

## Linkages between PMI, GDP growth and IIP growth

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In order to gauge the economic health of the country, Gross Domestic Product (GDP) growth, Index of Industrial Production (IIP) growth is considered to be the major indicators. In addition, the value of Purchasing Manager's Index (PMI), a survey based indicator, reflects the sentiments regarding industrial and thereby economic growth.

The question arises whether the PMI number actually reflects in the GDP growth of manufacturing and services sector and IIP growth. Therefore, the aim of this report is to probe into the relationship between PMI of manufacturing and services with GDP growth in the corresponding sectors and with IIP growth.

### What is PMI?

PMI is a survey based indicator that is conducted every month for manufacturing and services sector. It basically conveys the prevailing business conditions. The Nikkei PMI for manufacturing and services sector for India is published every month by Markit Economics. PMI-Manufacturing is derived from a survey of 500 manufacturing companies while PMI- Services is compiled by undertaking the survey of 350 private service sector companies. The manufacturing PMI is based on new orders, output, employment, supplier's delivery time and stock of items purchased. PMI-Services take into consideration sales, employment, inventories and prices. For calculating the PMI, certain weights are assigned to each of these variables. For example, PMI – Manufacturing assigns 0.3 weight to new orders, 0.25 to output, 0.2 to employment, 0.15 to suppliers delivery and 0.1 to inventories. The respondent can answer survey question only in terms of improvement, no change and deterioration.

The PMI data is then presented in a diffusion index; calculated by

$$PMI = (P_I * 1) + (P_{NC} * 0.5) + (P_D * 0)$$

where,

$P_I$  = Percentage of respondents with improvement

$P_{NC}$  = Percentage of respondents suggesting no change

$P_D$  = Percentage of respondents suggesting deterioration

To arrive at PMI figure, as indicated in the equation, the percentage number of respondents is multiplied by 1 for improvement, 0.5 for

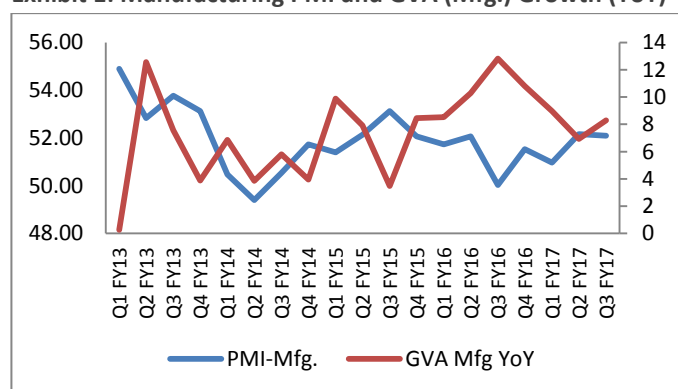
no change and 0 for deterioration. The resultant PMI number thus lies between 0 and 100. A reading above 50 indicates an expansion of the manufacturing sector compared to the previous month; below 50 represents a contraction; while 50 indicates no change.

## Correlation between PMI, GDP growth and IIP growth

As has been stated earlier, PMI is published on monthly basis. Thus, to compare the PMI of manufacturing and services sector with comparable sectoral GDP growth, the monthly PMI has been converted to quarterly PMI by taking an average. For comparison, yearly and quarterly GDP growth of manufacturing as well as services has been considered. For comparison with IIP growth, monthly data points of PMI-manufacturing and IIP growth rates on annual and quarterly basis have been used.

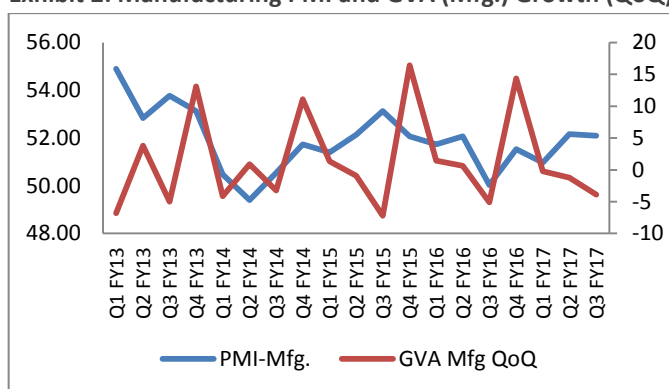
### Manufacturing PMI and GDP growth in manufacturing

Exhibit 1: Manufacturing PMI and GVA (Mfg.) Growth (YoY)



Source: MOSPI, Markit Economics

Exhibit 2: Manufacturing PMI and GVA (Mfg.) Growth (QoQ)



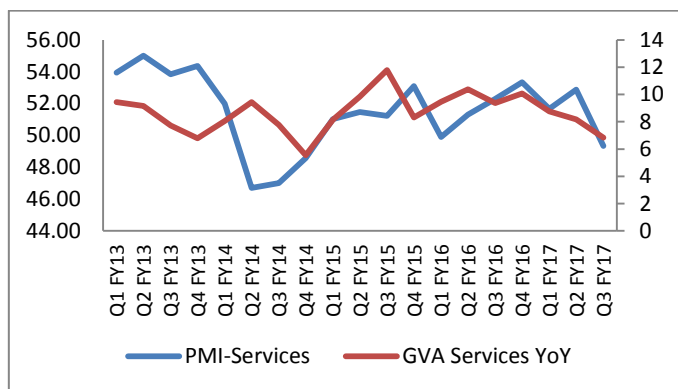
Source: MOSPI, Markit Economics

- It is evident from the Exhibit 1 and Exhibit 2 that the trends PMI manufacturing does not necessary reflect in GDP growth (YoY) and GDP growth (QoQ).
- Out of total 19 quarters in 13 quarters PMI – Manufacturing has indicated exactly opposite relation with GDP growth (YoY). While the PMI indicated a decline, the GDP growth (YoY) improved and vice-versa.
- Considering the PMI-Manufacturing and GDP growth (QoQ) the similar disconnect prevails. Out of 19 quarters, in 10 quarters the index and GDP growth suggested opposite relation.
- The correlation reiterates this disconnect between PMI- Manufacturing and GDP growth Coefficient of correlation between PMI-Manufacturing and GDP growth (YoY) is -0.34 indicating moderate negative correlation between the two while that between PMI and GDP growth (QoQ) is -0.04 suggesting very weak negative relationship.

### Services PMI and GDP growth in services

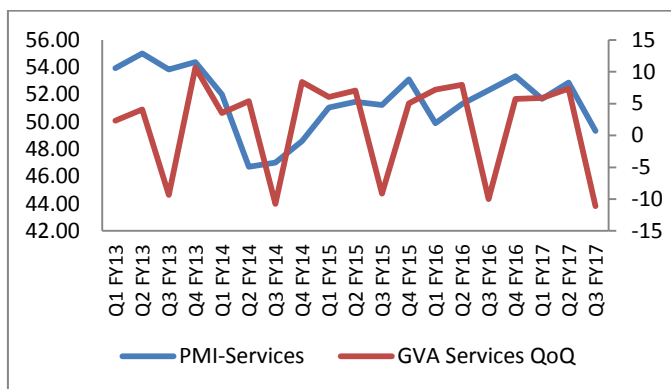
- Exhibit 3 plots PMI of services sector and GDP growth (YoY) of services while Exhibit 4 displays PMI along with GDP growth (QoQ) for services.
- The PMI –services is witnessed to reflect only marginally in the GDP growth.
- However, the sentiments gauged by PMI services are seem to reflect more in GDP quarterly growth rates rather than annual growth rates of GDP.
- Out of 19 quarters, in 10 quarters the PMI-Services exhibited opposite relation with GDP (YoY) growth. The coefficient is 0.14 indicated weak positive relationships between PMI-Services and GDP (YoY) growth for services sector.

**Exhibit 3: Services PMI and GVA (Services) Growth (YoY)**



Source: MOSPI, Markit Economics

**Exhibit 4: Services PMI and GVA (Services) Growth (QoQ)**



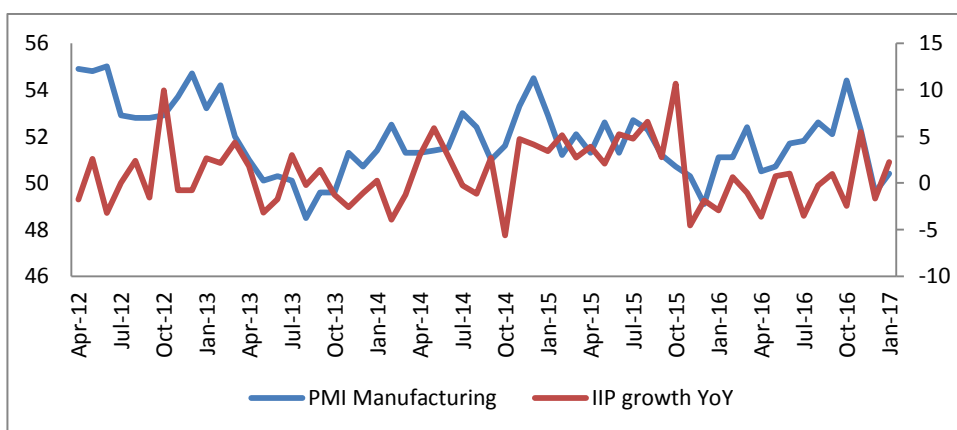
Source: MOSPI, Markit Economics

- However, a positive linear relationship has been depicted by PMI and GDP growth (QoQ) for services. In 13 out of 19 quarters, changes in PMI are witnessed to have reflected in the GDP growth. The coefficient of correlation between PMI-Services and GDP growth (QoQ) is 0.18 demonstrating positive but weak relationship between the two.

**PMI Manufacturing and IIP growth**

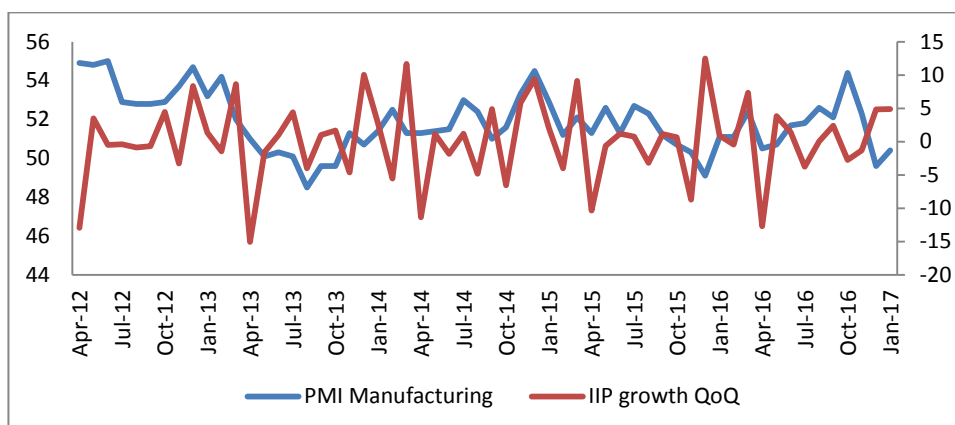
- PMI – Manufacturing when compared to IIP YoY growth and IIP QoQ growth depicts exact opposite results.
- While there is positive relationship between PMI and IIP YoY growth, the IIP QoQ growth indicates negative relationship with PMI.
- Out of 58 monthly observations, in 24 instances IIP YoY growth indicates same relation as per PMI – Manufacturing while in 31 cases IIP QoQ growth indicates opposite relation to that of PMI.
- As a result, the correlation remains weak between IIP growth and PMI.
- The correlation coefficient is 0.09 between PMI and IIP YoY growth indicating weak positive relation. Thus, it can be inferred that changes in PMI are correspondingly reflected though marginally in the IIP growth (YoY).
- On the other hand, the correlation between PMI and IIP QoQ growth is found to be negative at -0.003 suggesting very weak correlation between the two variables. Therefore, the sentiments as per PMI are not contemplated likewise in the IIP growth.

**Exhibit 5: Manufacturing PMI and IIP Growth (YoY)**



Source: MOSPI, Markit Economics

Exhibit 6: Manufacturing PMI and IIP Growth (QoQ)



Source: MOSPI, Markit Economics

### Concluding Remarks

- There seems to be disconnection between the sentiments gauged via PMI and GDP as well as IIP growth.
- In fact, there is very weak and rather negative correlation between PMI and GDP growth in the manufacturing sector. Any improvement in PMI – Manufacturing does not necessarily mean that GDP for manufacturing sector will improve.
- The PMI tends to follow the trend in the GDP growth of services sector as it has indicated marginal positive correlation.
- Comparison between PMI and IIP growth indicates positive relation though weak.
- Thus, it can be inferred that one cannot completely rely on the PMI of manufacturing and services sector for judging the growth in economic indicators like GDP and IIP growth.

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