

ARTICLES

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## Resilience of the Rural Employment Sector to Economic Shocks in India

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ABSTRACT

The study explores the effect of recent economic shocks due to policy changes and the COVID-19 pandemic on rural employment in India. The study uses three cases; (i) demonetization, (ii) Goods and Service Tax (GST) implementation, and the recent (iii) COVID-19 pandemic to explore the resilience of employment in the rural regions of India. The study used state-level data estimates on rural employment in India provided by CMIE, employment data from NSSO, and migration data from the population census. A modified version of interrupted time series analysis within the beta regression framework was used to quantify the effect of shocks. The study shows that the rural unemployment rates increased after economic shocks as per expectations. The effects were smaller in the case of demonetization but were significantly higher in the case of GST. Early trends suggest a significant short-term effect due to COVID-19-induced shock on unemployment. The study shows that the urban sector is more resilient than the rural sector. The study highlights the need for employment guarantee programmes and direct assistance during the shocks to increase the resilience of the rural economy.

**Keywords:** COVID pandemic, Demonetisation, GST, rural India, Unemployment

**JEL:** J21, J64, J69, E24

I

INTRODUCTION

The growth and development of the rural economy are key to economic growth and inclusive development in India (Chand *et al.*, 2017). The rural economy constitutes about 47 per cent of the national income in India. About two-thirds of the population live in rural areas, constituting 71 per cent of the workforce. The agriculture sector is the major employment sector in rural India; In 2017-18, the share of employment in the agriculture sector in the rural region was 52.1 per cent. But, over the period, the share of non-farm employment has been increasing, and it is advantageous considering the potential to augment farmer's income and reduce rural poverty (Reardon *et al.*, 2007; Lanjouw and Murgai, 2009; Haggblade *et al.*, 2010; Birthal *et al.*, 2014). The availability of employment in rural regions is also key for avoiding distress migration to urban areas (FAO, 2015). This is even more important considering that the rural region also suffers from higher poverty rates (25.7 per cent) compared to an urban region (13.7 per cent).

Lately, a series of unintended economic shocks have affected the rural economy. Policies such as demonetisation (2016) and Goods and Service Tax (GST) (2017) were

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designed to bring desired effects such as the removal of black money from the economy (Singh, 2018) and bringing uniformity of the sales taxes (Singh and Bisen, 2017) had ripple effects on the rural sector. Though there were a series of newspaper articles<sup>1</sup> that reported the effects of these policy changes on rural employment and GDP, only a few studies have explored these effects empirically; for instance, the impact of such shocks on market arrivals and prices (Aggarwal and Narayanan, 2023), employment and economy (Chodorow-Reich *et al.*, 2018).

The recent COVID-19 pandemic could also result in a similar economic shock in the rural economy. Kesar *et al.* (2020), based on a survey of 5000 respondents, reported that lockdowns implemented to manage COVID-19 had led to massive unemployment. The study of Carlsson-Szlezak *et al.* (2020) on understanding the economic shock of coronavirus highlighted that progression and recovery could be either V-shaped (Canada), U-shaped (United States), or L-shaped (Greece). This paper concluded that a less damaging V-shaped economic recovery scenario is desirable. Such economic shocks are usually an unintended effect of a policy or due to unforeseen events (for instance, the Covid-19 pandemic). Given the significance of rural employment in the Indian economy, it is important to have a rural economy resilient to shocks as the Indian economy depends on it to a large extent.

Resilience is “a system which has the property of robustness, adaptability, and transformability towards any form of internal or external stresses or shocks” (Folke *et al.*, 2010). Several studies have further defined the properties of resilience in detail. Darnhofer *et al.* (2010) described robustness as ‘bouncing back’; the ability of the system to cope with the shock and return to equilibrium. Adaptability is the ability of the system to provide outcomes under changing circumstances (Folke *et al.*, 2010, Meyer, 2020). In comparison, transformability is the ability of the system to deliver the desired outcomes under varying conditions and functioning. Thus adaptability is a short-term change, and transformation is a long-term change (Zurek *et al.*, 2022). Studies have explored the resilience of firms and policy response on employment during the COVID-19 pandemic (Calzada Olvera *et al.*, 2022). The resilience of the rural employment sector to the COVID-19 pandemic is not explored.

Heijman *et al.* (2019) defined rural resilience as the capacity of the rural region to change external circumstances. A study by Steiner and Atterton (2015) has shown that local enterprise plays a vital role in the resilience of the rural economy. A recent paper by Phillipson *et al.* (2020) also explores rural resilience, coping, and adaptation of rural economies during the COVID-19 pandemic. The study showed that characteristics of the rural economy such as higher levels of self-employment and small and micro-enterprises with limited solvency and cash reserves could make them resilient to disruptions caused by COVID-19. In this context, the present study explores the resilience of employment in rural regions based on the two previous cases of economic shocks (Demonetisation and GST) and explores the potential impact of economic shock as a result of the COVID-19 pandemic.

## II

## DATA AND METHODOLOGY

*Data*

The study uses data collected by the Centre for Monitoring Indian Economy (CMIE) and Census surveys. CMIE estimates the size of the labour force and the unemployment rates in India using CMIE's Consumer Pyramids Survey. Unlike NSSO employment-employment survey CMIE provides highly frequent data on employment. In this survey, a face-to-face interview with a sample of 5,22,000 members (older than 15 years) from 1,74,405 households is surveyed. CMIE uses a stratified multi-stage survey design for sampling (see <https://unemploymentinindia.cmie.com/> for details). The full survey of 174,405 households takes over a period of four months. The data is available for the period from January 2016 to April 2020. Concerning employment, four questions are asked; are they currently employed? if not, are they willing or actively looking for a job? are they willing or not actively looking for a job? and are they not willing or not actively looking for a job? Based on these questions, Labour Participation Rate (LPR), Unemployment rate (UER), and Greater Unemployment Rate (GUER) are estimated. LFR is the ratio of the persons in the labour force (who is employed or unemployed but willing and actively looking for a job and above 15 years) to the population greater than 15 years of age. UER is the ratio of unemployed persons who are willing to work and are actively looking for a job to the labour force. GUER is the sum of the person unemployed but is willing and actively looking for a job and those who are willing and not actively looking for a job to the greater labour force (persons who are of 15 years of age who are either employed or unemployed but willing to work and are actively looking for a job to the labour force). In addition to this data, we used the Census 2011 data and RBI (2021) data on reverse migration. We also used NSSO employment-unemployment Survey 2011-12 and PLFS Survey; 2017-18, 2018-19, 2019-20, and 2020-21 estimates on employment.

*Empirical Model*

All three incidences (demonetisation, GST, and COVID) happened during a specific period, and their repercussions occurred at different and specific points in time. To assess the impact of such events, the commonly used approach is to compare the employment estimates using the 'reflex method'; compare the data pertaining to before and after the specified period, as there is no counterfactual (Khandker *et al.*, 2010). This approach is used when we have no control group (counterfactuals) as these interventions/shocks were nationwide. Such a model can be estimated using a standard linear regression using a time dummy as the independent variable.

$$Y_t = \alpha + \beta D_t + \varepsilon$$

Where  $Y_t$  is the unemployment estimate at time  $t$ , and  $D$  is the dummy variable for which the value is 1 for the period after the incidence. The coefficient of the dummy

variable indicates the average difference between the two periods. One of the major drawbacks of this approach is that we cannot attribute the difference to the impact of the intervention, as it could be due to several other factors.

One advantage in this area is to use interrupted time series (ITS) analysis, a regression-based quasi-experimental approach (Kontopantelis *et al.*, 2015), which we also employ in the present study. ITS control for the pre-interruption trends. The difference in the pre and post-period could be decomposed into level change (immediate effect), slope change (sustained effect), and both. In this study for the period 2016-2019, there were two interruptions (Demonetization and GST). As the pre- and post-period overlap, they must be modelled as multiple treatment periods. Empirically the model is denoted as

$$Y_t = \alpha + \beta_1 T_t + \beta_2 D_t + \beta_3 T_t D_t + \beta_4 G_t + \beta_5 Z_t G_t + \varepsilon$$

Where  $Y_t$  is the unemployment estimate at time  $t$ ,  $D$  is the dummy variable (as discussed above) denoting the demonetization period capturing the short-term effect,  $T$  is the trend component, and  $T*D$  is the interaction of the two denoting the time after the demonetization which captures the long term effect.  $G$  is the dummy variable for the GST period, and  $G*Z$  denotes the time after GST capturing the short-term and long-term effects of GST. As in our case, the dependent variables are censored (ratio variable; 0-100 per cent) so instead of normal regression, the study uses beta regression (Ferrari and Cribari-Neto 2004). The study employed the benefits package in Stata software to implement the model.

### III

#### RESULTS AND DISCUSSION

##### *Employment Pattern in Rural and Urban India*

The study compared the employment pattern in rural and urban India by comparing the composition of households by employment types for the period 2011-12 and 2017-18 (Table 1). The data shows an increase in the share of households self-employed in agriculture from 34.3 per cent to 37.8 per cent. Similarly, the share of regular wage/salary wage-earning households has increased from 9.6 per cent to 12.7 per cent in the same period. In the urban region, there has been a slight decline in the share of self-employed and regular wage earners. The share of self-employed households declined from 35.3 per cent in 2011-12 to 32.4 per cent in 2017-18. While the share of regular wage earners declined from 41.7 per cent to 41.4 per cent during the same period.

##### *Trend in Unemployment Rates in India*

The trends in unemployment rates in India (Figure 1) show that the total unemployment rates were higher from January to April 2016 (8.62 per cent). It declined from 9.16 per cent to 3.88 per cent from May-August 2016 to May-August 2017,

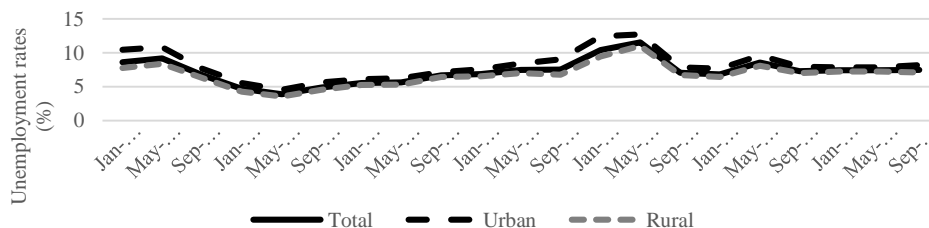
TABLE 1. SHARE OF HOUSEHOLD BY EMPLOYMENT TYPE IN RURAL AND URBAN INDIA

		Rural					Urban					(per cent)
(1)	(2)	2011-12	2017-18	2018-19	2019-20	2020-21	2011-12	2017-18	2018-19	2019-20	2020-21	(12)
A	Self-employed in agriculture	34.3	37.8	36.6	37.7	38.9						
B	Self-employed in non-agriculture	15.5	14.3	15.1	15.5	15.8						
C	Self-employed (A+B)*	49.8	52.1	51.7	53.2	54.8	35.3	32.4	31.8	30.7	33.2	
D	Regular wage/salary earning	9.6	12.7	13.1	12.9	13.0	41.7	41.4	42.8	43.1	42.5	
E	Casual labour in agriculture	21.0	12.1	11.7	11.9	10.8						
F	Casual labour in non-agriculture	13.5	12.9	13.4	12.9	13.3						
G	Casual labour (E+F)*	34.5	25.0	25.1	24.8	24.2	11.8	11.8	11.0	11.5	12.5	
H	Others	6.1	10.1	10.1	9.1	8.1	11.2	14.4	14.4	14.7	11.8	
	Overall (C+D+G+H)	100	100	100	100	100	100	100	100	100	100	

Source: Estimated from NSSO employment-unemployment Survey 2011-12 and PLFS Survey; 2017-18, 2018-19, 2019-20, 2020-21.

Note: \*In the case of the rural sector.

respectively. The rural unemployment rates were 8.39 per cent in May-August 2016, which declined to 3.55 per cent in May-August 2017. Similar trends were also observed in the case of urban unemployment rates, which declined from 10.46 per cent to 4.57 per cent in the same period. The unemployment rates started to increase marginally from September- December 2017-18 and kept increasing over the period. In May to August 2020, there was a sharp increase in unemployment rates. The total unemployment rate is 11.55 per cent, the urban unemployment rate is 12.70 per cent, and the rural unemployment rate is 11.02 per cent. The employment rates decreased in pre-covid times during September 2020 to April 2021 period. The unemployment rates later increased in the period from May to August 2021; 8.57 per cent in total, 9.61 per cent in urban area and 8.09 per cent in rural area. These shifts in unemployment rates coincide with the GST (2017) and the COVID pandemic 2020 and 2021 waves.



Note: See table 1 in the Appendix for data. Source: Developed by autjios based on CMIE data

Figure 1. Trends in Rural Unemployment in India.

### *Economic Shocks*

Economic shocks can be caused due to either external or internal reasons. External shocks result from the global crisis (2008 global financial crisis), and internal shocks are due to policy changes within the country (policy changes). ADB (2012), summarising the implication of the global financial crisis of 2008, shared that the government needs to safeguard the economy from such external shocks. However, there can also be unintended economic shocks due to policy changes in the country, the effects of which are less explored. The present study has looked into three cases; (i) Demonetisation, (ii) Good and Service Taxes, and (iii) the COVID-19 pandemic. A summary of these cases is given in this session.

Demonetisation was introduced on 8th November 2016 to remove counterfeit currency from circulation, unearth black money, and prevent terror financing. With this as a target, two predominant high-value denominations, Rs. 500 and Rs. 1000, were withdrawn as legal tender. This reduces 86 per cent of the money in circulation, leading to a liquidity crunch in the economy. Economists initially hoped this would also promote cashless transactions leading to long-term benefits. A study by Chodorow-Reich *et al.*, (2018) showed that there was a rise in cashless transactions in the short run, unfortunately, the extent of cashless transactions went back to a pre-demonetisation period. Zhu *et al.* (2018) based on a survey of rural households showed that the demonetisation lead to a short-term economic loss of 15.5 per cent.

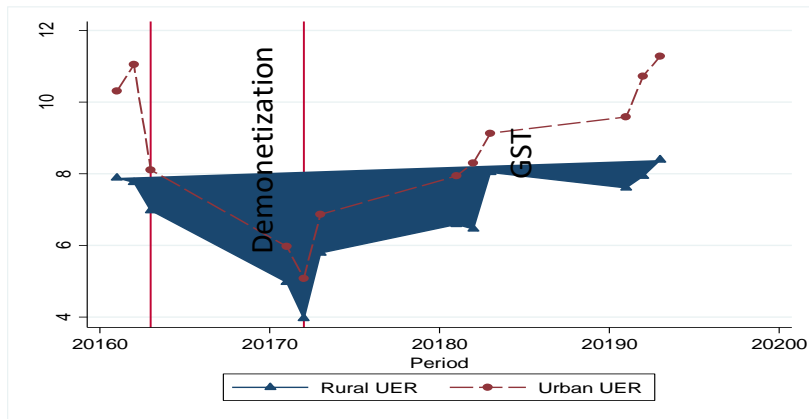
Good and Service Taxes (GST) was implemented as a comprehensive tax levy on goods and services at the national level on 1st July 2017. The idea of GST was to harmonize the tax systems across different states and tax compliance in the country. Singh and Bisen (2017) concluded that there is an expectation that the GST would lead to an increase in tax revenue in the long run, but the agricultural sector might face issues in the short run. Tiwari and Singh (2018) showed that the effect of GST showed that services suffered losses post-GST while the manufacturing sector had marginal gains.

The first case of the Covid-19 pandemic was reported on 30th January 2020. As a result of increasing cases, the Government of India implemented a nation-level lockdown. Kesar *et al.* (2020) also showed that there had been an increase in unemployment rates as a result of the lockdown due to the COVID-19 pandemic. Antipova (2021) analyses the impact of the COVID-19 pandemic on unemployment in the US and showed that the marginalised regions experienced disproportionate economic impact. Dhakal *et al.* (2022), reviewing the studies conducted on COVID-19 crisis and employment, reported that the impact of COVID-19 on work and labour markets is mixed and needs to be studied further to reach a conclusion.

### *Effect of Economic Shock on Rural and Urban Employment*

The current study looked into the effect of demonetisation on the rural and unemployed economy. Binplot<sup>2</sup> graphs were drawn using state-level unemployment

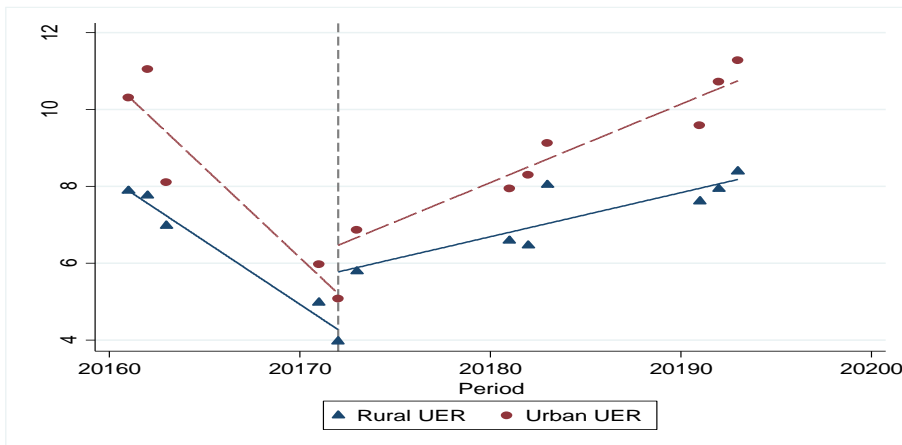
rates in the rural and urban region. Figure 2 shows that the unemployment rates in rural and urban regions declined during the demonetisation period. The total unemployment rates declined till the period May to August 2017. During the period of GST, the unemployment rates were lowest in urban and rural regions. They started increasing steeply after the GST implementation. But the rural regions show sharper declining curves compared to urban regions.



Note: The period is noted as the number of the year followed by the four-month number. Not to be interpreted for trend. Refer to figure 1 for the trends. UER- Unemployment rates.

Figure 2. Binplot Graphs Showing Trends in Rural and Urban Unemployment in India

A closer look into the state-level unemployment rates in both urban and rural regions before and after the GST period using bin plots (Figure 3), shows that there is



Note: The period specified is the number of years followed by the four-month number. The lines are linear fit using OLS.

Figure 3. Binplot of Effect of GST on Urban and Rural Unemployment.

a sharp increase in unemployment rates after the GST. The slope was higher in the rural region for the period 2017 and 2018. While a steeper increase in slope was observed in the case of an urban region in 2019. In 2018, a higher inter-year variation in unemployment was noticed at the state level in the rural region compared to the urban region. It is to be noted that there are multiple interventions in the period and there are overlaps in the pre and post-intervention periods.

The study modelled both the intervention demonetisation and GST together in the model. Regression estimates from beta fit regression show that the effects of demonetisation were smaller and non-significant on unemployment in urban and rural regions (Table 2). The coefficients were significant and positive in the case of GST (Dummy) in rural and urban regions. The effects of GST on unemployment in the rural region were higher than in the urban region in the short term. While the long-term effects of GST on unemployment were roughly the same in urban and rural regions. This infers that the employment sector in rural region is less resilient than the urban sector. This is probably due to the predominance of the informal sector, the majority of which lacks access to financial services and knowledge. Shifting completely to a new tax regime in terms of GST might have a disproportionately larger impact on the ill-equipped informal sector. The effect of GST on employment has been reported in new papers<sup>1</sup>. Though GST is prosed to improve economic efficiency, the complexities of the new tax regime have created challenges for small leading to unemployment.

TABLE 2. BETA FIT REGRESSION RESULTS- IMPACT OF POLICY CHANGES ON UNEMPLOYMENT RATES

VARIABLES (1)	Rural (2)	Urban (3)
Time ( $\beta_1$ )	-0.002 (0.006)	0.001 (0.005)
Demonetisation short-term impact ( $\beta_2$ )	0.072 (0.228)	-0.224 (0.206)
Demonetisation long-term impact ( $\beta_3$ )	-0.007 (0.007)	-0.009 (0.006)
GST short-term impact ( $\beta_4$ )	0.430** (0.192)	0.371** (0.177)
GST long-term impact ( $\beta_5$ )	0.010*** (0.004)	0.010*** (0.003)
Constant	-2.381*** (0.174)	-2.111*** (0.155)
ln_phi	3.381*** (0.082)	3.354*** (0.079)
Log-likelihood	577.198	546.033
Wald chi2(3)	17.23	33.08
Prob > chi2	0.004	0.000
Observations	317	329

Note: Standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

#### *Effect of COVID-19 on Rural Employment*

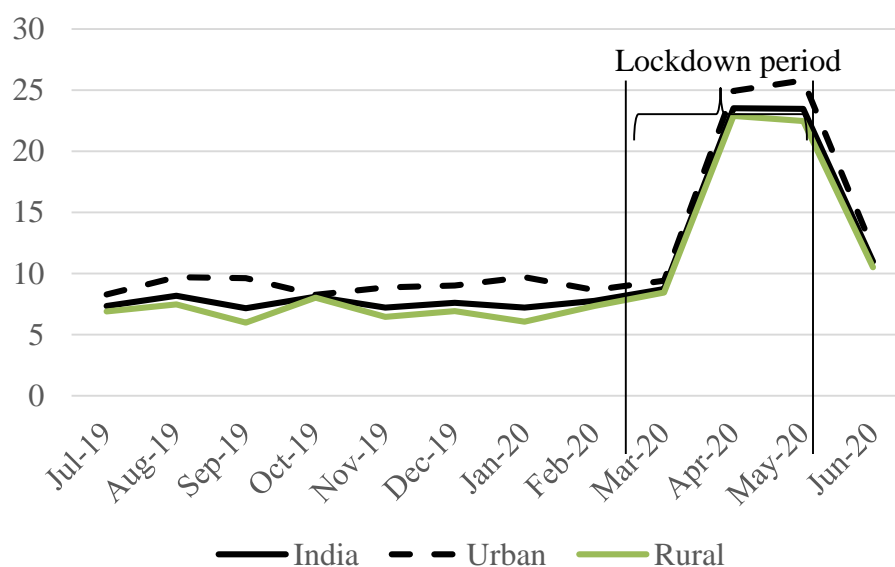
The COVID-19 lockdown was implemented in four phases from 25 March to 31 May; phase I (25 March to 14 April), phase II (15 April to 3 May), phase III (4 to



17 May), and phase IV (18-31 May). The unlocking of the lockdown happened over two phases; unlock 1.0 (1 to 30th June) and Unlock 2 (1 to 31 July). CMIE data on monthly employment show that the unemployment rate increased from 8.75 per cent in March 2020 to 23.42 per cent in April, which continued in May 2020 (23.48 per cent) (Figure 4). The spike in unemployment in the two months coincided with the lockdown period. After the lockdown period, the unemployment rates declined to the pre-lockdown levels. Dev and Sengupta (2020) looked into the effect of the COVID pandemic on the rural unemployment rate and argued that the influx of migrant workers back in rural India would lead to a decrease in wages. They suggested fiscal measures such as front-loading Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Yojana, Direct Benefit Transfer (DBT), extending MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) to migrant workers, a fund for construction workers to manage the economic shock. Varshney *et al.* (2020), studying the effect of the PM-KISAN Yojana, showed that the scheme reached farmers and significantly helped people primarily dependent on agriculture. Varshney *et al.* (2020) showed that during the COVID time government assistance programmes such as PM-KISAN and Pradhan Mantri Garib Kalyan Yojana (PM-GKY) benefited 89-94 per cent of the rural household. Jha and Kumar (2021) noted that the cash transfer and free-supplementary-ration needed to be revised were inadequate and suggested a higher amount (Rs. 7,500 per month). Walter (2020) commending the role of the International Labour Organisation (ILO) in managing such crises highlighted that the recovery process should be inclusive and build on the principles of social justice and solidarity.

#### *Reverse Migration*

COVID lockdown led to reverse migration of labourers in India. Mukhra *et al.* (2020) looked into the mass migration as a result of COVID-19 and opined that the lack of labour due to this reverse migration could lead to an economic slowdown. Jesline *et al.* (2021) did a systematic review of the plight of migrants during COVID and suggested to relook into the national migration policies. The study tracked the migration based on the total migration data provided by the Census. The current study looked into inter-state migrants who have been migrants for less than one year. This is done explicitly as it could be a proxy to capture the seasonal migrants. As the Census (2011) data shows, out of the total rural-to-urban migration, 23.7 per cent migrate for work, 29.6 per cent for marriage, and 36.2 per cent for a house. The study plotted the inter-state migration in major states using the 2011 census data on migration (Figure 5). The major states (>70,000 migrants) by migrant origin are Uttar Pradesh, Bihar, Karnataka, Andhra Pradesh, Madhya Pradesh, Rajasthan, and Gujarat. The major migrant destinations states are Maharashtra, NCT of Delhi, Gujarat, Haryana, Karnataka, Jharkhand, Gujarat, Uttarakhand, West Bengal and Punjab.

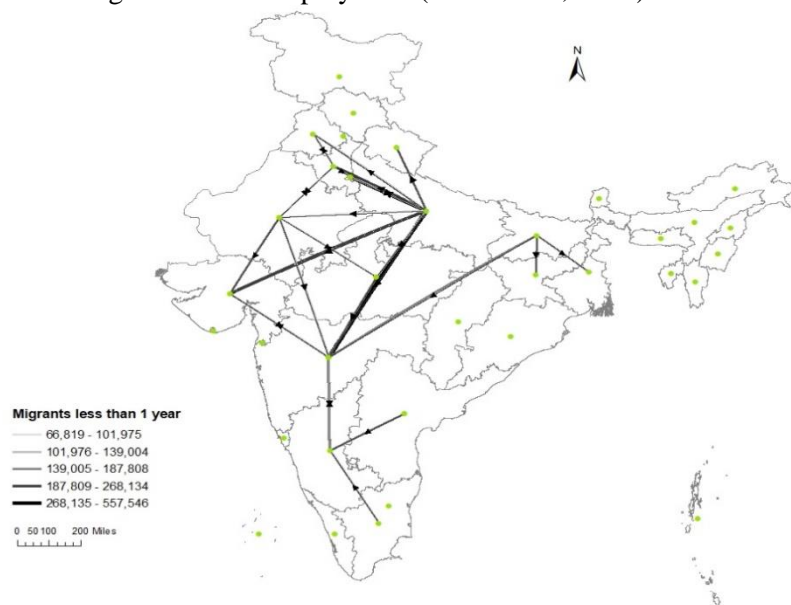


Source: Drawn by Authors based on CMIE data (NIAP 2020).

Figure 4. Monthly Unemployment Trend.

RBI (2021) report compiled data on major reverse migration corridors of selected states (Appendix Table 3). This data reflects the reverse migration trend shown in Figure 5. During the period from May 2020 to August 2020, 4621 Shramik trains were in operation, transiting 63.19 lakh migrant labours/passengers were taken back to their home states. The two major states of origin were Gujarat and Maharashtra, and the two major states of destination are Bihar and Uttar Pradesh. From Gujarat, about 8.13 lakh passengers transited back to Uttar Pradesh and 3.50 lakh passengers to Bihar. In Maharashtra, a similar trend was observed; about 6.84 lakh passengers transited back to Uttar Pradesh and 2.66 lakh passengers to Bihar. Statewise break-up of total passengers showed that Gujarat and Maharashtra were the top two states followed by Punjab and Uttar Pradesh (Loksabha Question No. 415).<sup>3</sup> From Punjab, 5.29 lakh passengers and from Haryana 1.54 lakh passengers used the trains for transit. This reverse migration could affect labour supply in agricultural states like Haryana and Punjab. Farmers in these states have resorted to direct sowing of rice or two other crops, such as cotton, which requires less labour during the sowing season. On the other hand, the migrant-origin states are predominantly agricultural, and the reverse migration coinciding with the agricultural season has led to higher labour availability, which is reflected as increased sowing area as reported by the Ministry of Agriculture and Farmers Welfare.<sup>4</sup> Unlike urban areas, rural areas were covered under social protection mechanisms for employment; Mahatma Gandhi National Rural Employment Act (MGNREGA) has reduced the effect of rural unemployment due to migration. Though

it has some effects in the short run, studies have highlighted the long-term effect of this reverse migration on unemployment (Kesar *et al.*, 2020).



Note: Refer to Table 2 in Appendix

Source: Drawn by Authors based on Census data (NIAP, 2020)

Figure 5. Inter-State Migration Among Migrants Less Than 1 Year (Major States- Migrants > 70,000 Migrants)

A recent report by OECD (2022) on the impact of COVID-19 on migrants showed that the recovery is slower and the migrants are hit hard by the pandemic compared to the non-migrants. There is a need for social protection policies for migrant workers. Kaur and Kaur (2021) reported that the COVID-19 pandemic has led to conflict between the land owners and labours in Punjab. This highlights that policies and measures are to be taken to protect and support domestic migrants. ILO (2020) suggested relaxing the rigid administrative process (duration of stay, minimum employment period) and removing discrimination to allow migrant workers to access the existing benefits and providing income support to cash transfers. These measures could avoid the exodus on migrants in such crisis and also ensure the fundamental and economic rights of domestic workers (Kumar and Choudhury, 2021).

#### IV

#### CONCLUSION AND POLICY RECOMMENDATIONS

The study explored the effect of policy changes such as demonetisation, GST, and the pandemic on rural employment. The study shows that all these shocks have varying impacts on employment. These shocks created economic frictions; in

Demonetisation, it was liquidity, in GST, it needed to adjust price strategy under the new tax system, and in the case of COVID-19, it was reverse migration. These effects were manifested as demand and supply constraints leading to unemployment. Among the policy shocks studied, GST significantly affected unemployment in rural and urban regions. The inference should be drawn cautiously as the analysis establishes association and not causation. In the case of the COVID-19 pandemic, similar short-term effects are visible. The study shows that in the case of rural employment, the region is less resilient compared to the urban region. Social protection programmes such as MGNREGA could ensure higher resilience in the rural region. The study emphasises the need for an employment guarantee programme to ensure the resilience of the rural economy. In addition to the designed employment generation program, the government assistance programs (Pradhan Mantri Garib Kalyan Yojana) and cash transfer programmes could also play a key role during the period in which the shocks are happening in the rural economy. Such measures are not only an essential economic policy but are essential to ensure fundamental human rights and economic rights guaranteed by our constitution.

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#### NOTES

1. Reuters reported that GST affected the employment irrespective of the growth (<https://in.reuters.com/article/india-election-tax-insight-gst/gst-effect-hundreds-of-thousands-laid-off-despite-growth-idINKCN1LL36M>). The Wire reported that the unemployment rates increased after demonetization and GST (<https://thewire.in/labour/unemployment-after-demonetisation-gst-was-even-more-than-6-1-report>)
2. Binplot graphs are binned scatterplots. They are a non-parametric method of plotting the average y value for each x value (based on conditional expectation function). The plot groups the x-axis variables into equal-seize bins and creates a scatter plot. It's used for the visualization of large data scatterplots.
3. Lok Sabha question no. 415 answered in Lok Sabha on 03.02.2021 by Shri. Girish Bhalachandra Bapat and Shri Ritesh Pandey regarding Shramik Express Trains. (<http://164.100.24.220/loksabhaquestions/annex/175/AU415.pdf>)
4. As of 14.08.2020, the Ministry of Agriculture and Farmers Welfare reported that the total *kharif* crops were sown as 1015.58 lakh ha area against 935.70 lakh ha area during the corresponding period of last year. There is an increase in area coverage by 8.54 per cent compared to last year for the *kharif* season.

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APPENDIX TABLE 1. UNEMPLOYMENT RATIO IN INDIA

Period (1)	Total (2)	Urban (3)	Rural (4)
Jan-Apr, 2016	8.62	10.46	7.77
May-Aug, 2016	9.16	10.83	8.39
Sep-Dec, 2016	6.74	7.69	6.3
Jan-Apr, 2017	4.7	5.57	4.3
May-Aug, 2017	3.88	4.57	3.55
Sep-Dec, 2017	4.89	5.62	4.55
Jan-Apr, 2018	5.54	6.13	5.26
May-Aug, 2018	5.63	6.27	5.33
Sep-Dec, 2018	6.68	7.16	6.46
Jan-Apr, 2019	6.87	7.56	6.55
May-Aug, 2019	7.46	8.44	7.00
Sep-Dec, 2019	7.52	9.04	6.79
Jan-Apr, 2020	10.4	12.42	9.48

(Contd.)

APPENDIX TABLE 1 (CONCLD.)

May-Aug, 2020	11.55	12.7	11.02
Sep-Dec, 2020	7.08	7.84	6.74
Jan-Apr, 2021	6.83	7.67	6.44
May-Aug, 2021	8.57	9.61	8.09
Sep-Dec, 2021	7.31	7.94	7.02
Jan-Apr, 2022	7.43	7.84	7.24
May-Aug, 2022	7.43	7.84	7.24
Sep-Dec, 2022	7.47	8.18	7.12

Source: Compiled by Authors from CMIE Report.

APPENDIX TABLE 2. INTRA-STATE MIGRATION (MAJOR STATES)

From (1)	To (2)	Total migrants (3)	Migrants <1 year (4)
Uttar Pradesh	Maharashtra	2,754,706.00	557,546.00
Uttar Pradesh	NCT of Delhi	2,854,297.00	409,836.00
Uttar Pradesh	Gujarat	929,411.00	268,134.00
Bihar	NCT of Delhi	1,106,629.00	222,477.00
Karnataka	Maharashtra	1,399,591.00	212,320.00
Uttar Pradesh	Haryana	1,113,535.00	205,910.00
Andhra Pradesh	Karnataka	890,697.00	187,808.00
Bihar	Jharkhand	1,336,048.00	175,919.00
Maharashtra	Gujarat	971,975.00	172,355.00
Uttar Pradesh	Uttarakhand	890,663.00	169,054.00
Bihar	Maharashtra	568,667.00	157,925.00
Madhya Pradesh	Maharashtra	824,624.00	156,689.00
Rajasthan	Gujarat	747,445.00	154,075.00
Bihar	Uttar Pradesh	1,072,739.00	152,951.00
Uttar Pradesh	Madhya Pradesh	1,090,881.00	151,099.00
Tamil Nadu	Karnataka	736,821.00	139,004.00
Gujarat	Maharashtra	983,653.00	131,305.00
Bihar	West Bengal	1,103,757.00	129,684.00
NCT of Delhi	Uttar Pradesh	566,210.00	128,546.00
Uttar Pradesh	Punjab	649,557.00	124,605.00
Rajasthan	Maharashtra	570,233.00	112,635.00
Uttar Pradesh	Rajasthan	585,982.00	101,975.00
Maharashtra	Karnataka	586,864.00	98,185.00
Madhya Pradesh	Rajasthan	554,058.00	91,766.00
Madhya Pradesh	Uttar Pradesh	668,537.00	88,183.00
Rajasthan	Haryana	611,160.00	84,524.00
Haryana	NCT of Delhi	666,331.00	79,497.00
Haryana	Rajasthan	533,963.00	79,323.00
Haryana	Punjab	545,584.00	74,112.00
Rajasthan	Madhya Pradesh	500,481.00	73,225.00
Punjab	Haryana	538,328.00	66,819.00

Note: Major States with Total Migrants > 5 Lakh and Migrants less than 1 Year > 70, 000.

APPENDIX TABLE 3. MAJOR REVERSE MIGRATION OF SELECTED STATES DURING THE COVID-19 PANDEMIC

From (1)	To (2)	Travellers (in lakhs) (3)
Gujarat	Uttar Pradesh	8.13
Gujarat	Bihar	3.50
Gujarat	Odisha	1.34
Gujarat	Jharkhand	0.53
Gujarat	West Bengal	0.38
Gujarat	Madhya Pradesh	0.34
Gujarat	Other states	0.44
Maharashtra	Uttar Pradesh	6.84
Maharashtra	Bihar	2.66
Maharashtra	West Bengal	0.72
Maharashtra	Jharkhand	0.45
Maharashtra	Madhya Pradesh	0.40
Maharashtra	Rajasthan	0.25
Maharashtra	Other states	0.79
Tamil Nadu	Bihar	1.36
Tamil Nadu	Uttar Pradesh	0.65
Tamil Nadu	Odisha	0.58
Tamil Nadu	Jharkhand	0.48
Tamil Nadu	West Bengal	0.47
Tamil Nadu	Assam	0.27
Tamil Nadu	Other states	0.43
Rajasthan	Bihar	3.12
Rajasthan	Uttar Pradesh	3.10
Rajasthan	West Bengal	1.01
Rajasthan	Gujarat	0.97
Rajasthan	Madhya Pradesh	0.94
Rajasthan	Maharashtra	0.76
Rajasthan	Other states	2.57

*Source:* RBI (2021).