

India's GDP Mis-estimation: Likelihood, Magnitudes, Mechanisms, and Implications

India changed its data sources and methodology for estimating real gross domestic product (GDP) for the period since 2011-12. This paper shows that that this change has led to a significant overestimation of growth. The paper focusses on the technical and methodological changes that affected the GDP estimation post-2011-12. Specifically, it addresses three questions: **Is there a problem of mis-estimation of GDP growth after 2011? What is the likely magnitude? What is its potential cause, and in particular, how might the revisions in methodology have contributed to the over-estimation?**

For the period 2005-2011, there are now two sets of estimates for GDP. The first set is constructed using 2004 as the base year, while the second set, released in December 2018—the so-called back-casted series—uses 2011 as the base year and also uses the new methodology. The data produced by the two methods produces stark differences in GDP numbers. The analysis in this paper is to compare 2 different methodologies, namely those used pre- and post-2011.

The main findings of this paper are the following:

Compelling evidence suggests that India's GDP growth has been over-stated by about 2 ½ percentage points per year in the post-2011 period, with a reasonable level of confidence. So, instead of the reported average growth of 6.9 percent between 2011 and 2016, actual GDP growth was more likely to have been between 3 ½ and 5 ½ percent. Given the magnitude of the over-estimation, this warrant serious policy consideration.

One of the potential explanations for the over-estimation has been identified which relates to the **impact of the methodology revisions on the estimation of the formal manufacturing sector**. In particular formal manufacturing growth has been found to move plausibly with other indicators of manufacturing such as the index of industrial production in the pre-2011 period, but it starts to diverge starkly thereafter (raising suspicion). Similarly, formal manufacturing growth is positively correlated with manufacturing exports in the pre-2011 period but puzzlingly becomes negatively correlated thereafter.

The possible causes that could have led to over-estimation is explained as follows:

Potential Cause 1: Moving from volume to value-based estimates in manufacturing

One of the key methodological changes was the move from establishment-based data from the Annual Survey of Industries (ASI) and Index of Industrial Production (IIP) to financial accounts-based data compiled by the Ministry of Corporate Affairs (MCA).

Why was the need?

It enlarged the scope of economic activity being covered: more than 600,000 companies file MCA data, which could be used for NIA estimates. It is intended to replace predominantly volume-based estimates of gross value added (GVA) to value-based estimates which in principle better capture the quality and technology changes of a modern, dynamic economy.

What was the problem?

Quality of MCA data is suspect due to presence of shell companies especially in the services sector. But it is also not obvious whether these problems necessarily affect the GDP estimates. (Though the analysis involved a much smaller set of 3000-5000 companies).

However, more analysis is necessary to see if the MCA data issues affect estimation of GDP levels or growth rates and whether it is nominal and/or real estimates that are impacted.

But the move to value based data combined with a change in the external environment post-2011 would have had significant consequences, particularly due to decline in oil prices and resultant fall in input prices, especially in manufacturing sector. And because new system is value based, the estimates have to be deflated by

prices to get the real magnitudes unlike the old system where price changes mattered less because real growth numbers were largely based on volumes not values.

In the ideal scenario if output values are deflated by output prices and input values by input prices (what is called “double deflation”), real value added can be properly estimated. But the revised methodology did not involve a move to such double deflation; it involved deflating both output and input values by output prices. This is likely to induce an upward bias in the estimates.

In other words, the inappropriate use of single deflation can artificially inflate growth figures by significant amounts when oil prices fall sharply, as they did in the post-2011 period, especially the post-2014 period.

If this analysis is correct, it has three plausible propositions. First, formal manufacturing value added, which is particularly oil-intensive, should be significantly affected in the post-2011 period. Second, manufacturing value added growth should be over-estimated post-2011. Third, manufacturing value added should be more sensitive to the output-input price wedge post-2011 than pre-2011 because in the earlier period estimation was more volume based.

Proposition 1. Formal manufacturing value-added is significantly affected.

There are two independent sources available for measuring the performance of the formal manufacturing sector on a quarterly basis: **the IIP (Manufacturing) and manufacturing exports.**

The NIA estimates real GVA growth for the formal manufacturing sector using company data and for the informal sector, it uses IIP data as a proxy, even though it is (a) based on a sample of *formal* sector establishments and (b) is mostly a volume metric.

In principle, the volume and value added metrics should not diverge unless the technological efficiency of the economy—defined as the relationship between intermediate inputs and output—changes (efficiency includes improvements in product quality). If an economy becomes more efficient at using inputs, then volume indicators will underestimate true value-added growth.

The fact that manufacturing companies make more profit because, say, oil prices decline should not alter the relationship between volume and value-added estimates, and does not signify higher real value added even though nominal value added may have increased.

The analysis indicates that manufacturing value added is particularly distorted in the second period (post 2011). Pre-2011, the correlation between formal manufacturing value added growth and IIP manufacturing growth, which are both measuring the same scope of real activity (formal manufacturing), is high and positive (0.7); but post-2011, it turns negative (-0.1). This is bizarre

Another measure of the distortion is suggested by comparing the correlation between real GVA growth and growth in manufacturing exports. Normally, higher manufacturing growth should be associated with higher growth in manufacturing exports. Since manufacturing production precedes manufacturing exports, we look at the correlation between manufacturing and exports a quarter later. During Q3 2008-09 to Q4 2012-13 (old series), this correlation was expectedly positive at 0.4. But for the period covered by the new GVA series, this correlation becomes negative at -0.3, which is very unusual. So, again, the old real GVA growth series yields reasonably plausible relationships with other related series, but the new series yields counter-intuitive results.

Proposition 2. Formal manufacturing value-added growth is over-estimated:

Pre-2011, GVA growth in the formal manufacturing sector estimated from NIA data and that of IIP manufacturing growth diverged but in both directions so that the average difference was minuscule, as it should be. However, post-2011, under the new series, the divergence is almost entirely one way, with real GVA growth consistently exceeding IIP growth by about 5.9 percentage points on average.

With reasonable quality and efficiency growth, the GVA number should probably exceed the IIP number and the excess in the first period of 0.9 percentage points seems reasonable. But the sudden jump to 5.9 percentage points in the post-2011 period seems baffling.

When we take this discrepancy in account in context of the share of manufacturing in aggregate GVA (about 17 percent), it amounts to an over-estimation of nearly 0.9 percentage points, roughly one-third of the over-estimation of total GDP growth.

Proposition 3. Over-estimation of formal manufacturing related to output-input price wedge:

The final piece of evidence relates to the relationship between the divergence and the output-input price wedge. Output prices are proxied by the CPI, and input prices by the WPI, because the WPI is heavily weighted toward commodities, which are typically used as inputs.

Based on the data analysis it turns out that under the old series, the real GVA measurements were less susceptible to price changes, as they should be. But under the new series, it becomes more vulnerable to relative price changes. In effect, the lower the WPI inflation (proxying the cost of inputs) relative to CPI inflation, the more GVA growth is relative to IIP growth.

Potential Cause 2: Deflating Services by Manufacturing Deflators

For the purpose of adjusting the measurements for price change, consumer services values are deflated by the relevant CPI-services index, producer services (including trade and repair; storage; information and computer-related; professional, scientific and technical activities, including R & D; real estate), which account for about 20 percent of overall GVA are deflated by the aggregate WPI manufacturing index.

The underlying logic is that (a) producer services should be deflated by a producer index and (b) WPI manufacturing is a good proxy for producer prices for services. The first assumption is reasonable but the second is deeply problematic, because there has been a large trend change in the relative price of goods—especially commodities--and services. As a result, in the post-2014 period, inflation in CPI services exceeded that for WPI manufacturing systematically.

Potentially, 20 percent of gross value added is being over-stated because value estimates are being deflated by prices that were declining due to oil price changes. **It seems here that the problem was less the methodology *per se* but the interaction of the methodology combined with circumstantial changes.**

Potential Cause 3: Proxying Informal by Formal Activity

The NIA estimates of real GVA growth for the *informal* sector are based on and proxied by the IIP, which is mostly composed of formal sector firms. The informal sector accounts for 30 percent of manufacturing GVA and hence about 5 percent of overall GVA. This proxy might be reasonable in normal times. But it likely overestimated growth during a period when major policy actions—demonetization and GST—disproportionately impacted the informal sector.

This, however, is not an explanation for our results because our baseline results do not cover the period beyond March 2017 when the impacts of demonetization, and especially the GST, would have been most severe.