

Twin Shocks of Pandemic, Industrial Recession and Unemployment in India: An Econometric Analysis of Effects and Persistence

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Abstract

The objective of this study is to analyse the short run and long run impacts of COVID-19 induced shutdown on industrial growth in India. It quantifies the short term effect on growth across different industries and analyses whether the recessionary effect of the shock will be long lasting or short living. The study examines the stochastic behaviour and nature of trend of the monthly time series of *iip* from different sectors by considering possible structural break in the series. The study observes that manufacturing is the worst affected sector because of lockdown registering average rate of fall in production at around 43 per cent. But all manufacturing groups have not been affected equally. Production of motor vehicles declined at the fastest rate (more than 76 per cent) during this period. Capital goods sector was the bad performer exhibiting negative growth even before the COVID 19 outbreak and declined by more than 65 percent during the pandemic. During lockdown, production of consumer durable goods declined at the highest rate as compared to the other sectors in use base category in industrial production

JEL Code: E12, E6, H0, I1

Key words: Recession, Macroeconomic outlook, Pandemic

1. Introduction

The outbreak of the COVID-19¹ is a great shock to the world economy. The recessionary effects of this shock started from both demand and supply sides and in this sense the impact of this shock is expected to be more severe than the Great depression of 1929 and, perhaps, will be long lasting. The World economy during the 1930s guided primarily by the market based competitive price system was survived by following Keynes's prescription. As the recession at that time was generated primarily by the lack of effective demand, the crisis was

¹ The COVID-19 is declared as a pandemic by the WHO not because it is more deadly, but because of its global spread at unusual faster rate. A pandemic is a type of epidemic that relates to geographic spread and describes a disease that affects the whole world. The novel coronavirus has infected more than half a million people worldwide and is present in more than 175 countries. It has killed more than 22,000 people and has a global fatality rate of 4.4%.

tackled by raising demand and the State played a crucial role in this regard. During the 1930s there was no problem on the supply side and Keynes's multiplier theory was very much effective in raising GDP and its growth either by raising government expenditure or by tax cut or by using the so called policy mix.

The Great depression was endogenous in the sense that the shocks were generated endogenously within the economic system and their effects transmitted to different sectors through spill over effects. Unlike the past recessions, the global recession today has been originating from the COVID 19 pandemic, the exogenous shocks generated outside the economic system. The global economy is expected to collapse into greater recession in 2020 because of the pandemic. However, the underlying reasons for the downfall of production and employment, and contraction in almost all economic activities are known. As the shutdowns of production and locking down most of the sectors are state coordinated, the governments can take initiatives to control the downward spiral gradually through appropriate fiscal and monetary measures.

The economy today has to face demand shock as well as supply shock simultaneously because of the pandemic. To control the pandemic most of the countries locked down their economic activities completely or in some cases partially. In India, strict lockdown was imposed in March 25 and continued till May 31, 2020. The process of unlocking started thereafter in a phased manner and economic activities have been opening gradually, but not in full form. The negative supply shock caused by factory closures is transmitted through supply chains to downstream sectors around the world. In addition, the pandemic is causing income and demand to contract, which affects the upstream sectors everywhere. The resulting decline in income because of the sudden shut down of production in almost every sector (excepting for essential services) of the economy can cause a downward spiral in demand for products and services. The market itself could not solve this problem by its demand-supply mechanism. The role of the state once again becomes highly significant as prescribed by Keynes in 9 decades ago in controlling the crisis, but, perhaps in a modified way.

The objective of this study is to analyse the short run and long run impacts of COVID-19 induced shutdown on industrial growth in India. The specific emphasis is given to the dynamics of industrial production, and employment. The study provides the quantitative estimates of growth in pre-lockdown and during lockdown period. It quantifies the short term effect on growth across different industries which are essential to determine the relative

response of different industries during the shutdown period, and anti-recessionary measures required in different industries for a return to their long run path. Stochastic behaviour of the macroeconomic time series of production is examined to analyse whether the pandemic is the primary cause for long run recessionary effects on the economy, and whether the recessionary effect of the shock will be long lasting or short living.

The rest of the paper is organised as follows: a short description of data and methodology is provided in section 2. Section 3 demonstrates the condition of the macro economy in India before the outbreak of the pandemic. Section 4 compares the changes in average growth rates of production in different industrial groups. Section 5 examines the stochastic behaviour of the monthly time series of *iip* by sectoral and use base decomposition to analyse how the pandemic is responsible and how long the recessionary effects persist. Section 6 provides a snapshot view on unemployment rate because of lockdown. Section 7 concludes.

2. Data and methodology

2.1 Data

In this study, we have used the new series (2011-12) of index of industrial production (*iip*) published by the National Statistical Office (NSO) and available from April 2012 to May 2020. The *iip* shows a summary trend in industrial output comprising of nearly 700 items from mining, manufacturing and electricity. Figures for May 2020 are the quick estimates, but calculated with more weighted response rate as compared to April, 2020. Growth rates are calculated from monthly data as year on year basis. We have examined the stochastic behaviour of the monthly series of growth rates calculated from *iip* in different industrial groups and manufacturing industries at 2 digit level.

In India, the primary source of employment and unemployment data in official statistics is the household survey conducted by the NSSO roughly in five years interval. Another source of employment data is the enterprise survey. There are some inherent problems in conducting enterprise survey in India where only 1.4 per cent of the enterprises engage 10 or more workers absorbing 21.5 per cent of the work force. This is what is usually called the organised sector. The large share (78.5 per cent) of employment absorbed in the unorganised sector enterprises who do not maintain employment record properly. In addition, the Labour Bureau conducted labour force survey on annual basis by following the methodology very

similar to the NSSO's surveys from 2009-10 to 2015-16. Household surveys by the Labour Bureau appeared with an annual frequency and its enterprise surveys came with a quarterly frequency. The earlier employment and unemployment survey has been replaced by the periodic labour force survey in 2017-18

As the official statistics on periodic labour force survey has been lagging behind roughly 2 years, we have used unemployment data from Consumer Pyramids Household Survey (CPHS) conducted by Centre for Monitoring Indian Economy (CMIE) which is available for the pandemic regime. It is a large longitudinal household survey conducted in three waves (four months period in each wave) every year. CMIE in collaboration with BSE publishes unemployment measure from this survey on weekly, monthly and daily 30 day moving averages since 2016. The sample is framed to cover all states and union territories. The total sample units of a wave is equally distributed over the 16 weeks of the wave keeping the share of sample households constant over the week and across rural and urban areas.

Employment status is looked at on the basis of persons with age 12 years or more in the sample households. But to estimations of labour force, labour participation rate, and unemployment rate, the employment status of persons with age 15 years or more is considered. In this survey, there are three types of unemployment defined in terms of willing to work and searching activity to get a job: unemployment of category 1 includes those persons who are willing to work and also actively searching for employment, category 2 includes those who are willing to work but not actively looking for a job, and in category 3 people are neither willing to work nor searching for work. But, labour force includes employed, unemployed and looking for a job. This survey defines unemployment rate as unemployed and actively looking for a job as a per cent of the labour force. Labour participation rate is defined as employed as a per cent of estimated population of 15 years or more. Daily unemployment rate is calculated by applying the preceding 30-days moving average of unemployment rate.

2.2 Econometric model

To investigate whether the recessionary phase is long lasting we have carried out unit root test. If we go through the literature on unit root, we find that a large number of methodologies have been developed so far in carrying out tests of the unit root hypothesis relating to different macroeconomic series. In testing unit root, Perron (1989) first introduced a break

point. But, the choice of break point exogenously by economic information in this framework was criticised in the subsequent theoretical and empirical literature (Banerjee et al. 1992, Zivot and Andrews 1992, Perron and Vogelsang 1992, Chu and White 1992). By considering endogenous structural break, Zivot and Andrews (1992) performed a sequential test using a different dummy variable for each possible break date in OLS based ADF formulation. In this test, a break date is chosen endogenously where the evidence is the least favourable for unit root null. Banerjee *et al.* (1992) also carried out unit root tests by treating possible break point endogenous and utilising sequential, rolling and recursive tests. In both tests, non-rejection of the null hypothesis implies the presence of unit root with no break. Perron and Vogelsang (1992) proposed a class of test statistics in the additive outlier model to capture a sudden change, and in the innovation outlier model for gradual shift in the mean of the series. Lumsdaine and Papell (1997) extended the work of Zivot and Andrews (1992) by allowing multiple endogenous breaks under the alternative hypothesis. Lee and Strazicich (2003), and Perron (2005) criticised these tests on the ground of the size distortion and loss of power in the presence of structural breaks under the null. Lee and Strazicich (2003) considered two breaks under the null hypothesis. Elliott and Müller (2006) considered the tests of the null hypothesis of a stable linear model against the alternative of a partially unstable model. In their model, breaks occur in a random fashion.

In this study, we employ the methodology developed in Zivot and Andrews (1992) and Clemente et al. (1998) which is based on Perron and Vogelsang (1992). By following Zivot and Andrews (1992), we have carried out a sequential test, by utilizing the full sample and using a different dummy variable for each possible break date. The break date is selected endogenously at a time point where the test statistic is maximum, called the suprimum value.

To carry out this test we estimate ADF type of model after incorporating different dummy variables to account for structural break determined endogenously.

(1)

Here D_p represents a pulse dummy variable such that

$$D_p = 1 \text{ if } t = m + 1 \text{ and zero otherwise,}$$

D_L represents a level dummy variable such that

$$D_L = 1 \text{ if } t > m, \text{ and zero otherwise.}$$

D_T is the slope dummy, and is defined as

$D_T = t - m$, for $t > m$ and zero otherwise.

Here, m is the break point.

Perron and Vogelsang (1992) proposed a class of test statistics in the additive outlier model to capture a sudden change, and in the innovation outlier model for gradual shift in the mean of the series. We have used the extended model of this type developed in Clemente et al. (1998).

The additive outlier model is specified as

(2)

Here, the intercept dummy, $D_{1t} = 1$ for $t > m$, and 0 elsewhere; m is the break point

This model does not require a priori breakpoint, it is determined endogenously within the system in estimating the model. After estimating this model, The ADF form of the residual is estimated for testing unit root:

(3)

$D_{2t} = 1$, for $t = m + 1$, and 0 elsewhere

In the innovation outlier model, the dynamics of y_t is specified as

(4)

In both model, the breakpoint and the autoregressive order are unknown.

3. Indian macro economy before lockdown

To control the epidemic the efforts are focussed on restricting people's movement, quarantines and social isolation of people. The containment measures taken by the government have led to collapses production and economic activities in different sectors in different extent. To analyse the relative significance of different sectors to overall recession of the economy we have to find out sectoral contributions to GDP. The distribution of GVA at constant (2011-12) prices by major sectors and their annual growth rates in 2019-20, just before the pandemic, in India are shown in Table 1. This distribution provides an idea about how the pandemic induced lockdown has had direct effect on Indian macro economy. The actual recessionary effect is higher because of the secondary or intersectoral impacts on production in addition to the direct effects. In terms of national account's classification, the most affected sectors are wholesale and retail trade, repair of goods, hotels and restaurants,

transport, storage and communications². These mostly affected sectors contributed nearly 20 per cent of real GVA and experienced 3.6 per cent annual growth in 2019-20. The moderately affected sectors include mining and quarrying, manufacturing industries, electricity, gas and water supply, construction, financial intermediation, real estate, business and other services. The share of these sectors together was more than 65 per cent of total GVA in that year. Among these sectors, manufacturing contributed 17.4 per cent and experienced very close to zero per cent growth even before the outbreak. Thus, the effect of the shocks on manufacturing industries is expected to be severe. The least affected sectors include agriculture, livestock, forestry and fishing. But, this sector contributed only less than 15 percent and grew at the rate of 4 per cent. The sectoral division of GVA as shown in Table 1 has various dimensions in terms of pace of growth, production structure and technological intensity, as we have discussed below.

Table 1 Sectoral composition and annual growth rate of GVA: 2019-20

Sectors	Percentage share	Annual growth rate
Agriculture, forestry and fishing	14.6	4.05
Mining and quarrying	2.7	3.08
Manufacturing	17.4	0.03
Electricity, gas, water supply and other utility services	2.3	4.14
Construction	7.8	1.27
Trade, hotels, transport, communication and services related to broadcasting	19.4	3.61
Financial , real estate and professional services	21.9	4.62
Public Administration, defence and other services	13.9	9.96
GVA at basic prices	100.0	3.89

Source: NAS, National Statistical Office, June 2020

A sequential slowdown started in the Indian economy much before the outbreak of COVID-19 and the growth rate reached below 5 per cent in third quarter of 2019-20 (Table 2). The GDP growth during this period was driven mainly by government expenditure and household consumption expenditure. However, the slower growth of consumption expenditure on final goods by the households in 2019-20 as compared to previous financial year was caused partly by the deceleration in demand for consumer durables like small passenger vehicles. Private investment measured by gross fixed capital formation (GFCF) showed actual fall in the

² The most badly affected activities are aviation, tourism, and commerce.

second quarter of 2019-20 and the rate of fall increased in the next quarter, although it improved marginally during the last quarter of 2019-20. Both exports and imports declined, but imports declined at higher rates during the last three quarters of 2019-20. The decline in merchandise exports started in second quarter of 2019-2020 because of the fall in shipment of engineering goods, gems and jewellery, cotton and handloom products.

Table 2 Quarterly growth rates of real GDP at market price

Components of GDP	2018-19				2019-20			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4*
Private final consumption expenditure	6.7	8.8	7	6.2	5	5.6	5.9	4.9
Government final consumption expenditure	8.5	10.8	7	14.4	8.8	13.2	11.8	4.9
Gross fixed capital formation	12.9	11.5	11.4	4.4	4.3	-4.1	-5.2	2.5
Exports	9.5	12.5	15.8	11.6	3.2	-2.1	-5.5	-2.8
Imports	5.9	18.7	10	0.8	2.1	-9.3	-11.2	-3
GDP at market prices	7.1	6.2	5.6	5.7	5.6	5.1	4.7	4.7

Note: Projected growth

Source: National Statistics Office

Table 3 Quarterly growth rates of real GVA at basic prices

Components of GVA	2018-19				2019-20			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4*
Agriculture, forestry and fishing	3.8	2.5	2	1.6	2.8	3.1	3.5	5
Industry	7.8	4.7	4.4	1.4	3.2	0.1	0.1	2.3
Mining and quarrying	-7.3	-7	-4.4	-4.8	4.7	0.2	3.2	2.6
Manufacturing	10.7	5.6	5.2	2.1	2.2	-0.4	-0.2	1.8
Electricity, gas, water supply and	7.9	9.9	9.5	5.5	8.8	3.9	-0.7	6.5
Services	7.3	7.2	7.3	8.3	6.7	6.8	6.4	6.1
Construction	6.4	5.2	6.6	6	5.5	2.9	0.3	3.2
Trade, hotels, transport, communication	8.5	7.8	7.8	6.9	5.7	5.8	5.9	5.1
Financial, real estate and professional services	6	6.5	6.5	8.7	6.9	7.1	7.3	8
Public administration, defence and other services	8.8	8.9	8.1	11.6	8.7	10.1	9.7	6.7
GVA at basic Prices	6.9	6.1	5.6	5.6	5.4	4.8	4.5	5

Note: Projected growth

Source: As for Table 1

On the supply side, the slowdown in growth of gross value added (GVA) was caused by the deceleration in industrial and services activities (Table 3). Agriculture and allied activities, on the other hand, accelerated in the second half of 2019-2020. Industrial deceleration led by the manufacturing sector deepened the slowdown because of low domestic and external demand.

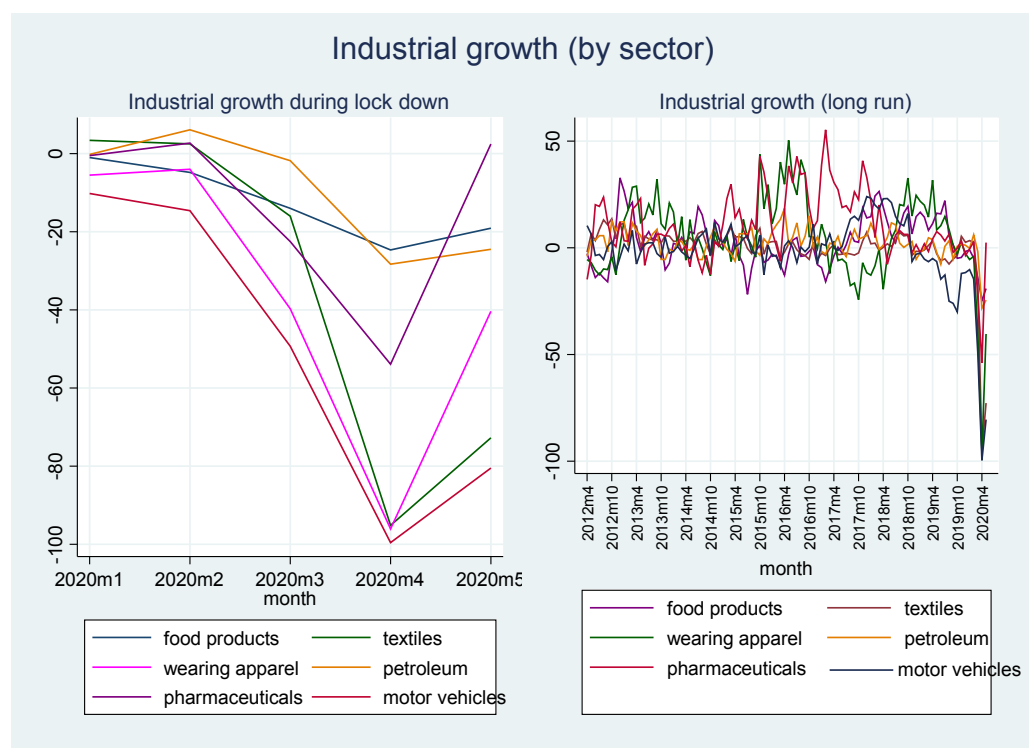
Services sector activities contributed the most to (GVA) although its growth rate declined in 2019-20. Agriculture and allied activities also provided momentum to some extent to GVA in second and third quarter of the past financial year. The industrial sector remained declining because of low demand conditions. In the manufacturing sector, dislocations of labour adversely impacted automobiles, electronic goods and appliances, and apparel. Services such as trade, tourism, airlines, the hospitality sector and construction have been affected badly in a greater extent. Demand for transport and hospitality declined for maintaining social distancing and that for health services increased and as a result composition of aggregate demand changes significantly because of the outbreak.

4. Industrial growth in pre- and post-COVID regime

The new series (2011-12) of index of industrial production (*iip*) shows negative growth in many industries in different time points (months) since the beginning period of the series (April, 2012) with some major and minor fluctuations. But, a deep decline of production of all industries appeared during the lockdown of the domestic economy in the wake of the outbreak of COVID-19. This sudden fall in industrial growth witnesses a clear supply shock in the macro economy in India (Figures 1 and 2). The sharpest supply shock was witnessed during April, 2020, when the *iip* for all industries declined by more than 57 per cent for all industrial products. The highest decline in production growth was registered in motor vehicles (-99.6 per cent) and the lowest decline in food products industries (-24.6 per cent) during this month as compared to April, 2019. In use base classification, manufacturing of consumer durables was the worst affected sector showing -96 per cent growth followed by capital goods (-92.6 per cent) and infrastructure (-84.7 per cent). De-growth of capital goods, and infrastructure goods is an indicative of fall in investment demand because of the pandemic. The decline of production of primary goods was the lowest (-26.6 per cent) in April, 2020.

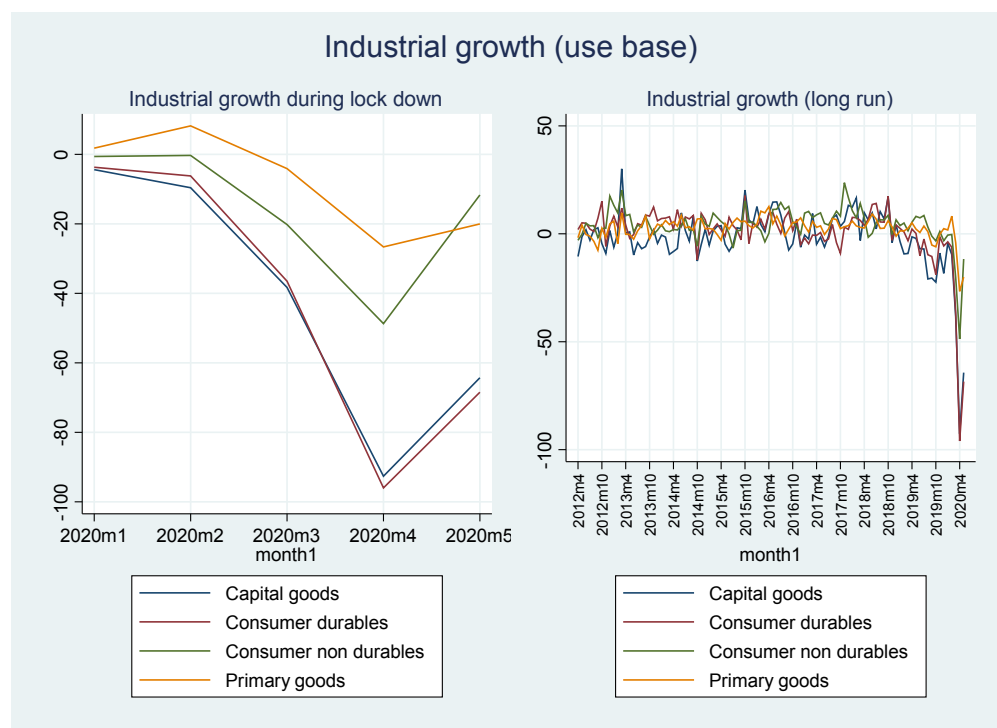
In the manufacturing sector, motor vehicles, furniture, machinery, electrical equipment, computers and electronics, fabricated metal products, wood, paper, leather, textiles, readymade garments, and beverages and tobacco contributed to approximately 40 per cent of the total fall of industrial output in April 2020 (Table 2, GOI: Macroeconomic Report, June 2020). Production of electricity declined by 23 per cent during this month despite it was exempt in the lockdown, may be because of fall in demand for power in the industrial sector.

Figure 1 Annual growth of industrial production by major sectors



Source: NSO, Index of industrial production (2011-12)

Figure 2 Annual growth of industrial production by use base category



Source: As for Figure 1

Average annual growth rates for different industry groups, calculated from *iip* new series (2011-12), before lockdown period and during lockdown period are displayed in Table 4. The period from April 2012 to February 2020 is treated here as pre-lockdown period and March to May, 2020 as the lockdown period. Production from all industries grew at around 3.5 per cent (year on year basis) during pre-lockdown period, and the growth rate was declined to -36.9 per cent during lockdown (Table 4). Mining and quarrying activities were exempt in the lockdown, thereby entailing a relatively lower negative contribution to industrial growth. Electricity exhibited the highest growth rate among different industry groups by sectors in the pre-lockdown period and was dropped to -15.5 per cent during March to May, 2020. Manufacturing is the worst affected sector because of lockdown registering average rate of fall in production at around 43 per cent. In use base classification, production of consumer non-durable goods grew at the highest rate (5.2 per cent) during April 2012 to February 2020 and dropped by 27 per cent during lockdown. Capital goods sector, on the other hand, was the bad performer exhibiting negative growth even before the COVID 19 outbreak and declined by more than 65 percent during the pandemic. During lockdown, production of consumer durable goods declined at the highest rate as compared to the other sectors in use base category in industrial production (Table 4)³. The severity of de-growth was different in different industry groups depending on the nature of pre-COVID growth conditions and demand conditions for products of those sub-sectors. For example, production of capital goods which experienced negative growth even before the outbreak declined at much higher rate than the other sub-sectors in use base categories during lockdown.

Manufacturing is the worst affected sector among different industrial sectors in India, but all manufacturing groups have not been affected equally because of lockdown induced by the outbreak of COVID-19. The middle part of Table 4 compares average growth rates of production from different manufacturing groups at 2 digit NIC before lockdown and during lockdown period. Manufacturing of pharmaceuticals was the best performer among the 2 digit manufacturing groups followed by manufacture of furniture showing above 11 per cent growth rate before March 2020. However, some manufacturing groups like paper products, printing materials and fabricated metal products exhibited negative output growth during this period.

³ There has been structural transformation in the payment system particularly for consumer durable goods. Retail payments through digital platforms increased sharply in May 2020 by nearly 44 percent in terms of products' value and more than 8 per cent in terms of volume of output.

Table 4 Average annual growth[#] rates of industrial production

Industry group (setoral division)	Pre-lockdown period*	Lockdown period**
Mining	1.24	-16.46
Manufacturing	3.64	-42.95
Electricity	6.18	-15.53
All industry	3.53	-36.88
Manufacturing group		
Food products	3.36	-19.25
Beverages	1.67	-60.74
Tobacco products	1.33	-58.28
Textiles	2.14	-61.30
Wearing apparel	7.24	-58.71
Leather products	3.14	-57.89
Wood products	2.32	-63.73
Paper products	-0.58	-51.72
Printing	-0.44	-49.98
Petroleum products	3.18	-18.19
Chemicals	2.49	-33.09
Pharmaceutical	11.35	-24.65
Rubber and plastics products	0.61	-44.13
Non-metallic mineral products	2.93	-45.26
Basic metals	6.42	-44.91
Fabricated metal products	-0.18	-61.89
Computer and electronic products	6.64	-71.55
Electrical equipment	1.75	-65.80
Machinery and equipment	1.87	-63.41
Motor vehicles	1.13	-76.45
Other transport equipment	4.57	-64.97
Furniture	11.22	-55.89
Other manufacturing	-0.11	-65.37
Industry group (use based)		
Primary goods	3.16	-16.91
Capital goods	-0.02	-65.07
Intermediate goods	4.44	-42.66
Infrastructure and construction goods	4.41	-50.65
Consumer durable goods	2.84	-66.98
Consumer non-durable goods	5.22	-26.87

Note: #Growth rate,

* April 2012 to February 2020, ** March 2020 to May 2020

Source: Author's estimation by using monthly iip 2011-12 series, NSO

While growth rate of output for every manufacturing group was negative during the lockdown, production of motor vehicles declined at the fastest rate (more than 76 per cent) during this period. Total sales of automobiles declined nearly to 0 in April 2020 and registration of motor vehicles declined by around 90 percent in May, 2020, comparing to the same month in 2019 (GOI 2020, Macroeconomic Report June 2020). Other manufacturing groups affected highly exhibiting de-growth at more than 60 per cent are computer and electronic products, electrical equipment, transport equipment, wood products, machinery and equipment, fabricated metal products and textiles in this period. Petroleum products declined by 18 per cent during lockdown⁴.

5. Persistence of the shock and structural break in industrial growth

As shown in Table 4, the COVID 19 pandemic induced economic lockdown has reduced production in every sector. In this context the major research questions may be whether the containment measures in the form temporary shutdown of production and other economic activities are the primary sources of industrial recession experienced recently in India and whether the recessionary process is long lasting or short living. To investigate these issues we have examined the stochastic behaviour and nature of trend of the monthly time series of *iip* from different sectors by considering possible structural break in the series. In this study, the structural break is defined as a sudden change in average growth rates. The location of the break point in the time series of industrial growth would be helpful in finding out whether the temporary shutdown is responsible for industrial recession. The appearance of a significant break in growth, if any, first time during lockdown phase may be an indication that pandemic is the primary source of industrial recession. The presence of unit root in a series has serious macroeconomic implications. The stochastic process of the *iip* series with unit root implies the presence of stochastic trend which is unobservable. If a series exhibits stochastic trend, the impact of external shock in the series will be long lasting, while in a stationary series the effects of the shock will be transitory in nature.

⁴ Consumption of petroleum products declined by 45.8 per cent in April and 23.2 per cent in May 2020 (GOI, 2020).

Table 5 Testing of unit root and structural break in industrial growth

Manufacturing group	Perron-Vogelsang unit root test		Zivot-Andrews unit root test	
	t statistics*	Break point	t statistics**	Break point
Food products	-1.432	November, 2019	-3.819	August, 2019
Beverages	-5.694	December, 2019	-6.679	March, 2020
Tobacco products	-2.318	January, 2020	-8.147	April, 2020
Textiles	-1.569	January, 2020	-9.264	April, 2020
Wearing apparel	-4.61	December, 2019	-3.548	March, 2020
Leather products	-2.639	January, 2020	-11.727	April, 2020
Wood products	-0.452	December, 2019	-8.394	March, 2020
Paper products	-2.004	December, 2019	-8.431	April, 2020
Printing	-2.593	December, 2019	-4.041	April, 2020
Petroleum products	-5.146	January, 2020	-7.66	April, 2020
Chemicals	-3.415	December, 2019	-11.565	March, 2020
Pharmaceutical	-1.103	September, 2017	-5.876	January, 2015
Rubber and plastics products	-2.497	December, 2019	-6.666	March, 2020
Non-metallic mineral products	-1.854	December, 2019	-8.818	March, 2020
Basic metals	-3.103	December, 2019	-7.567	April, 2020
Fabricated metal products	-6.308	December, 2019	-6.925	March, 2020
Computer and electronic products	-4.068	November, 2019	-2.229	March, 2020
Electrical equipment	-2.214	January, 2020	-7.781	April, 2020
Machinery and equipment	-3.301	January, 2020	-3.153	March, 2020
Motor vehicles	-4.477	November, 2019	-5.289	March, 2020
Other transport equipment	-3.889	January, 2020	-7.747	April, 2020
Furniture	-2.816	November, 2019	-4.802	April, 2015
Other manufacturing	-2.428	December, 2019	-4.32	June, 2015

Note: * 5% critical value -3.560, **Critical values: 1%: -5.34, 5%: -4.80, 10%: -4.58

Source: As for Table 4

Table 5 displays the estimated test statistic and the possible break point in the series of industrial growth. While the actual production in every industry declined deeply during lockdown, the structural break in growth rates of production in some industry groups appeared much before the lockdown period. For example, in manufacturing of food products significant break is identified in August 2019 by Zivot-Andrews test and in November 2019 by Perron-Vogelsang test. In pharmaceutical also a significant structural break occurred much before the lockdown period. We can draw similar inference for manufacturing of furniture and other manufacturing group (Table 5). For rest of the industry groups, break point is located in March or April, 2020 by Zivot-Andrews test, and around December 2019 or

January 2020 by Perron-Vogelsang test. These findings suggest that although total production declined sharply in every sub-sector in industry during lockdown or near lockdown, in some industries the structural break towards the fall in industrial production appeared much before lockdown. Thus, the COVID 19 induced lockdown may not be the primary factor for recession at least for some industries like pharmaceuticals, but it expedites the rate of fall for obvious reasons.

To examine whether the impact of negative shocks on output growth in industries will be long lasting or short living, and the market driven uncertainty in the growth process we have carried out unit root test at zero frequency. The recovery has started in industrial growth after partial unlocking the economy since May 2020. But the nature of recovery and the extent of uncertainty involved in the growth process is not similar for all manufacturing groups. The downfall of industrial production with increasing uncertainty in terms of time dependant volatility will persist for longer period if the monthly series of growth rates exhibits stochastic trend which is generated by accumulating the shocks.

The estimated statistics for testing unit root by allowing the possibility of structural break is shown in Table 5. Zivot-Andrews t statistic suggest that the recessionary process in manufacturing of food products, wearing apparel, printing, computer and electronic products, machinery and equipment, and manufacturing of furniture would be long lasting. While the inference on the presence of stochastic trend drawn from Perron-Vogelsang unit root test and Zivot-Andrews test is conflicting for some industries, we can conclude that the recovery phase to reach at least pre-COVID long run average growth will be longer for some manufacturing groups like food products. As the stochastic trend is unobserved it is highly difficult to take appropriate government measures to control uncertainty involved in growth process of these industry groups.

6. Trend in unemployment

The labour market in India is undergoing tremendous stress because of the COVID-19 outbreak and subsequent mitigation efforts. The largest employment generating sector has been collapsed nearly completely since more than a month. In addition, huge job losses occurred because of decline in demand in prolonged lockdown. Only the services like communication, broadcasting, and healthcare experienced growing trend during this crisis, but they have contributed only 3.5 per cent to overall GVA. Many workers have lost their job

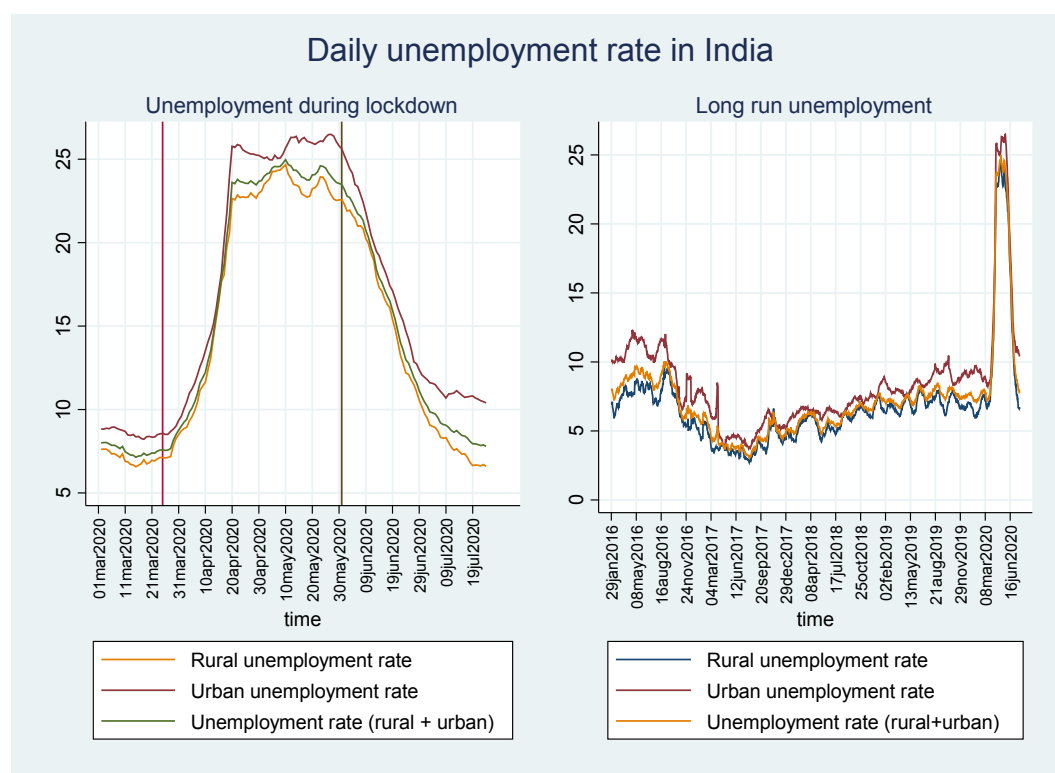
because of closures of nonessential business, health issues, and reduced demand for goods and services. Massive job losses are indicated directly in the movement of unemployment rate. As shown in Tables 2 and 3, the Indian economy had started slowing down since the beginning of 2018-19 causing unemployment to rise steadily (Figure 3).

Figure 3 shows the trend in unemployment rate since January 2016 on daily basis in rural, urban and the combined sector as provided by the CMIE. While the unemployment rate declined till the mid-2017, it started to increase and the rate of jobless had hovered between 7 to 8 per cent during the preceding months of lockdown. The rate jumped up from 7.6 percent in March 25 to around 25 percent in May 10, 2020, and started to fall thereafter as the mitigation efforts begin to subside in June 01, 2020 and reached at a level nearly equal to the rate prevailed before lockdown. The urban unemployment rate has been higher than the rural unemployment rate and the gap was higher during the lockdown period. The staggering scale of unemployment in India forced to accept low wages for some sporadic work. The young age people, constituting the major part of India's working age population affected the most because of the recession. With no jobs or low paying jobs reduced the demand that, in turn, affected industrial production causing the downward spiral in the economy. The twin shocks of COVID-19 and the lockdown expedite the downward trend in different sectors at different rates that have serious impact on employment. The shut down because of the pandemic collapsed the informal sector causing the job losses of the millions of the workforce who were absorbed in this sector.

Although there is no reliable estimates on informal migration from one state to another because of the lack of jobs in the native state, the precarious condition of the migrant workers was visible in different parts of the country. Workers from socially disadvantaged sections like Dalits and Adivasi suffered more job losses and even much more for women workers⁵. The vast number of self-employed like petty shopkeepers, vendors and hawkers, rickshaw pullers, providers of personal services, and other such workers sellers of labour lost their jobs because of the lockdown. The wave of reverse migration was a direct result of the pandemic induced lockdown. The fall in unemployment rate since June 1, 2020 primarily because a vast number of jobless people have been absorbing in land based activities and in MGNREGA.

⁵ Women are the frontline workers in the fight against COVID-19, like ASHAs and nurses. Most of the workers performing sanitation and cleaning are Dalits women who are in vulnerable condition during the crisis.

Figure 3 Daily unemployment rate



Source: CMIE

7. Conclusions

In this study, we have analysed the short run and long run impacts of COVID-19 induced shutdown on industrial growth and unemployment in India. A sequential slowdown started in the Indian economy much before the outbreak of COVID-19 and the growth rate reached below 5 per cent in third quarter of 2019-20. The slowdown in growth of gross value added (GVA) was caused by the deceleration in industrial and services activities. Manufacturing contributed 17.4 per cent and experienced near stagnation before the outbreak. De-growth of capital goods, and infrastructure goods indicates a fall in investment demand because of the pandemic. The decline of production of primary goods was the lowest in April, 2020. The severity of de-growth was different in different industry groups depending on the nature of pre-COVID growth conditions and demand conditions for products of those sub-sectors. Production of capital goods which experienced negative growth even before the outbreak

declined at much higher rate than the other sub-sectors in use base categories during lockdown. While production growth declined sharply for all industries because of the temporary shutdown, a significant recessionary trend started much before lockdown period in some industries like pharmaceuticals.

The process of industrial growth contains a lot of uncertainty because of technological characters of production which may generate stochastic trend, the trend because of accumulation of unobserved shocks, in industrial production. In addition, the huge uncertainty around the pandemic stemming from the unknown sources increases the probability of appearance of stochastic trend in industrial production. The study observes the presence of stochastic trend in some manufacturing groups like food products in which the effects of unknown external shocks persist for longer period.

It is still too early to make an assessment of the impact of the pandemic on growth and employment with full statistical evidence. It is difficult to estimate the impact of social distancing and overall decline of economic activity on those selected sectors, but anecdotal evidence suggests that it is likely to be significant. Economic shutdown due to the spread of COVID-19 has led to the recessionary effects by injecting some shocks into the economy. The pandemic induced lockdown has created direct shock in the form of sudden drop of production and employment. The indirect shock appeared in the form of fall of demand because of the containment measures to fight against the disease. Composition of demand has been changed – demand for services like mass transport, domestic and international tourism, restaurants, and recreational activities declined, while demand shifts towards health related services.

The deep recession may occur in India following the global trend, despite the extraordinary efforts of governments to counter the downturn with fiscal and monetary policy support. In a developing country like India, the recessionary effects may be more critical because of the dominance of the vulnerable people and informal production system. The state has implemented quickly and effectively emergency programs like direct transfer of funds to those who lost their jobs at least temporarily in addition to provide effective health services to control the pandemic. To boost up demand, the state also has to take some measures that may include the temporary suspension of tax and interest payments. The state's initiatives to raise demand ignoring the supply side would create a mismatch that results in another crisis in the form of hyperinflation. Thus, the real challenge is to take some measures that can enhance

production in matching with rising demand particularly in a situation where production restrictions are essential to save the human life from the pandemic.

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