not affect the growth rate.

Figure 7: Private Corporate Sector's composition, as per MCA and MOPSI information



Source: *Monthly Information Bulletin*, Ministry of Corporate Affairs, *Reserve Bank of India Bulletin*, various issues, CSO (2015b)

3.2 Accounting for companies not in the sample

Under the old NAS, GDP of PCS was not estimated directly. It used to be derived indirectly, as a residual. The saving and investment of the PCS were estimated by the RBI using the balance sheet of selected companies. RBI sample consisted of about

4,500 large public limited companies and a smaller number of private limited companies. For public limited companies, PUC of the selected large companies was said to be around 45 per-cent of the total PUC of public limited companies (as provided to RBI by MCA). Likewise for the private limited companies. The estimates of the selected companies were blown-up to cover the entire universe of companies. Separate blow-up factors were used for public and private limited companies.

There was a concern that RBI's blowing up procedure was problematic because the size and composition of PCS had changed substantially during the last three decades. To overcome the problem, National Statistical Commission headed by C Rangarajan recommended conducting of a census of working companies. This was not taken up. Instead MCA's e-filing initiative was seen as a solution to the problem of obtaining the universe of working companies.

Under the new NAS, the CSO does not have data on the returns of the companies that are part of the universe but not of the sample i.e. the non-filing, active companies. So they use a *blow-up* methodology to calculate the GVA of these companies. The estimates for the non-filing companies are obtained by blowing-up the estimates of the filing companies. The blow-up factor used by the CSO (also called the Paid-Up Capital or PUC factor) is computed as the reciprocal of the ratio of PUC of `filing` companies to the PUC of all `active` companies (CSO, 2015a, 2015d).[8]

This implies that if there are problems in the 'non-filing, active' set of companies, then the estimates obtained after blowing-up may not convey the true picture of the sectoral growth and hence of the aggregate growth. Depending on the nature of the problems there could be overestimation of the growth rates. Several studies have pointed out problems with this blowing-up methodology. Here we discuss the two main problems.

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[8] Paid up Capital of a company is the amount for which shares are issued to shareholders. According to the Companies Act, 2013 (section 64) paid-up share capital is such aggregate amount of money credited as paid-up as is equivalent to the amount received as paid-up in respect of shares issued and also includes any amount credited as paid-up in respect of shares of the company. The reliance on PUC is because in absence of information on actual production, a physical indicator is required that is closely related to production (or production capacity).

3.2.1 Lack of correspondence between PUC and GVA

The use of PUC in computing the blow-up factor is based on the assumption that GVA and PUC have a one-to-one correspondence and that one can directly infer about a company's value addition by analysing its PUC.

Sapre and Sinha (2016) replicated the process of blow-up of GVA for a comparable sample of firms (from the CMIE Prowess database) that qualify for filing in the XBRL format in the MCA21. They find that GVA and PUC have little or no correspondence, especially in cases where GVA is negative (i.e. a loss making company). PUC of a company is by definition always positive. This means that it is possible that using a PUC based blow-up factor, estimates are scaled up for companies that are in reality loss-making companies with negative GVA. This would potentially lead to an overestimation (see Box 1 for details).[9]

Application of the blow-up methodology requires a detailed analysis of GVA and PUC of registered companies in the MCA21 database. In response to this problem, NSC (2018) recommends:

'Cross-validation study on data on corporate bodies with single manufacturing unit available from the two sources - MCA and the ASI. Additionally, a study of plants covered in ASI data belonging to non-reporting but active companies in the MCA list should be undertaken. In the same vain, the ratio of GVA to PUC should be compared between companies that submit their return by the specified due date and those that submit return after the due date. A related research that may be undertaken using ASI and MCA data is to identify plant covered in ASI data which belong to active but not reporting manufacturing companies in the MCA list. The ratio of GVA to invested capital for such plants should be studied in comparison with plants that belong to companies in the MCA list which are active and reporting.' [III 6.5 NSC (2018)]

At present the PUC based blow-up factor is determined on the basis of the data of firms that have submitted their data in the required forms by a specific date. Some of the non-reporting firms submit their data later. The ratio GVA to PUC should be

[9] Manna (2017) corroborates this finding by highlighting that a common blow-up factor for all companies would be inappropriate and separate blow-up factors ought to be computed for different size classes of PUC. Both Sapre and Sinha (2016) and Manna (2017) have argued in favour of exploring alternatives other than PUC for blow-up of GVA. Manna (2017) proposed the use of Gross Fixed Assets and Sapre and Sinha (2016) explored the possibility of using industry wise growth rates for scaling up of GVA of non-filing companies.

compared between the firms that submit their returns within the specified date and those that submit later. Such research may provide an answer to the question whether the ratio of GVA to PUC is lower for later filers or non-filers as compared to the firms that file their returns in time' [III 3.3.11 NSC (2018)]

3.2.2 Issues with the unavailable companies

One key issue in using the MCA21 dataset is in dealing with the problem of non filing. Given the process of data extraction from the MCA21 database, the non-filling points to a case of potential over-estimation. If there are sufficient reasons to consider that non-filing firms are (i) wound up, or de-registered, (ii) loss making or (iii) are fictitious shell companies that exist only on paper and are not undertaking any service or production activities, then scaling up the estimates of the `filing' companies to account for the `non-filing' ones is likely to lead to overestimation of GVA of the PCS and possibly of the overall level of GDP as well.. As discussed earlier, the NSS report of May 2019 showed that there are indeed serious problems of missing companies in the `active' set and in the set of `non-filing' companies.

The problem with the blowing-up methodology is therefore an inevitable consequence of inappropriate sampling where in the set of `non-filing' companies:
(i) there could be shell companies with fake accounts, showing growth rates that never happened, (ii) there could be dead companies (i.e. companies that have shut down) with zero GVA, whose imputed growth rates will be higher than actual, (iii) there could be loss-making companies, whose value added is overstated, because PUC is used as a blow-up factor. Since these companies are actually shrinking, overall growth rates will be overstated, because positive growth rates will be imputed to them.

In summary the main point as discussed in sections 3.1 and 3.2 is that the extent to which the MCA21 database problems distort the sectoral and aggregate GDP growth rates depends on (1) the blow-up ratio for the `non-filing' companies and (2) the nature of the problems (low growth rates, no growth, decline in GVA, negative GVA etc) with the `non-filing' companies. Problems would also arise if the `active' set contains shell companies. Unless there is concrete evidence that the `non-

filing' set consists of proper companies with positive GVA and growth rates and that the `active' set does not contain shell companies, it is hard to dismiss the doubts of overestimation given the sampling and methodological issues outlined above.

3.3 Companies that cannot be sampled

A portion of the PCS under the new NAS consists of entities that cannot be sampled. They do not file returns in the MCA21 database which means they are not part of the usual sample of `filing' companies used by the CSO for GVA estimation. The manner in which their growth rate is estimated raises questions about possible overestimation. These entities are the quasi-corporations (QCs). They are perhaps the least understood part of PCS in the new NAS, as disaggregated information on the PCS is not available. Here we piece together the available information on PCS, and the size and composition of QCs.

In figure 4b, the size and structure of PCS in the old and the new NAS is discernible (as discussed in the section 2). The size of PCS relative to GDP in the new series increased substantially, mainly on account of QCs, which in 2011-12 constituted 8.1 per-cent of GDP.

What are QCs?

A QC is an enterprise not registered under the Companies Act yet said to behave like a company. It is a partnership or proprietary enterprise maintaining books of accounts. The underlying idea apparently is that such enterprises are akin to limited liability, profit maximising firm, as against own-account or household (HH) enterprises engaged in subsistence activities often employing family labour. The new NAS, following the SNA 2008 guidelines, introduced the concept of QCs by bifurcating unorganised/HH/informal sector enterprises into QCs, and clubbing them with non-financial private corporate sector, leaving household/own-account enterprises in the HH/informal sector. As per the new NAS, QCs consist of:

1. Crop production in plantations, other than those covered in private corporate sector.
2. Unincorporated Enterprises covered in Annual Survey of Industries.
3. Unincorporated enterprises of manufacturing that are not covered under ASI but maintain accounts.
4. Co-operatives providing non-financial services.
5. Unincorporated enterprises providing non-financial services maintaining accounts.
6. Unorganised financial enterprises[10]

In the earlier NAS, items (i), (ii) and (iv) were included in the non-financial PCS. The remaining three are the new additions clubbed together under QCs. Table 6 below provides the share of institutions in GDP as of 2015-16 (based on RBI's analysis of MCA data).[11] QCs' share in GDP was 9.6 per-cent in 2015-16 and their share in non-financial PCS GDP was 27.5 per-cent.

[10] It is not clear how unorganised financial enterprises – essentially, informal money lenders – are included in QCs.

[11] It is to be noted that the RBI's analysis of MCA database provides summary results separately for non-government, non-financial (NGNF) public and private limited companies. QCs' share is obtained by subtracting the share of public and private limited companies from PCS.

TABLE 6: DISAGGREGATION OF NON-FINANCIAL PCS AND THEIR SHARES IN GDP FOR 2015-16

	Institutional sector	Share in GDP	Share of non-financial PCS GDP
1	Public limited companies	13.4	38.5
2	Private limited companies	11.9	34.0
3	Quasi-corporations	9.6	27.5
4	Non-financial PCS	34.9	100

Source: *Reserve Bank of India Bulletin*, various issues.

Table 7 shows industry or sectoral distribution of QCs' output for 2011-12 (more recent data is not available). Evidently two sectors namely manufacturing and trade, hotel and restaurants account for 61 per cent of QC's output in 2015-16. Incidentally, these are also the sectors which had witnessed a significant boost to their growth rates after the GDP revision.

TABLE 7: GVA OF QCS BY INDUSTRY OR SECTOR FOR 2011-12

Sector	Distribution of QCs
Agriculture & allied	4.2
Mining & quarrying	1.7
Manufacturing	**28.3**
Electricity, gas & water	-0.6
Construction	-1.0
Trade, hotel and restaurants	**40.0**
Transport & communication	5.7
Community, social, & personal services	9.2
Total	100

Source: CSO (2015b)

Methodologically, the shift of QCs from unorganised sector to PCS is questionable. SNA (2008) lays down conditions under which such a shift may be done. To quote SNA, QC is "an unincorporated enterprise that has sufficient information to compile a complete set of accounts as if it were a separate corporation and whose de facto relationship to its owner is that of a corporation to its shareholders." (as mentioned in Subba Rao, 2015).

In contrast, what is done in India is the following: “The enterprise survey collects information on whether the enterprise is maintaining books of accounts or not. As recommended by SNA 2008, all these unincorporated enterprises have been classified as quasi-corporations, if they are maintaining accounts, otherwise as household enterprises. Estimate of GVA from quasi-corporations have been added to GVA of incorporated enterprises in case of non-financial corporations” (CSOb, 2015, p. 11).

In the GDP revision, proprietary and partnership firms in ASI and non-household enterprises in NSS surveys were *deemed* to maintain accounts, and hence were categorised as QCs. There is no evidence of the NAS revision committees verifying if QCs in fact maintained accounts and whether “...it were a separate corporation and whose de facto relationship to its owner is that of a corporation to its shareholders.”

As mentioned in the previous section, the mere shifting of QCs from unorganised/HH sector to PCS should not change the aggregate growth estimates. But the concern is that along with the shift, methods of estimating their output have also undergone some changes, which may have affected the growth rates (Subba Rao, 2015). Since QCs do not form a part of the sample used by the CSO for PCS-GVA estimation, to the best of our knowledge their growth rate is estimated in two different ways depending on which sector they belong to. For the QCs engaged in manufacturing activities, their growth rate is taken from the ASI data on partnerships and proprietary entities. For the QCs engaged in services, the growth rate is taken to be the same as that of the rest of the private corporate sector, which would be an exaggeration given the nature of the QCs. This may have boosted the growth rate of the QCs and accordingly of PCS and aggregate GDP.

The issue really is whether the QCs are growing at the rate of other companies in the PCS. For most periods, we do not have enough information to assess this. They may be more dynamic, since they are smaller or they may be stagnant in which case their growth would be overestimated. It is possible some are the former, some the latter. We have no idea what the aggregate situation is for the QCs. It is possible

however, that post-demonetisation and post-GST these companies are growing much more slowly than the big companies in PCS. In that case the maintained assumption will lead to an overestimation of growth.

3.4 Comparability of MCA21 with ASI based estimates

The discussion in sections 3.1-3.3 shows that there are myriad problems with the MCA21 database used by the CSO to compile the estimates for PCS under the new NAS. Both the universe and the sample of companies used for the estimation of GVA seem to be riddled with holes and given the manner in which blowing up of estimates is undertaken, there is ample room for overestimation of sectoral and aggregate growth rates.

As mentioned earlier, under the old NAS, for much of the non-government and non-agricultural activities, data used to be collected for the factory sector from the Annual Survey of Industries (ASI). In addition various unorganised sector surveys by the NSS were establishment based surveys. However, there has been a concern that ASI was increasingly missing out value addition taking place outside of factory premises, in sites such as service centres, R&D labs, company headquarters etc. Hence a view prevailed that the ASI was underestimating the output growth in the manufacturing sector, given its specific approach to data collection.

The replacement of ASI with MCA21 database for manufacturing sector was predicated on the foregoing views. The problems with the MCA database that have been uncovered over the past few years by various academic experts raised the following question: Is it really true that the ASI captured value addition taking place only inside the registered premises, ignoring the related or auxiliary activities? Dholakia, Nagaraj and Pandya (2018) examined the question by closely looking at (i) ASI schedule, (ii) its field investigators manual (which provides detailed instructions to investigators on how to post the information in the questionnaire), and discussions with the concerned officials responsible for the data collection.

The investigation revealed that the ASI in fact gathers information on all activities of a factory, and the data gathered are apportioned to different factories of an enterprise as per standardised procedures. The argument that a shift to enterprise approach increased capture of value addition is not entirely correct. In light of this research, the premises of the change over from an establishment approach to an enterprise approach for GDP estimation and hence the use of MCA database itself appears questionable and unwarranted.

In the face of all the criticisms, the CSO has continued to defend the use of the MCA 21 database. In 2015, after the release of the new series, the then Chief Statistician of India, T. C. Anant claimed that the use of the new database for the PCS captures the production that was left out in the earlier ASI series. To quote him,

> "There is a large invisible corporate segment, which we were not adequately describing in the earlier series. We were partially describing it in manufacturing through the ASI. So, there is recognition that there is a need to get better information on this segment as a large part of government policies are aimed at this segment. The 5,000 listed companies are typically not the principal focus of promotional policies." (Sidhartha and Gupta, 2015).

While the MCA database may have technically increased the coverage of companies, it is worth noting that more data need not necessarily mean better data, as has been analysed in the previous sections.

3.5 Other problems with the MCA21 database

3.5.1 Shift from Establishment to Enterprise approach

The 2011-12 series makes a conceptual shift by capturing value addition at an `enterprise` level instead of at an `establishment` level. In economic terms the distinction between the two can be understood as the difference between a factory (or a plant) and a firm (or an enterprise). The former is a technical unit of production, and the latter is an organisational unit of production. Various authors (Nagaraj, 2015a, 2015b, 2015c; Raja Kumar, Sawant and Shetty, 2015; Nagaraj and Srinivasan, 2017; Sapre and Sinha, 2016) have looked into several aspects of the

estimation process in detail. In the new series the GDP of the private corporate sector is estimated using the financial statements of enterprises as a whole as opposed to the earlier method of using industrial output of factory establishments. This shift leads to a direct comparison with the ASI based estimates.

Sapre and Sinha (2016) point out that lack of clarity on measures of output and costs at the enterprise level can lead to imprecise estimates of GVA for various sectors. For instance, the activities of enterprises can be much more diverse than those of factories, and not all of these functions would qualify as manufacturing. Yet under the enterprise approach, all sources of value added of enterprises classified as 'manufacturing companies' are included in the calculation of manufacturing sector's GVA. This approach inflates the level of manufacturing output and possibly also the growth rate of the sector, if the ancillary activities are growing faster than the manufacturing ones. To get a sense of the magnitude, we can compare the level of output based on industrial sales, i.e. only considering manufacturing output with the total revenue which includes the overall enterprise activities. Using data from CMIE Prowess, Sapre and Sinha (2016) show the difference in value addition based on two different measures of output for a set of companies.

TABLE 8: COMPARISON OF GVA USING INDUSTRIAL SALES AND TOTAL REVENUE AS MEASURES OF OUTPUT, 2011-12 TO 2013-14

	Based on		Based on		Difference (Rs. crores)
Year	Sales (Rs. crores)	Growth rate (%)	Dis. Revenue (Rs. crores)	Growth rate (%)	
2011-12	701896.6		767311.7		65415.1
2012-13	742237.2	5.74	819228.5	6.76	76991.3
2013-14	780371.1	5.13	872178.0	6.46	91806.9

Source: Sapre and Sinha (2016). Dis. Revenue are fields of disaggregated revenue adding up to total revenue of the company

As can be seen from table 8, in comparison to industrial sales, total revenue shows a considerable increase in the level estimates of GVA. Total revenue fields include revenues from ancillary and related manufacturing activities and other non-operating revenues such as treasury operations, etc. The change in the measure of

output possibly explains the large upward revisions in levels and on average it corresponds to a 1 per-cent increase in growth rate for the manufacturing sector.

In comparison to the establishment based estimation, the enterprise approach has also complicated the process of GVA estimation to some extent. Conventionally, subtracting cost of production (of manufactured items) and taxes from the value of output gives an estimate of value addition. However, with diversified activities under one roof in case of an enterprise, identifying costs of manufacturing activities from financial statements poses serious challenges (see Sapre and Sinha, 2016 for details on the process of GVA estimation). Lack of proper identification of cost components can lead to imprecise GVA estimates.

3.5.2 Identification of firms in the MCA21 database

In the MCA21 database, the CSO relied on using Company Identification (CIN) code to identify manufacturing companies. The decision to use CIN was made as the ITC-HS codes of products were either unreported or unavailable in the XBRL forms (see CSO, 2015d for details).[12] However, in absence of the ITC-HS codes, using CIN code can potentially lead to a misclassification of companies in identifying their business activity. Sapre and Sinha (2016) find that within the manufacturing sector several companies operate as wholesale traders or service providers. These companies may have changed their line of business since they were originally registered (this was reported in the NSS survey of services as discussed earlier). These changes do not get reflected in the Company Identification (CIN) code assigned to the companies. Such misclassification of companies will distort the manufacturing estimates, although not the overall GVA. The paper and Table 9 shows an illustration on how firms registered in manufacturing can be in other activities.

[12] ITC-HS (Indian Trade Classification Harmonized System) is an eight digit code system used for product identification for import, export operations. XBRL is Extensive Business Reporting Language e-platform used for filing annual financial statements with the MCA. Companies that have (i) turnover greater than INR 100 crores or (ii) Paid Up Capital greater than INR 5 crores or (iii) are listed, file in the XBRL format. (See http://www.mca.gov.in/XBRL/pdf/ITC_HS_codes.pdf for details)

Companies may change their primary activity over time as part of their usual business strategy and even repeatedly. Hence, lack of a proper identification system poses serious challenges for classification and estimation of value addition at the sectoral level. Sapre and Sinha (2016) and Pandey, Sapre and Sinha (2019) show the extent of misclassification that can arise in absence of a system of identification and classification and present an illustrative exercise on the frequency of changes in economic activity. They contend that it is of crucial importance to build and use the history of economic activity of companies so as to correctly classify companies into respective sectors based on their primary economic activity. As an illustrative case, table 9 shows a sample of companies with economic activity different from their CIN based activity.

TABLE 9: SAMPLE OF FIRMS WITH CIN REGISTERED IN MANUFACTURING ACTIVITIES BUT OPERATING AS SERVICES COMPANIES (2011-12)

Industry activity (2 digit NIC 2008)	Number	Industry activity (2 digit NIC 2008)	Number
Trade in other manuf. goods	362	Financial services including leasing	328
Other asset financing services	279	Securities investment services	275
Renting services	163	Services	128
Software services	81	Commission agents services	76
Trade in electrical machinery	76	Trade in manufactured products	63
Trade in chemicals	59	Trade in minerals & energy sources	57
Real estate infra. services	54	Trade in transport equipment	49
Trade in drugs & medicines	48	Business services	43
Trading in food products	43	Trade in agricultural crops	40
Tech. Consultancy & Engg. serv.	31	Info. Tech Enabled Service/BPO	21
Hotel & restaurant service	22	Other Consultancy	17
Fund based financial services	19	Trade in non-electrical machinery	15
Finance related allied activities	15	Shipping services	13
Printing and related services	13	Research & development	10
Storage & warehousing services	11		

Source: CMIE Prowess, See Sapre and Sinha (2016) for details

In principle, the misclassification is a year-on-year problem and requires a detailed scrutiny of their product schedules. While the problem in using CIN code

was briefly raised in CSO (2015d), no systematic recourse was mentioned to solve this problem. NSC (2018) had taken a critical view of the problem by stating:

> Moreover, the MCA-21dataset has serious quality issues. The economic activity or activities (NIC codes) perused by a company is extracted out of the CIN (Corporate Identification Number), assigned to the company at the time of registration. The NIC code reported at time of registration is likely to undergo change in due course of time. The MCA-21 dataset is not designed to include all the economic activities pursued by a company. However, it may be possible to tackle this difficulty by using the MGT-7 forms which contain information regarding activity-mix of the companies. [III 3.3.9 NSC (2018)]

The extent of distortion in GVA estimates due to misclassification cannot be assumed to be negligible. There are two main concerns: (i) misclassification introduces spurious volatility in levels and growth rates and such volatility does not represent actual movements, and (ii) it distorts the GVA-to-Output (GVA/GVO) ratio which is significantly different for manufacturing and services. Identification of economic activity remains amongst the finer aspects of measurement and accuracy of macroeconomic aggregates. The case of the manufacturing or services sector is no different and deciphering information from a large dataset like the MCA21 is a challenging task.

4. Deflator related issues

The issues discussed in the previous section pertain to nominal GDP estimation. When it comes to real GDP growth rate estimation under the new NAS, a major issue is related to the kind of deflators that are being used to convert the nominal values to real estimates. There are two main issues in this regard and we discuss them below.

4.1 Single vs. double deflation

To get to the heart of the problem, one needs to understand how the GDP figures or almost equivalently, Gross Value Added (GVA) figures are calculated. In the broadest terms, the procedure followed by the CSO is the same as that all over the world. It

obtains data on the nominal values of output produced in various sectors of the economy from the financial accounts of firms. Then, it deflates these figures by price indices to arrive at estimates of real GDP. CSO's methodology differs from what is followed in other countries in two specific areas: the deflating procedure it follows and the price indices it uses.

In terms of the deflating procedure, the standard international practice, followed by nearly every major country with the exception of China and India, is to use a methodology called 'double deflation'. Under this procedure, the output price is deflated by an output deflator, while raw material prices are deflated by a raw material deflator. Then the real input value is subtracted from the real output value to obtain real GVA estimates. The CSO's methodology is different in that it first computes the nominal GVA, and then deflates this number using a single deflator to obtain the real GVA. The main problem with this approach is that if input prices move in tandem with output prices, there is no problem and both methodologies will give similar results. But if the two price series diverge- as they did in India for the first few years after the release of the new GDP series- single deflation can overstate growth by a big margin.[13]

The reason is not difficult to see. If the price of inputs falls sharply, profits will increase, and nominal value added will go up. Since real GDP is supposed to be measured at `constant prices', this increase needs to be *deflated away*. Double deflation will do this easily. But single deflation will not work. In fact, if a commodity-weighted deflator like the Wholesale Price Index (WPI) is used, as is the case under the current methodology, nominal growth will be inflated, on the grounds that prices are actually falling. In this case, real growth will be seriously overestimated.

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[13] For more details about how lack of a double deflation practice may have overstated real GDP growth under the new series, see article: https://www.livemint.com/Opinion/58qihTaOIRd3rPyf1eK09L/Real-GDP-is-growing-at-5-not-71.html

As the gap between input and output inflation starts to close, the problem will diminish. But that could also send a misleading signal, because it might seem that growth is slowing, when only the measurement bias is disappearing. This can be best explained using a numerical example as given in Box 1.

Box 1: Single vs. Double deflation: An illustrative example

Consider a case where actual production is stagnating at say 100 units in years 2014-15 and 2015-16 but output and input prices are changing. Assume that a firm raises its output price by 5%, in line with general consumer price index (CPI) inflation, whereas the price of its raw materials falls by 5 percent since WPI is down by 5%. In this example, nominal value added defined as value of sales less value of raw materials will increase by 8% from 2014-15 to 2015-16. Since this increase arises entirely from price changes, it needs to be deflated away in order to obtain 'real GVA at constant prices'.

	2014-15	2015-16	2015-16	2015-16	2015-16
	Nominal	Nominal	Real	Real	Real
			Estimated using Double Deflation	Estimated using Single Deflation and WPI	Estimated using Single Deflation and CPI
Sales	100	105	100		
Raw materials	20	19	20		
Value added	80	86	80	91	82
CPI inflation (%)		5			
WPI inflation (%)		-5			
Growth (%)		8	0	13	2

As the table above shows, using the double-deflation methodology real GVA growth is zero. In other words production has remained unchanged, which is correct, by construction. If instead the CSO's method of single deflation were applied to this example, one would simply take the nominal value added and deflate it by the WPI. Since nominal growth is 8% and the WPI has fallen by 5%, then real GVA growth is estimated at 13%, which is clearly way off the mark. It conveys the impression of a boom when none in fact exists.

Source: Authors' estimates.

Globally, major developed countries have moved to a double deflator method, particularly for the manufacturing sector. In India, the issue of deflator regained importance in the 2011-12 series for two reasons. First, while under the old NAS real growth rate was calculated largely using volume based measures, under the new NAS it is calculated using value based measures. As a result the deflating procedure has become more critical than before. Secondly, starting 2012-13, the WPI and the CPI series diverged substantially from each other, owing to dramatic fall in global oil prices which pushed the WPI sigificantly lower than the CPI. For example, in 2015-16 while WPI inflation fell to -3.7%, CPI inflation was 4.9%. This divergence continued till 2017-18. Considering WPI is the main deflator used by the CSO, this gap between input prices and output prices would have led to an overestimation of the real GDP growth rates under the new series, irrespective of the problems with data and methodology described in the previous section.

The introduction of the MCA21 database has led to new challenges in construction of a double deflator method in case of the manufacturing sector. It is a database of financial statements (such as Profit/Loss statements and Balance Sheets) that does not provide information on input or output prices at a commodity level. These are necessary ingredients for constructing a double deflator that can deflate values of inputs and outputs separately. In most countries, nominal production is deflated by the producer price index (PPI). India lacks a PPI, so the

CSO uses the WPI instead. To ensure that the GDP numbers accurately reflect developments in the economy, the CSO needs to develop proper PPIs, and then employ them using the double deflation methodology. In fact the NSC Real Sector Committee recommended that ASI data should be used together with the MCA data to develop a procedure for processing the data, including use of the double deflation procedure.

4.2 WPI vs. CPI as deflator

It will take some time to develop PPIs, and even longer to calibrate double deflation for each sector. There is however an interim solution that can be much more easily applied. The other problem with CSO's deflation procedure is that the WPI suffers from several drawbacks. For one, it does not measure the price of services, and services constitute the bulk - around two-thirds - of India's economy. Instead, the WPI is heavily weighted towards commodities, especially oil. So when oil prices fall, the WPI falls, and this leads to measured deflation in the services sectors (notably finance and trade) even if service costs could actually be rising. As a result, growth in services could be overstated by a large margin.

One interim solution to this problem, till the time a proper PPI is developed and data on input prices are collected is to start using the Consumer Price Index (CPI) series for the whole of the services sector, instead of the WPI. The change to CPI makes even more sense in the services sector, because the CPI has extensive information on price movements in the various services sub-sectors.

Using the CPI would not solve the problems caused by single deflation as that can only be resolved through the introduction of double deflation methodology, especially for the manufacturing sector, but it would nonetheless help as shown in the table in Box 1. The main reason is that the CPI at least has the correct sign for the deflator. It is increasing when the deflator needs to increase, rather than falling like the WPI. The result, of course, is not perfect. Using the CPI to deflate the nominal

value added leads to an estimated real GVA growth of 2% in our example, when the correct answer is zero. But this is much closer to the reality than the 13% real growth rate obtained by using WPI as the deflator.

The better 'fit' of the CPI is not just an accident of the particular example chosen. It is perfectly general because when commodity prices (such as oil prices) fall, GVA tends to increase, at least in commodity importers such as India. (In this case, one should think of GVA as firm profits, which will go up when input prices fall.) Since this increase needs to be deflated away to arrive at a real GVA estimate at constant prices, one needs an index that will increase when commodity prices fall, rather than decrease, as the WPI tends to do. The CPI will also tend to decrease, but by much less than the WPI, since commodities constitute a much smaller share of the consumer basket.[14]

5. Issues in compiling Regional Accounts (Gross State Domestic Product)

The 2011-12 GDP series has led to new challenges for compiling state level GDP estimates. After the introduction of the MCA21 database, estimates of the organised manufacturing and services sectors are available only at the all-India level. This constraint is because the consolidated financial statements of enterprises are not available as per geographical regions, plant locations and products. As a result, state level GDP for the organized manufacturing and services sectors is driven largely by allocation rather than by actual estimation done in each state. Relying on an allocation method (example using ASI shares of value added poses serious measurement issues as such estimates may not entirely reflect ground realities.

For instance, Manna (2018) shows the bias arising out allocating state wise GVA based on shares of each compilation category in total GVA available from ASI.

[14] As shown in Sengupta (2016 https://www.livemint.com/Opinion/58qihTaOIRd3rPyf1eK09L/Real-GDP-is-growing-at-5-not-71.html), for the year 2015-16 official statistics showed that nominal growth was 8%, and real growth was 9% in the manufacturing sector. If the correct deflator was actually around 3%, in line with CPI manufacturing inflation, then real growth was only around 5%.

Instead, Manna (2018) argues that a more appropriate allocation method would be to use the shares of respective compilation category in total GVA of private companies as per ASI. The issue with such an allocation method is that both the MCA21 and ASI frame have different coverage of units and GVA thus leading to mismatches in growth rates. The problem has also been acknowledged by the Committee of Real Sector Statistics when it stated that:

> The most important gap in MCA-21data relates to the information at the regional (State) level. For the companies operating in more than one State, there is no way of ascertaining the distribution of GVA of such a company over its States of operation. [III 3.3.7 NSC (2018)]

Adding another dimension to the problem, Dholakia and Pandya (2018) in the context of the unorganized services argued that the ELI method does not take into account variations in productivity at the state level. They argue that that labour productivity in sectors such as trade, and freight transport services would be necessarily different across states and ignoring such differences can lead to imprecise estimates. In the old Labor Input (LI) method although category wise labour productivity was not explicitly considered, inter-state variation was taken into account as output per worker varied across states. Thus, on theoretical grounds, the new ELI method cannot be assumed to be superior as compared to the simple Labour Input method.

The revised GDP methodology has affected state domestic product estimation, with a sharp rise in 'apportionments' and 'projections' and a decline in the share of estimates based on state-level primary data, as demonstrated by Dholakia and Pandya (2017) for Gujarat. This amounts to a regression in the quality of estimation of SDP series. It has happened at a time when a greater share of fiscal resources is being managed by the states. In response to the problems in compiling the regional accounts, NSC (2018) clearly outlined that the major issue with regional accounts apart from existing problems was due to the data gap in MCA21. To quote:

> In absence of details of a company's state-wise activities, the national-level GVA estimates are allocated to States in proportion to (i) State-level GVA estimates obtained from ASI for manufacturing activities, (ii) The indicators

for allocating services sector estimates have been mentioned in para IV.2.4.3 above. [IV. 3.3.6 NSC (2018)]

Given the complexity of the problem at the regional level, lack of credible SDP estimates could adversely affect states' ability for resource planning and budgeting. The recommendations of the NSC (2018) for resolving these issues would require a series of policy and regulatory efforts so as to rely less on voluntary compliance by companies and more on data validation and scrutiny checks.

6. Issues with the 2011-12 Back Series of GDP

While data and methodology problems remained unresolved, new controversies related to the 2011-12 series also cropped up in the last one year. Since its release, the 2011-12 NAS did not have a 'back casted series', i.e. estimates at 2011-12 prices beginning from 1950-51. The release of back series of any new base year series is a routine exercise. Given the substantial changes in data sources and methods of estimation in the 2011-12 NAS series which introduced inconsistencies with the sources and methods used in the older series, compiling a back series was a major challenge.

However in 2018, two separate sets of back series based on two different approaches were released, one official and another unofficial, for varying time lengths, leading to an inconclusive debate on the historic growth performance of the economy. First, the Committee on Real Sector Statistics presented its own estimates from 1994-95 till 2013-14 (henceforth NSC back series). Subsequently the CSO released the official version of the back series for only seven years from 2004-05 till 2011-12 (henceforth CSO back series).[15] These two series showed diametrically opposite growth trends (CSO, 2018; NSC, 2018). This is clearly demonstrated in figures 8 and 89

[15] See NSC (2018) and CSO (2018a) for details and documentation

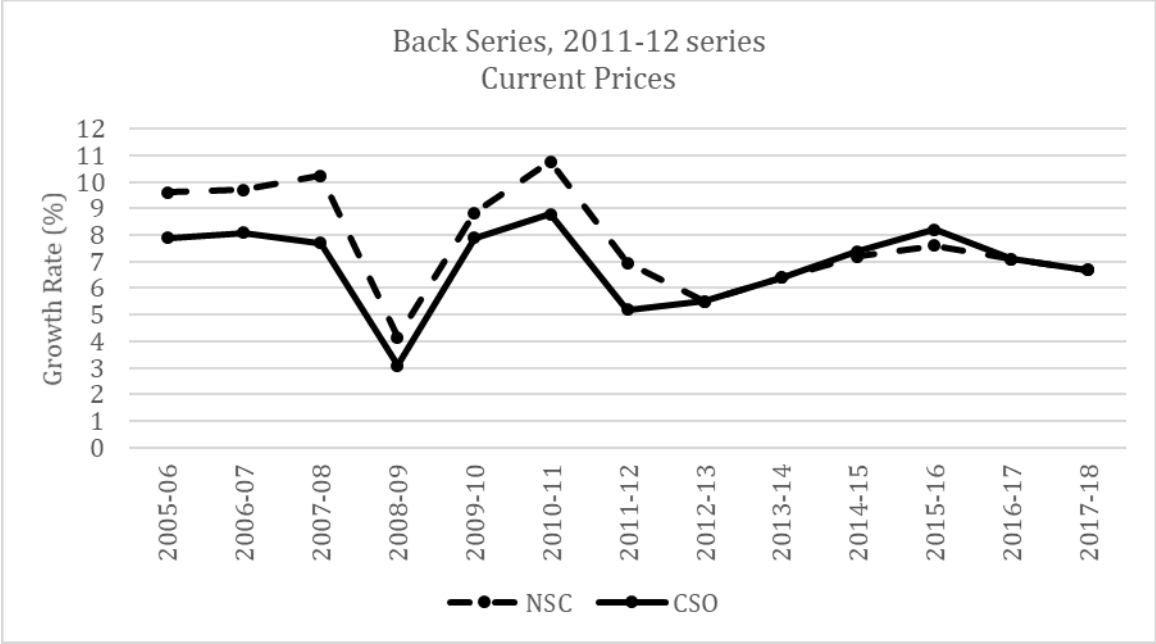
The CSO back series showed lower annual growth rates for all the years from 2005-06 to 2011-12. For the seven year period, most of which was so far considered to be an economic boom period for India, CSO back series reported an average annual growth rate of 6.9 percent as opposed to the 8.2 percent growth rate reported in the 2004-05 base year series.

The significant downward revision of growth rates and also the diametrically opposite picture painted by the CSO back series compared to the NSC back series, raised suspicion about the veracity of the estimates. This was especially because, as mentioned earlier, by most popular accounts, these seven years recorded unprecedented economic growth, an export boom, a credit boom, and an investment boom when India was hailed as one of the fastest growing economies in the world. The CSO back series changed this piece of Indian economic history.

In addition to changes in the aggregate growth rates, the CSO back series also changed the overall composition of GDP in the following ways:

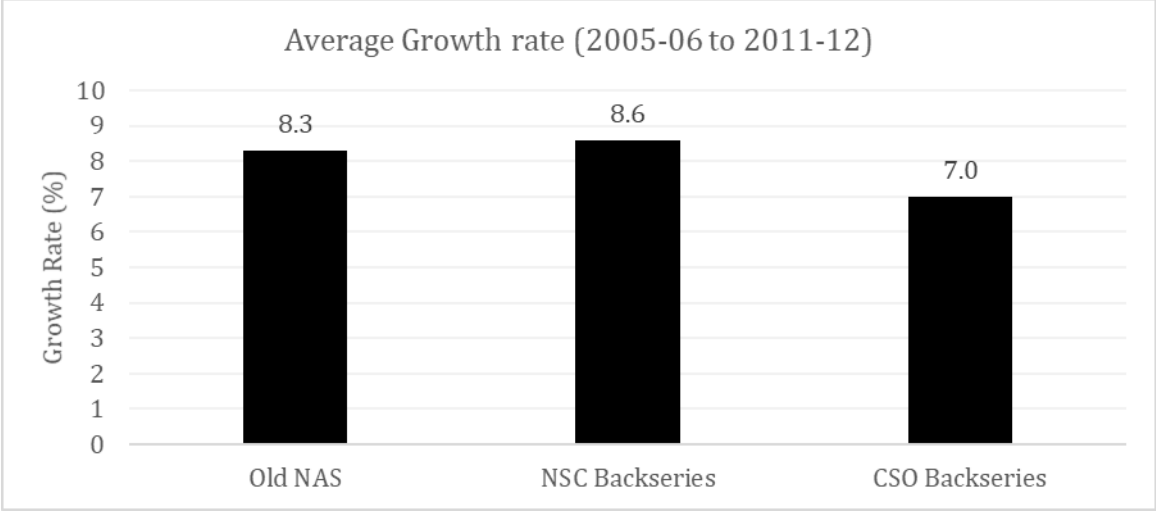
1. Reduction in the share of the services sector for this seven year period.
2. A rise in the shares of primary and secondary sectors (corporate manufacturing in particular)
3. A reduction in the size of unorganised/informal sector and expansion of the size of the private corporate sector

FIGURE 8: COMPARISON OF THE NSC AND THE CSO BACK SERIES GROWTH RATES



Source: CSO (2018a)

FIGURE 9: COMPARISON OF THE 2004-05 SERIES, NSC BACK SERIES AND CSO BACK SERIES



Source: CSO (2018a)

The CSO has so far not released the details of all the methods, procedures and adjustment made in preparing the back series. We can obtain some understanding of how this series was put together from its press release of November 28, 2018. While the NSC back series applied a 'production-shift' technique to obtain previous years'

growth rates, it seems the CSO back series used a concoction of methods and data sources.

For example as claimed by the CSO in its press note, till the time MCA 21 database was available they used this data to calculate the GVA of PCS. For all the previous years when MCA data on corporate filings were not available, they resorted to the ASI data (that was used in the older NAS series). They further mention in the same press note:

> "The methodology for preparing the back-series estimates for the years 2004-05 to 2010-11 is largely the same as the methodology followed in the new base (2011-12). In certain cases, owing to the limitations of the availability of data, either splicing method or ratios observed in the estimates in base year 2011-12 have been applied. … Splicing method has been applied for preparing the estimates in Construction Sector entirely and applied partially in Agriculture and Allied Sectors, Gas Trade, Repair, Hotels and Restaurants, Real Estate, Ownership of Dwelling and Professional Services, Public Administration and Defence and Other Services."

This shows that the CSO back series was estimated using different databases for different period and different methods for different sectors. This raises serious doubts about the comparability and continuity of the back series with the new 2011-12 GDP series and hence, about the reliability and usability of the back series.

Moreover as discussed in detail in the previous sections of this paper, many infirmities in the new methodologies and data sources used by the CSO have come to light in the GDP measurement debate and none of these has been resolved so far. The use of the MCA database in particular could have misleadingly enlarged the private corporate sector's share in the Indian economy and its growth rate. Therefore using the same methods and data sources to back-cast the 2011-12 series is likely to result in incorrect estimates as well. In this context it is worth asking how correct and prudent it is to selectively use some of the contested methods for preparing the back series.

7. Conclusion and way forward:

In 2015, the CSO introduced a new series of National Accounts Statistics with 2011-12 as the base year, replacing the earlier 2004-05 base year series – a routine matter for statistical authorities of most countries. The re-basing was carried out to account for the economy's structural changes, and in relative prices, always following the global template of UN System of National Accounts (UNSNA), the latest one being the 2008 edition. It is also an occasion for statistical authorities to introduce newer databases and better methodologies to improve the data quality.

Typically, as seen in the past, re-basing leads to a slight enlargement of the absolute GDP size, as output that was previously left out or inadequately captured gets recorded after the revision. This does not usually lead to changes in the growth rates, implying that the underlying trend remains the same. The latest NAS revision however defied these usual patterns, and reported a slight contraction of the GDP size in the base year, as well as a faster growth rate in the subsequent years. As the growth trends in the new series did not square with related macroeconomic aggregates, widespread scepticism emerged questioning the veracity of the new GDP series. Statistical authority responded saying that the newer estimates are sound because they have used the latest UN guidelines, larger databases and improved methodologies but this failed to carry conviction.

In their IPF paper, Nagaraj and Srinivasan (2017) unpacked the issues and recorded the state of affairs as they were till mid-2016. Since then, fresh research and data releases have uncovered newer problems thereby strengthening the earlier doubts about the new GDP's veracity and reliability. This has made it imperative to assess the issues, which is the objective of our present paper. Given that much of the newer research and questions are centred on the private corporate sector output estimates, our paper has paid most attention to this aspect of the revision.

A major change in GDP estimation in the new series was the use of regulatory filings of financial returns (in the MCA database) to estimate output of the private corporate sector, replacing the production accounts obtained under the Annual

Survey of Industries (ASI) for manufacturing firms (which account for nearly one-half of the overall corporate sector output). This change was predicated on the view that the production accounts did not capture output outside the factory premises given *its approach* to data collection. The *enterprise approach* used company balance sheet is considered a solution to this problem. Research undertaken to closely examine the ASI data revealed that the assumption for the shift in the approach is factually incorrect, thereby undercutting the very basis of the innovation introduced in the new NAS. Since manufacturing sector growth rate has been persistently higher in the new series compared to picture painted by other macroeconomic indicators, there are apprehensions that the change in approach to data collection may be at the source of the problem.

While the universe of registered companies may have increased substantially, the state of `active' and `filing' companies in the database has serious implications for GVA estimation. The structure of the private corporate sector is such that a small number of large companies contribute a large share to GVA. Limited information from the MCA database suggests that a large number of small companies are unavailable for estimation on an annual basis. Their estimates are obtained through a blowing-up procedure whose details have not been released by the CSO. GVA estimates can be imprecise especially when the sample size, its fraction and the universe of working companies is indeterminate.

A recent official data release gave credence to the above suspicion. In 2016-17, NSSO conducted a survey of non-government and non-financial services sector enterprises, on its way to lunch a full-fledged series of annual survey of services, on the lines of ASI. One of the list-frames (that is, the universe) for drawing the sample, expectedly, was the MCA's list of `active' (that is, deemed working) companies – a part of the universe of companies CSO uses for estimating private corporate sector GDP. After due verification, when NSSO launched the survey, it failed to get response from up to 45 per cent of the sampled companies. Admittedly, some of the non-responses could be due to misclassification (which in principle could be rectified).

But the fact that 24 per cent of the sample companies were non-traceable/failed to respond suggest that the universe of 'active' companies used for private corporate sector GDP estimation is unreliable and riddled with holes. This raises doubts about the magnitude and reliability of output estimates (prepared using the same list frame) accounting for over 1/3rd of the economy's GDP.

Another problem with the GDP measurement which is a legacy issue but became prominent when the new NAS was released is the manner in which nominal GDP or GVA values are deflated to obtain the real GDP growth rates. The global best practice is double deflation where different price indices are used for the inputs and outputs because if their prices are changing at different rates, then using the same price deflators would yield distorted estimates of value addition. This has not been done for the new GDP series. A single deflator is used in generating the GVA series for a given sector. In absence of the double deflator method, whenever there is a divergence between output and input prices, the real growth rates would tend to be overestimated. This is exactly what happened in the period 2013-2016 when WPI inflation was significantly lower than the CPI inflation, net result being a potential overestimation of the real GDP growth rates under the new NAS.

Regional Accounts are an integral part of the system of national accounts. The NAS revision process has apparently paid scant attention to the implications of methodological and database changes for the estimation of state domestic product estimates. The problem arises because the newer databases used – such as the corporate filings in MCA database mentioned above – are not geared for producing state-level (let alone at the district level) output estimates. As a result, the state level estimates are mostly apportionments of the national estimates, grossly distorting the statistical picture of underlying economic reality. With increasing economic decentralisation, distorted state income accounts end up affecting the distribution of resources and probably even aggravating inter-regional inequalities.

After denying for three years that GDP back-series could not be prepared due to the substantial methodological changes in the latest GDP revision, in 2018, the

statistical establishment, in quick succession, came out with two back-series with diametrically opposite trends. While the series by a committee of the National Statistical Commission boosted the growth rates for the last decade (2004-05 to 2011-12), CSO's officially accepted series, reversed the trends, drastically lowering the growth trends of the previous. The conflicting trends and lack of transparency in the methodology used (especially) in the official back-series, confounded data users, and also further dented the credibility of the statistical establishment.

Recommendations

If the foregoing analysis is sound and substantial, then they cast a serious doubt on the new GDP series. In response, many private and international financial firms have apparently resorted to their own devices to find proxies for GDP. Some are apparently using World Bank's night lights data as a measure of economic activity, or high frequency industry and sector specific data – all of which are at best second best solutions.

Going forward, we consider two sets of recommendations, one short run or intermediate remedies, and the second a longer term and lasting solution. Since the MCA database and the methodologies are the heart of problem, authorities should immediately release the data in suitable form for independent verification of the official GDP estimates. As corporate filing is a statutory requirement, the data should in principle be easily accessible in public domain. However, considering its sheer size and complexity the database needs to be made public in a suitable format via public institutions. MCA could set up data labs in leading research institutions and universities, similar to the Census Commission's initiative, to encourage policy-oriented research on the corporate sector. More specifically and immediately, MCA/CSO can release the following data from 2011-12 onwards,

- Yearly information on the sample size, sample fraction and the size of universe of `active' companies and their PUCs.
- A break-up of financial and non-financial companies, by various categories.

- List of companies filing returns with information on selected variables, which could help data users to independently verify the data quality.

MCA and CSO should also create a suitable institutionalised forum for regular and sustained interaction with data users to address the numerous issues that have come up in the course of the GDP measurement debate.

To address the problems arising out of the single deflator issue, till the time producer price indices are generated which may enable the move towards a double deflator method, CSO may consider using the WPI as a deflator for the industrial sector and the CPI as a deflator for the services sector. This will help deal with some parts of the problem arising from the deflator issue.

For a lasting overall solution – reiterating Nagaraj and Srinivasan's 2017 recommendation – a statistical audit and a credible expert committee need to be set up to invite the best expertise available globally to review the GDP revision process. Some of the core issues that the expert body may examine are the following:

1. Appropriateness of replacing the establishment approach to data collection with enterprise approach for the non-farm sector, given the present level of India's development and quality and reliability of the available statistical bases.
2. Shifting of Quasi corporations (QCs) from household/unorganised sector to private corporate sector, and its many ramifications for macroeconomic aggregates, and policy.
3. Critically examine the incompleteness and unreliability of the MCA database, given limited state capacity to enforce laws governing private enterprises. There is an urgent need for a thorough investigation to ascertain its suitability for estimating domestic output for an emerging market economy like India.

The objective of the audit/committee would be to investigate in detail the problems in the sources and methods of the new NAS and help come up with the best

alternative estimates, preferably before the next base-year revision is conducted. Otherwise we may end up perpetuating the defects in the current base-year series and India's GDP will continue to be marred in controversy.

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