Nature of employment and outcomes for urban labor: evidence from the latest labor force surveys in India

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Abstract
Given its size and level of income, India faces unique challenges in the labor market. In the urban labor force of nearly 100 million, half of the workers engage in regular wage/salaried employment including in short-term contracts, yet a large number are either self-employed or work as casual labor. This vast pool of employees in the urban sector exists without job contract (92%), social security (90%) or paid leave (89%) barely earning subsistence wages, many close to the poverty threshold. This paper looks at the types of employment (TOE) for urban workforce and its effects on worker outcomes (earnings, hours worked, job loss). The assessment of the effects of TOE remains mostly instinctive without rigorous empirical research. Using latest three rounds of nationally representative Periodic Labor Force Surveys (PLFS), we assess the outcomes for urban workers based on TOE. We estimate the probability of being poor based on TOE and occupation where urban casual labor is associated with 7 percentage points higher likelihood of being poor and nearly 17% lower earnings. We uniquely assess the extent of job turnovers for urban workers and falling into unemployment at high frequency based on TOE. Analysis of urban panel after accounting for unobserved worker level factors captures the extent of fall in income due to job switching and loss of employment. Results indicate significant potential for poverty if worker is not socially protected, engaged in distress entrepreneurship or as casual labor.

Keywords Transient poverty · PLFS · Casual labor · Urban panel · Own account enterprises

JEL Classification J40 · J46 · J43
1 Introduction

In countries around the world, a shock like COVID-19 has shown to be not only a public health crisis but also a severe economic crisis. The crisis led to a sharp rise in unemployment with job losses, reduced wages, and restricted hours. These labor market effects however have not been uniform and were comparatively severe for some type of employment (TOE) than others. Informal employment, employment in micro, small and own account enterprises, and the casual labor force were comparatively adversely affected. Even in normal times, the outcomes for labor (wages, hours worked, periodicity of employment) vary significantly by TOE i.e., employees without job contract, social security or paid leave earn remarkably lower wages and remain closer to the poverty threshold.

The difference in outcomes for workers specifically due to TOE though widely discussed has not been rigorously analyzed for India with nearly half a billion strong labor force where nationally less than 10% are under any job contract. Using large scale nationally representative employment surveys, in this paper we try to assess the outcomes for urban labor based on TOE (casual labor, self-employment as microentrepreneur and employment with different contractual provisions). Rural work force is dominated by self-employment in farming. Regular wage and salaried (RWS) employment in rural areas that can be used for comparison is comparatively rare. In contrast in urban labor force, nearly 50% are engaged in regular wage salaried (RWS) employment that helps us understand the role of TOE contrasting with casual labor and employment in own account micro enterprises.

Also, India spends just over 2% of its Gross Domestic Product (GDP) (mostly for rural areas) on social protection. India’s urban population stands at 34% and its share is growing steadily. Most adversely affected due to TOE in labor market are the urban poor. Rural population does have an annual employment guarantee for 100 days (at basic wage) that gets activated or enlarged in response to shocks; on the other hand, urban labor does not have any such system except in few states (Himachal Pradesh, Jharkhand, and Odisha). These factors imply low bargaining power for the workers in certain TOE resulting in low wages, rationed working hours and short tenure in employment.

The outcomes based on TOE can also be gendered. There are not only differences in wages and employment, in recessions, job losses during shocks that disproportionally affects casual labor and self-employed also vary between men and women. For men, job losses have generically been high in most countries which tends to be concentrated in sectors with a high cyclical exposure, and women in comparatively stable employment over the cycle (Coskun & Dalgic, 2020).

More men work in industries heavily affected by a “standard” downturn (manufacturing and construction), while women’s employment is usually concentrated in sectors such as health care and education (Alon et al., 2020). However, the effects depend on the nature of shock as well. A correlated shock like COVID-19 affected

1 https://www.orfonline.org/expert-speak/covid19-wake-up-call-urban-social-protection-india-63545/.
men and women workers alike. Unlike developed countries where men and women have equal labor force participation rate (LFPR), in India, women LFPR has been falling over time being much lower than south-east Asian countries and also neighboring Bangladesh.

In this paper, we assess outcomes in the urban labor market based on TOE. About 220 million Indians sustain on expenditure below 50 cents/day largely due to the nature of participation in the labor markets (The Global Social Mobility Report, 2020). For poor, labor is the primary endowment, attempts to lift them out of poverty or to build their capacity to withstand shocks requires understanding the link between poverty, vulnerability, and labor markets. Estimates from World Bank suggest that a shock like COVID-19 will push 12 million Indians into extreme poverty (earning less than $1.90/day). Most of this descent into poverty would be in certain TOE.

To understand the effects of TOE for urban workers on outcomes such as wages, earnings hours worked and poverty status, we employ available rounds of nationally representative PLFS—2017–18, 2018–19 and 2019–20. PLFS 2019–20 also helps us gauge the effects of COVID-19 shock by comparing with earlier rounds where the differences in outcomes by TOE get starker with shocks to the labor market.

Indian labor statistics have recently undergone a transition. Most existing studies on labor markets have used the erstwhile five-yearly employment-unemployment surveys conducted by the National Sample Survey Office (NSS-EUS), the last of which was in 2011–12. It has now been discontinued. The annual surveys conducted by the Labor Bureau (LB-EUS) have also been discontinued (last data available is for 2015). These surveys have been replaced with annual PLFS, the two latest rounds of which we employ.

We assess the outcomes based on worker, job, and employment characteristics along with sector and occupation differences. Moreover, we uniquely employ the urban panel of the PLFS to look at determinants and implications of switching jobs at high frequency (quarter wise) or falling into unemployment, that are directly linked to TOE. These dynamics in the urban labor market could never be assessed using the NSS data.

Using census weights to get the population numbers for urban work force, based on PLFS 2019–20, about 38% of India’s urban work force is self-employed, nearly half of the urban work force is in RWS employment and over 12% engaged as casual labor. The self-employed and casual labor work mostly in informal sector usually with no job security. They tend to have irregular working hours, distress entrepreneurship, no formal contract or paid leave, no social security and access to credit. Casual labor and self-employment in micro enterprises (including unremunerated family labor equaling 6 million) together comprise half of 101 million urban workforce. Lack of job protection is widely rooted including in case of some urban RWS.

Sporadicity of employment for casual labor creates a basis for job and income losses in face of shocks. Sector wise and by occupation, some workers are more susceptible depending on the extent and nature of shock, and worker and location characteristics. Labor market shocks lead to a loss of livelihood mostly for those who either work on short-term contracts or work without a contract. Examples include jobs in tourism industry, services like parking contractors, cleaners, waiters...
in restaurants, suppliers of vegetables and flowers to the hotels (Bhagat et al., 2020). If construction and manufacturing slow down, employment in the backward linked sectors like cement, construction materials are also affected with accompanying job losses and wage reduction, that disproportionately affects casual laborers.

Further, there are dynamic effects of shocks possible by TOE due to high returns to experience in the labor market. Losing jobs or switching across jobs at high frequency means that such returns are not realized. Note that a large majority of casual labor and self-employment comprises migrant workers, such employees are comparatively badly hit with shocks and are forced to switch jobs (ILO, 2020). Unfortunately, PLFS data does not identify migration status and thus our analysis overlooks an important aspect of India’s labor market based on TOE.

Urban sample of PLFS shows both a low share of trade related jobs and hardly any employment growth in that sector. Construction has been mostly absorbing the low skilled in India as casual workers (7 million). However, construction has been slowing in urban sector for last few years. In the recent past, the only possible choice for new labor market entrants, especially women seem to be the services sector. In services, however the job growth is driven primarily by select services.2

Further, studies assess a continued trend towards system of contract labor in India (Kapoor & Krishnapriya, 2019). In the PLFS, these works are classified as RWS employment that could partly explain the near 50% employment falling in RWS category in urban employment. Between 2000 and 2015, the share of contract labor in manufacturing increased from 15 to 28%, and of directly hired workers reduced to 50% from 61%. Thus, job insecurity, typical of informal sector, has percolated to the organized sector in the form of contract labor.

On the side of earnings, a vast majority of workers in India just earn subsistence wages. Based on PLFS data, the mean urban wage for casual workers in non-public works was $4.3/day in urban areas in 2019–20. Average wages for women casual urban workers were only lower at $3.2/day. Though RWS earn more than casual labor and self-employed in urban areas, they still realize less than $8/day.

We identify most workers having low skills (education, experience, and training), being comparatively young. With some TOE, it takes little for such workers to lose jobs and face income losses. The likelihood and the size of effect of such occurrence, we determine using the urban panel of PLFS. During initial nationwide lockdown period for example in April 2020 due to COVID-19, Centre for Monitoring of Indian Economy (CMIE) reported 27 million youth (20–30 years) lost their jobs. Young workers losing their job implies forgoing returns to experience and it would also lead to less secure employment in future (Jarosch, 2021). This effect would extend also to those who are about to enter the workforce.

We also look at the distribution of earnings by TOE. Across types of employment, the wage and income inequality is likely to differ. In TOE where workers

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2 Drivers of services sector growth comprise education, entertainment, hotel and restaurant, catering and food service activities, health and community social services, telecommunication, business support services, sale, maintenance and repair of motor vehicles, financial intermediation, computer related activities, transport, real estate services, and insurance and pension funding.
are similarly skilled, the terms of engagement are nearly identical, motivations for employment are comparatively homogenous, wage inequality could be lower. Certain TOE viz. casual labor and self-employment are characterized by uniformly low earnings and hence low inequality.

The paper is organized as follows. Section 2 provides brief on data source i.e., PLFS. Section 3 provides motivating summary statistics for workforce characteristics, employment characteristics and job that together represent the roles of TOE in determining worker outcomes. Section 4 provides determinants of employment status. Section 5 assesses the association of types of employment and of job shifts using urban panel of PLFS. Section 6 provides implications for wage inequality by TOE and Sect. 7 concludes.

2 Details on PLFS 2017–18, 2018–19 and 2019–20

2.1 Sampling design: PLFS

PLFS, nationally representative surveys are designed with two main objectives: (a) to measure dynamics in LFP and employment status in time interval of three months for urban in terms of Current Weekly Status (CWS) and (b) for both rural and urban areas, obtain both usual status and CWS at annual frequency. PLFS uses a multi-stage stratified random sampling and collects information in four phases (urban sample) within a year to address seasonality.

In PLFS, second stage stratification is based on education (number of household members with secondary/higher education) instead of monthly per capita spending of households, the selection of first-stage units (villages and urban wards) and the hamlet groups (sub-blocks of large first-stage sampling unit (FSUs) based on population size criteria (PLFS 2018–19).

The urban survey i.e., utilized in this paper uses a rotational panel of two years duration. Each selected household is visited four times—once with first visit schedule and next three with revisit schedule. Not all households/individuals get surveyed 4 times within a year. Depending on whether the household/individual has been surveyed twice, thrice or four times, we label them as panel 2, panel 3 and panel 4 respectively (Appendix Table 10).

In PLFS, FSU are the Urban Frame Survey (UFS) blocks in urban areas and 2011 Population Census villages (Panchayat (collection of five villages) wards for Kerala state) in rural areas. The ultimate stage units (USU) are households. Total sample size (FSUs): 12,800 FSUs (7024 villages and 5776 UFS blocks) are covered annually at all-India level. Urban FSUs are selected by probability proportional to size

\[3\text{ Just for comparison, rural samples without revisit for all 8 quarters are selected before commencement of survey for each 2-year period, while the frame remains same for this duration. As scheme of rotation, 75% FSUs are matched between two consecutive visits. In rural areas, in each quarter, 25% FSUs of annual allocation were covered.} \]
with replacement (PPSWR) scheme, size being the number of households in the UFS blocks.

3 Characteristics of work force, employment, and job particulars

India’s labor market is exceptional because of its sheer size. As second most populous and youngest country on the planet, over 101 million workers constitute the urban workforce in 2019–20 (78 million males, 23 million females). The average worker in India is young, almost 45% work force is below 35 years of age, 56–65 years age category constitute only over 10% of urban workforce.

Based on the latest rounds of PLFS 2019–20, illiterates comprise more than 12% of urban workforce and over 46% have education only up to middle school. With loose labor market, low skills make workers dispensable with near costless replacement for employers. Further, only 15% of the urban workforce in India received any training if at all (notwithstanding a 5%-point increase between PLFS 2017–18 and PLFS 2018–19 (Table 1). Figure 1 presents distribution of workers by education and training. Among those who received training, 13 million got formal vocational/technical training, 18 million either self-learn or learn on the job. The type of training typifies low end of skill development mostly in services (excluding higher skill IT and IT enabled services and little in manufacturing).

Mehrotra and Parida (2019) also show that non-manufacturing sector (mostly construction) was creating 4 million jobs/year during 2004–05 and 2011–12 but created only 0.6 million jobs/year between 2011–12 and 2017–18. Slow growth of construction jobs can amplify effect on poor given their TOE. The only sector which has sustained jobs growth (3 million/year) in India is services. Within manufacturing, employment growth has been comparatively small and concentrated in capital intensive segment, Machinery Equipment, Electrical and Electronics Machinery, Motor Vehicles, and Basic Metals.

In just one year between the two rounds in pre-pandemic period, there have been employment losses in urban sector. States ranking high on employment loss numbers in million between 2017–18 and 2018–19 include Rajasthan (0.20), Delhi (0.17), Odisha (0.13), Uttar Pradesh (0.11), Telangana (0.08), Punjab (0.07), Uttar Pradesh (0.06), and Haryana (0.05). But to look at the employment losses between pre-pandemic period (2017–18) and pandemic period (2019–20), the scenario has changed, and unemployment had increased by around 13 times. The major states ranking high on employment loss numbers in million include Uttar Pradesh (1.53), Maharashtra (1.45), Tamil Nadu (1.27), Gujarat (1.02), Madhya Pradesh (1.01), West Bengal (0.88) and Kerala (0.82).

Three facts stand out in Table 1 (i) Even in the latest labor force surveys (2019–20) nearly half of the urban work force comprises self-employment and casual labor (41 million men, 9 million women) (ii) half of the workforce comprises regular wage and salaried class and (iii) RWS employment i.e., characterized by highest job protection has grown glacially at 2.4%. 50 million are regular wage/salaried (50%) and 38 million men and 12 million women are urban workers.
| Characteristic                        | SE (2017–18) | RWS (2017–18) | CL (2017–18) | ToT (2017–18) | SE (2018–19) | RWS (2018–19) |
|--------------------------------------|--------------|---------------|--------------|---------------|--------------|---------------|
| Estimated sample^a (million)         | 36.3         | 47.9          | 11.9         | 96.1          | 37.3         | 49.2          |
| Age (in years)                       | 40.77 (12.54)| 36.96 (11.45) | 37.78 (12.06)| 38.56 (12.1)  | 41.50 (12.52)| 37.04 (11.41)|
| Age group (%)                        |              |               |              |               |              |               |
| < 25                                 | 10.90 (31.16)| 16.88 (37.45) | 16.71 (37.31)| 14.51 (35.22) | 9.90 (29.87) | 17.17 (37.71) |
| 26–35                                | 27.09 (44.44)| 34.52 (47.54) | 30.42 (46)   | 31.07 (46.28) | 25.63 (43.66)| 33.20 (47.09)|
| 36–45                                | 29.48 (45.6) | 25.56 (43.62) | 27.73 (44.77)| 27.38 (44.59) | 29.41 (45.56)| 26.18 (43.96)|
| 46–55                                | 19.44 (39.58)| 16.39 (37.02) | 17.49 (37.99)| 17.73 (38.19) | 21.52 (41.09)| 16.97 (37.54)|
| 56–65                                | 10.36 (30.48)| 5.99 (23.74)  | 6.73 (25.05) | 7.80 (26.82)  | 10.52 (30.69)| 5.84 (23.44)  |
| > 65                                 | 2.73 (16.3)  | 0.66 (8.11)   | 0.92 (9.54)  | 1.51 (12.18)  | 3.02 (17.12) | 0.65 (8.02)   |
| Household size (nos)                 | 5.06 (2.45)  | 4.43 (2.02)   | 4.67 (2.04)  | 4.71 (2.22)   | 4.89 (2.23)  | 4.28 (1.96)   |
| Male workforce (%)                   | 83.04 (37.53)| 77.61 (41.69) | 84.89 (35.82)| 80.69 (39.47) | 82.56 (37.95)| 77.05 (42.05)|
| Social group (%)                     |              |               |              |               |              |               |
| Scheduled tribes (STs)               | 2.83 (16.57) | 3.84 (19.22)  | 6.43 (24.52) | 3.78 (19.08)  | 2.11 (14.37) | 3.34 (17.96)  |
| Scheduled caste (SCs)                | 10.28 (30.37)| 15.57 (36.26) | 23.83 (42.61)| 14.58 (35.29) | 11.17 (31.5) | 15.41 (36.11) |
| Other backward caste (OBCs)          | 42.70 (49.46)| 36.06 (48.02) | 46.56 (49.88)| 40.03 (49)    | 44.40 (49.69)| 38.76 (48.72)|
| General                              | 44.19 (49.66)| 44.53 (49.7)  | 23.18 (42.2) | 41.61 (49.29) | 42.32 (49.41)| 42.49 (49.43) |
| Education completed (in years)       | 8.92 (4.97)  | 10.92 (5.06)  | 5.56 (4.2)   | 9.44 (5.23)   | 8.97 (4.98)  | 10.99 (5.08)  |
| Education category (%)               |              |               |              |               |              |               |
| Illiterate                           | 12.25 (32.79)| 7.70 (26.66)  | 26.79 (44.29)| 11.98 (32.47) | 12.78 (33.39)| 8.06 (27.23)  |
| Up to primary                        | 18.28 (38.65)| 11.54 (31.96) | 29.17 (45.45)| 16.49 (37.1)  | 17.20 (37.74)| 10.97 (31.25)|
| Skills (%) | 2017–18 | 2018–19 |
|-----------|---------|---------|
| Middle school | 21.53 (41.1) | 21.92 (41.37) |
| Secondary and above | 47.94 (49.96) | 48.09 (49.96) |
| Skills (%) | 2017–18 | 2018–19 |
| Technical/vocational training | 0.00 (0) | 6.45 (24.56) |
| Technical education | 5.08 (21.97) | 4.68 (21.12) |

| Age group (%) | 2017–18 | 2018–19 |
|---------------|---------|---------|
| < 25 | 17.56 (38.05) | 17.99 (38.41) |
| 26–35 | 27.75 (44.78) | 28.09 (44.94) |
| 36–45 | 28.85 (45.31) | 26.87 (44.33) |
| 46–55 | 17.22 (37.75) | 17.60 (38.08) |
| 56–65 | 7.13 (25.74) | 8.07 (27.24) |
| > 65 | 1.50 (12.14) | 1.39 (11.69) |

| Household size (nos) | 2017–18 | 2018–19 |
|----------------------|---------|---------|
| 4.62 (2.1) | 4.52 (2.03) |

| Male workforce (%) | 2017–18 | 2018–19 |
|--------------------|---------|---------|
| 85.32 (35.39) | 84.91 (35.79) |
|                          | 2018–19 | 2019–20 |
|--------------------------|---------|---------|
|                          | CL      | ToT     | SE      | RWS     | CL      | ToT     |
| Scheduled tribes (STs)   | 4.93 (21.64) | 3.08 (17.26) | 2.54 (15.73) | 3.46 (18.29) | 5.33 (22.47) | 3.33 (17.95) |
| Scheduled caste (SCs)    | 24.98 (43.29) | 15.03 (35.73) | 10.01 (30.02) | 15.40 (36.09) | 25.74 (43.72) | 14.57 (35.28) |
| Other backward caste (OBCs) | 49.81 (50) | 42.29 (49.4) | 45.69 (49.81) | 38.52 (48.66) | 49.27 (49.99) | 42.54 (49.44) |
| General                  | 20.28 (40.21) | 39.61 (48.91) | 41.76 (49.32) | 42.62 (49.45) | 19.66 (39.74) | 39.55 (48.90) |
| Education completed (in years) | 5.46 (4.26) | 9.53 (5.27) | 9.15 (5.04) | 11.11 (5.02) | 5.59 (4.33) | 9.70 (5.26) |
| Education category (%)   |         |         |         |         |         |
| Illiterate               | 28.88 (45.32) | 12.48 (33.05) | 12.55 (33.13) | 7.50 (26.34) | 28.08 (44.94) | 11.88 (32.36) |
| Up to primary            | 27.50 (44.65) | 15.42 (36.11) | 16.31 (36.95) | 10.91 (31.18) | 28.47 (45.13) | 15.07 (35.77) |
| Middle school            | 26.28 (44.02) | 20.08 (40.06) | 21.13 (40.82) | 16.20 (36.85) | 25.09 (43.35) | 19.15 (39.35) |
| Secondary and above      | 17.34 (37.86) | 52.02 (49.96) | 50.01 (50.00) | 65.38 (47.58) | 18.37 (38.72) | 53.90 (49.85) |
| Skills (%)               |         |         |         |         |         |
| Technical/vocational training | 4.66 (21.08) | 6.56 (24.75) | 5.91 (23.59) | 6.63 (24.88) | 4.02 (19.65) | 6.06 (23.85) |
| Technical education      | 0.70 (8.35) | 8.11 (27.3) | 5.24 (22.27) | 13.39 (34.06) | 0.94 (9.65) | 8.79 (28.31) |

Standard deviations in parenthesis

Source: Authors’ calculation from PLFS unit level data for urban sample 2017–18, 2018–19 and 2019–20

SE self-employed, RWS regular wage/salaried, CL casual labor, ToT total, Mn million

*We showcased an estimated sample of workforce for 2017–18, 2018–19 and 2019–20 based on Census Projected population for 2017, 2018 and 2019, respectively*
Between PLFS 2018–19 and PLFS 2019–20, casual urban labor remained nearly the same increasing by 0.06 million, RWS increased by 1.2 million between the last two rounds of periodic labor force surveys so did self-employment by 0.37 million, both small compositional changes for labor in relation to the enormous size. Across two rounds, urban female labor force increased by over 4 million. Finding employment for Indian women is likely to be comparatively demanding.

3.1 Type of employment (TOE)

A fundamental question in relation to casual labor is about its drivers. Labor in developing countries generally follows a dual market model: a formal segment with high wages, providing job security and social security and an informal sector paying low wages and serving as last resort to unemployment (Harris & Todaro, 1970; Radchenko, 2017). The segmentation in labor market is well established including in urban labor force (Banerjee, 1983; Khandker, 1992; Mazumdar, 1983).

Apart from observable characteristics in Table 1, unobservable factors could be sorting labor into casual and non-casual employment. Maloney (1999) states that casual work corresponds most closely to the overall definition of informality by Portes et al (1989) that has at its foundation a dualistic labor market. A simple probit estimation (Table 4 below) shows both men and women in the urban work force as equally unlikely to be under formal contract. Men in the urban work force are more likely to be a casual laborer. Relative to the youngest workers, all other age categories in the urban work force are less likely to engage in RWS employment. Elementary occupations exhibit lower probability of hiring with contract. Part of the reason for the declining LFP of women in India could be that there are not enough stable and secured jobs that is comparatively desirable for women (Desai & Joshi,
2019). Education expectedly reduces the probability of engaging as casual labor for the urban work force.

With half of the urban workers in casual employment and as micro entrepreneurs, it is no surprise that skill levels of the work force are quite low notwithstanding the skill premium in wages. Figure 2 shows the importance of skills in determining wages. The only place where education does not seem to make a measurable difference in earnings is casual labor, i.e., likely to be the option for reentry of most jobless people after loss of employment due to any shock. The urban casual labor is mostly in manual work in construction, carpentry, trade, transport, and small
manufacturing and services as street vendors, hawkers, head load workers, garment makers, rag pickers and others.

In India, one important aspect of labor market is caste-based differentiation where extensive evidence on discrimination exists. Highest caste comprises a comparatively high share of workforce in urban areas. Thorat and Newman (2010) show caste affecting rural and urban labor markets equally through exclusion, selective inclusion, unfavorable inclusion, and selective exclusion.

Upper caste has relatively higher earning in comparison to lowest castes viz scheduled tribe (ST)/scheduled caste (SC)/other backward caste (OBC). Agriculture, forestry, fisheries; crafts and trade workers; and elementary occupations have low earnings. In coping with shocks in casual labor or in self-employment, caste related inclusion and exclusion systems are likely to matter. Lower caste faces higher probability of exclusion and lower probability of inclusion in cases requiring reentry.4

Further, only ST and highest caste labor force have reduced in number between pre-pandemic period (2017–18) and pandemic period (2019–20). SC (0.7 million) and OBC (4.6 million) have become larger. Overall, urban LFP increased by 5.1 million. Such massive growth in workforce in just a couple of years poses a big employment challenge.

3.2 Variation across industry and occupation

Manufacturing in India has high migrant labor dependence and 83% of manufacturing workforce is informal in India.5 Indian firms though are not engaged in Global Value Chains (GVC) to the same extent as countries like China are, yet some industries do have substantial GVC dependence, for example Gems and Jewelry, automotive components, leather and leather Products, Sports Goods and Garments. Even in these industries, a large fraction of production in India occurs in the informal sector (Damodaran, 2010). Table 2 presents the industry affiliation and occupations of India’s urban labor force.

In self-employment, the highest share is trade followed by manufacturing. For casual labor, the highest share is in construction. In case of RWS, service class such as education, public administration, financial services, office administrative, computer (IT) and legal activities is followed by manufacturing. Elementary occupations, characterized by low skills hence replaceable, delivering products or services that under shocks are deferrable (non-essential category), these occupations employ mostly casual laborers.

Table 3 presents some job particulars, social or job security provisions and worker outcomes for urban labor force. Strikingly less than 7.5% even among urban workers have a job contract in India even though half of the urban workforce is in RWS category. More than 90% urban workers have no benefits associated with their job. With shocks, such workers may be pushed to take any job that pays some cash.

4 The lowest caste (SC and ST) and other backward caste (OBC) are eligible for job reservations in public sector as part of affirmative action. The government however has not been the employment generator.
5 https://www.imf.org/-/media/Files/Conferences/2019/7th-statistics-forum/session-ii-murthy.ashx.
| Employment type                        | 2017–18 |          |          |          | 2018–19 |          |
|---------------------------------------|---------|----------|----------|----------|---------|----------|
|                                       | SE      | RWS      | CL       | ToT      | SE      | RWS      |
| Agriculture                           | 9.74 (29.65) | 0.47 (6.86) | 12.40 (32.96) | 5.66 (23.11) | 10.13 (30.18) | 0.61 (7.8) |
| Mining and quarrying                   | 0.10 (3.15) | 0.70 (8.37) | 0.36 (5.99) | 0.42 (6.49) | 0.14 (3.77) | 0.91 (9.48) |
| Manufacturing                          | 21.56 (41.13) | 23.37 (42.32) | 16.92 (37.49) | 21.82 (41.3) | 22.24 (41.58) | 24.00 (42.71) |
| Electricity and water supply           | 0.67 (8.14) | 1.92 (13.71) | 0.42 (6.44) | 1.23 (11.02) | 0.78 (8.8) | 1.96 (13.86) |
| Construction                           | 3.86 (19.25) | 2.77 (16.42) | 49.80 (50) | 9.34 (29.1) | 4.31 (20.31) | 2.36 (15.18) |
| Trade                                 | 34.00 (47.37) | 12.64 (33.23) | 5.73 (23.25) | 20.10 (40.08) | 33.17 (47.08) | 12.40 (32.96) |
| Transport                              | 9.28 (29.02) | 7.69 (26.64) | 6.63 (24.88) | 8.17 (27.4) | 9.20 (28.91) | 6.94 (25.42) |
| Accommodation and food services        | 5.15 (22.11) | 2.80 (16.5) | 2.72 (16.27) | 3.71 (18.91) | 4.70 (21.17) | 2.79 (16.47) |
| Other services                         | 15.64 (36.32) | 47.64 (49.94) | 5.02 (21.83) | 29.54 (45.62) | 15.31 (36.01) | 48.03 (49.96) |
| Occupation category (NCO)a             |         |          |          |          |         |          |
| Managers                               | 31.32 (46.38) | 6.94 (25.41) | 0.38 (6.17) | 15.63 (36.32) | 32.90 (46.98) | 7.08 (25.65) |
| Professionals                          | 6.90 (25.34) | 13.82 (34.51) | 0.58 (7.56) | 9.38 (29.15) | 7.13 (25.74) | 12.93 (33.55) |
| Technicians and associate professionals | 2.40 (15.31) | 12.46 (33.03) | 0.39 (6.27) | 6.95 (25.42) | 2.26 (14.85) | 12.15 (32.67) |
| Clerical support workers               | 0.34 (5.78) | 8.33 (27.63) | 0.20 (4.46) | 4.14 (19.91) | 0.29 (5.35) | 9.06 (28.71) |
| Service and sales workers              | 20.72 (40.53) | 18.39 (38.74) | 5.65 (23.09) | 17.64 (38.11) | 19.51 (39.63) | 19.00 (39.23) |
| Skilled agricultural, forestry and fishery workers | 8.49 (27.87) | 0.32 (5.69) | 1.64 (12.7) | 3.69 (18.86) | 9.17 (28.86) | 0.54 (7.34) |
| Craft and related trades workers       | 15.74 (36.42) | 13.96 (34.66) | 34.11 (47.41) | 17.29 (37.82) | 15.52 (36.21) | 13.69 (34.38) |
### Table 2 (continued)

| Employment type                                      | 2017–18          |          |          |          | 2018–19          |          |          |
|------------------------------------------------------|------------------|----------|----------|----------|------------------|----------|----------|
|                                                      | SE (NCO)         | RWS (NCO)| CL (NCO) | Tot (NCO) | SE (NCO)         | RWS (NCO)| CL (NCO) |
| Plant and machine operators and assemblers           | 7.64 (26.56)     | 12.11 (32.63)| 5.64 (23.06)| 9.52 (29.34)| 7.39 (26.16)     | 11.69 (32.13)|
| Elementary occupations                              | 6.44 (24.55)     | 13.64 (34.32)| 51.38 (49.98)| 15.75 (36.43)| 5.82 (23.41)     | 13.84 (34.53)|
| Employment status (%)                                |                  |          |          |          |                  |          |          |
| Self-employed                                        |                  |          |          |          |                  |          |          |
| Regular wage/salaried                                |                  |          |          |          |                  |          |          |
| Casual labor                                         |                  |          |          |          |                  |          |          |

| Employment type                                      | 2018–19          |          |          |          | 2019–20          |          |          |
|                                                      | SE (NCO)         | RWS (NCO)| CL (NCO) | Tot (NCO) | SE (NCO)         | RWS (NCO)| CL (NCO) |
| Agriculture                                          | 9.26 (28.99)     | 5.30 (22.4)| 10.78 (31.02)| 0.42 (6.45)| 10.15 (30.19)     | 5.54 (22.88)|
| Mining and quarrying                                 | 0.44 (6.62)      | 0.56 (7.46)| 0.11 (3.26)| 0.71 (8.42)| 0.46 (6.79)       | 0.45 (6.71)|
| Manufacturing                                         | 16.92 (37.49)    | 22.44 (41.72)| 20.52 (40.38)| 23.32 (42.28)| 15.26 (35.96)     | 21.28 (40.93)|
| Electricity and water supply                          | 0.35 (5.93)      | 1.31 (11.37)| 0.60 (7.72)| 1.92 (13.71)| 0.64 (7.97)       | 1.26 (11.16)|
| Construction                                          | 53.49 (49.88)    | 9.58 (29.43)| 4.27 (20.21)| 2.52 (15.67)| 53.28 (49.89)     | 9.24 (28.96)|
| Trade                                                | 5.14 (22.08)     | 19.31 (39.48)| 34.56 (47.56)| 13.61 (34.29)| 5.83 (23.44)       | 20.70 (40.52)|
| Transport                                             | 6.65 (24.91)     | 7.76 (26.75)| 9.25 (28.97)| 6.49 (24.64)| 6.13 (23.98)       | 7.50 (26.35)|
| Accommodation and food services                       | 2.76 (16.4)      | 3.51 (18.4)| 4.65 (21.05)| 2.64 (16.02)| 3.12 (17.39)       | 3.46 (18.29)|
| Other services                                        | 4.98 (21.76)     | 30.24 (45.93)| 15.27 (35.97)| 48.37 (49.97)| 5.13 (22.06)       | 30.55 (46.06)|

* NCO: Occupation category
Table 2 (continued)

| Employment type                                      | 2018–19 | 2019–20 |
|------------------------------------------------------|---------|---------|
|                                                      | CL      | TOT     | SE       | RWS      | CL      | TOT     |
| Managers                                             | 0.13 (3.6) | 15.94 (36.6) | 35.48 (47.85) | 6.70 (25) | 0.32 (5.61) | 16.99 (37.56) |
| Professionals                                        | 0.29 (5.35) | 9.14 (28.82) | 6.68 (24.97) | 13.84 (34.53) | 0.52 (7.19) | 9.50 (29.33) |
| Technicians and associate professionals               | 0.65 (8.01) | 6.96 (25.45) | 2.38 (15.23) | 11.59 (32.01) | 0.88 (9.32) | 6.78 (25.13) |
| Clerical support workers                              | 0.13 (3.61) | 4.62 (21) | 0.36 (5.98) | 9.12 (28.79) | 0.25 (5.01) | 4.70 (21.16) |
| Service and sales workers                             | 4.84 (21.45) | 17.40 (37.91) | 19.20 (39.39) | 19.35 (39.51) | 4.91 (21.6) | 17.57 (38.06) |
| Skilled agricultural, forestry and fishery workers    | 1.66 (12.79) | 3.94 (19.45) | 9.61 (29.48) | 0.66 (8.07) | 1.23 (11.04) | 4.16 (19.98) |
| Craft and related trades workers                      | 36.04 (48.01) | 17.21 (37.75) | 13.92 (34.61) | 12.81 (33.42) | 37.58 (48.43) | 16.18 (36.83) |
| Plant and machine operators and assemblers           | 5.97 (23.69) | 9.34 (29.1) | 6.99 (25.5) | 11.11 (31.43) | 6.33 (24.34) | 8.96 (28.56) |
| Elementary occupations                               | 50.28 (50) | 15.43 (36.12) | 5.38 (22.57) | 14.82 (35.53) | 47.99 (49.96) | 15.15 (35.85) |

Employment status (%)

|                                                      | 2018–19 | 2019–20 |
|------------------------------------------------------|---------|---------|
| Self-employed                                        | 37.71 (48.47) | 38.28 (48.61) |
| Regular wage/salaried                                | 49.61 (50.00) | 49.80 (50.00) |
| Casual labor                                         | 12.68 (33.27) | 11.92 (32.4) |

Note and Source: Same as Table 1

*Based on ILO classifications
Table 3  Job particulars and types of employment in urban sample workforce

|                                    | 2017–18 |          |          | 2018–19 |          |
|------------------------------------|---------|----------|----------|---------|----------|
|                                    | SE      | RWS      | CL       | ToT     | SE       | RWS     |
| Have job contract (%)              | NA      | NA       | NA       | NA      | 7.77 (26.77) |
| Eligible for paid leave (%)        | NA      | NA       | NA       | NA      | 12.96 (33.59) |
| Any social security benefits (%)   | NA      | NA       | NA       | NA      | 12.18 (32.71) |
| Social security category (%)       | No benefits | NA   | NA       | NA      | 84.06 (36.61) |
|                                    | Only job contract | NA | NA       | NA      | 0.66 (8.12)  |
|                                    | Only social security | NA | NA       | NA      | 1.7 (12.94)  |
|                                    | Only paid leave | NA     | NA       | NA      | 2.27 (14.9)  |
|                                    | Job contract and social benefits | NA | NA       | NA      | 0.61 (7.81)  |
|                                    | Job contract and paid leave | NA | NA       | NA      | 0.82 (9.02)  |
|                                    | Paid leave and social benefits | NA | NA       | NA      | 4.19 (20.04) |
|                                    | All three (paid leave, social security, job contract) | NA | NA       | NA      | 5.68 (23.14) |
| Outcome indicators                 |         |          |          |         |          |
| Hours worked/week                  | 55.77 (14.38) | 58.49 (10.03) | 44.6 (15.34) | 55.61 (13.4) | 53.12 (14.55) | 53.17 (11.04) |
| Wage/day (at 2017–18 price)        | 434.3 (582.06) | 574.94 (536.32) | 304 (134.64) | 484.46 (530.67) | 406.98 (1205.22) | 553.72 (562.86) |
| Wage/hour (at 2017–18 price)       | 53.14 (69.22) | 70.27 (67.63) | 60.68 (60.46) | 62.31 (67.84) | 53.63 (206.41) | 76.49 (85.81) |
| Table 3 (continued) | 2017–18 | 2018–19 | 2018–19 |
|---------------------|---------|---------|---------|
|                     | SE RWS  | CL ToT  | SE RWS  | 82.36 (61.22) | 102.94 (80.45) |
| Per capita expenditure at 2011–12 constant price (In INR) | 83.57 (68.83) | 105.32 (85.49) | 54.68 (31.61) | 90.19 (75.95) | 82.36 (61.22) |
| Working poverty Ten-dulkar line (%) | 12.61 (33.2) | 6.34 (24.38) | 24.13 (42.79) | 11.12 (31.44) | 9.65 (29.53) |
| Working poverty (< $1.90/day) (%) | 8.72 (28.22) | 5.19 (22.18) | 3.49 (18.35) | 6.21 (24.13) | 8.66 (28.13) |
| Working poverty (< 375/day) (%) | 57.56 (49.42) | 48.27 (49.97) | 76.88 (42.16) | 55.65 (49.68) | 59.86 (49.02) |
| 2018–19 | 2019–20 | 2018–19 | 2019–20 |
| Have job contract (%) | 0.24 (4.85) | 6.25 (24.2) | 8.88 (28.44) | 0.75 (8.61) | 7.31 (26.03) |
| Eligible for paid leave (%) | 0.52 (7.19) | 10.44 (30.58) | 12.95 (33.58) | 0.51 (7.12) | 10.56 (30.73) |
| Any social security benefits (%) | 0.15 (3.87) | 9.73 (29.64) | 12.04 (32.55) | 0.45 (6.66) | 9.81 (29.75) |
| Social security category (%) | 99.15 (9.19) | 87.13 (33.49) | 83.96 (36.7) | 98.4 (12.56) | 86.74 (33.92) |
| No benefits | 0.2 (4.51) | 0.57 (7.53) | 0.99 (9.91) | 0.69 (8.29) | 0.93 (9.62) |
| Only job contract | 0.12 (3.49) | 1.38 (11.68) | 1.44 (11.93) | 0.38 (6.15) | 1.24 (11.06) |
| Only social security | 0.48 (6.89) | 1.91 (13.68) | 2.14 (14.48) | 0.45 (6.68) | 1.82 (13.35) |
| Only paid leave | 0.01 (0.78) | 0.49 (6.98) | 0.66 (8.08) | 0.02 (1.46) | 0.53 (7.29) |
Table 3 (continued)

|                                | 2018–19 |   | 2019–20 |   | 2019–20 |   | 2019–20 |   |
|--------------------------------|---------|---|---------|---|---------|---|---------|---|
|                                | CL      | ToT| SE       | RWS| CL      | ToT|
| Job contract and paid leave    | 0.02 (1.46) | 0.66 (8.08) | 0.87 (9.27) | 0.02 (1.31) | 0.7 (8.36) |
| Paid leave and social benefits | 0.02 (1.32) | 3.34 (17.97) | 3.58 (18.58) | 0.03 (1.69) | 2.9 (16.77) |
| All three (paid leave, social security, job contract) | 0 (0.67) | 4.52 (20.78) | 6.36 (24.4) | 0.02 (1.28) | 5.14 (22.08) |
| Outcome indicators             |         |    |         |    |         |    |         |    |
| Hours worked/week              | 43.65 (14.59) | 51.94 (13.32) | 52.06 (15.16) | 53.55 (11.74) | 44.16 (14.75) | 51.87 (13.82) |
| Wage/day (at 2017–18 price)    | 310.66 (142.54) | 467.57 (845.99) | 396.2 (510.33) | 564.39 (570.36) | 328.2 (161.44) | 472.02 (523.3) |
| Wage/hour (at 2017–18 price)   | 64.26 (87.25) | 66.32 (144.21) | 52.74 (79.08) | 77.5 (84.51) | 69.66 (202.7) | 67.1 (104.75) |
| Per capita expenditure at 2011–12 constant price (INR) | 54.13 (30.16) | 88.99 (70.76) | 87.9 (71.33) | 109.08 (90.83) | 58.99 (32.36) | 95.03 (80.36) |
| Working poverty Tendulkar line (%) | 21.67 (41.2) | 9.09 (28.75) | 8.4 (27.74) | 4.35 (20.41) | 18.39 (38.74) | 7.57 (26.45) |
| Working poverty (< $1.90/day) (%) | 1.37 (11.61) | 5.53 (22.85) | 8.96 (28.55) | 5.73 (23.24) | 1.75 (13.11) | 6.33 (24.35) |
| Working poverty (< 375/day) (%) | 86.39 (34.28) | 59.47 (49.1) | 61.46 (48.67) | 52.29 (49.95) | 76.62 (42.32) | 58.69 (49.24) |

Standard deviations in parenthesis
Source: Same as Table 1
NA not applicable, INR Indian Rupees
*aMissing entries depict
Greater the barriers to entry in regular jobs (education, experience, training, social barriers) smaller would be the wage discount needed to meet their individual rationality constraint for LFP as a casual labor.

Figure 3 gives a contrast description of formal contract between RWS and casual labor. The figures are striking where except managers and professionals, most jobs comprise either self-employment or casual jobs. Figure 4 does show that contracts even when they are in place are mostly for short term even though the tenures in urban employment are comparatively high.
4 Determinants of TOE

In this section, we assess the determinants of being self-employed, casual labor and being in RWS work. The marginal effects from the probit model determining the binary choice in each TOE is presented in Table 4. After accounting for industry affiliation, occupation relationship, and worker characteristics, the youngest urban workers (below 25 years of age) and men have higher likelihood of being a casual labor and lower likelihood of being self-employed.

Further, a secondary educated urban worker has nearly 3% lower probability of employment as casual labor relative to illiterate workers. Further, having had some training is associated with a much smaller likelihood of being a casual labor. The lowest caste has greater likelihood of being in RWS possibly because of greater employment in the public sector (Table 4).

Banerjee and Knight (1985), Barooah et al. (2007), Madheswaran, and Attewell (2007) and Ito (2009) study caste-based wage or employment discrimination in Indian labor market. Munshi and Rosenzweig (2009) document lack of labor mobility in India and how caste-based networks affect education choices by gender. The stratification based on caste is a unique feature of the Indian labor market that would bear on impacts of any shock to labor market as well as in ability to recover from the shock across TOE.

5 What does TOE imply for labor outcomes in the urban work force?

What is the measurable association of being a casual labor, self-employed or RWS with wages, hours worked, incomes and likelihood of being poor? Fig. 5 summarizes from PLFS the distribution of the poor based on national poverty line by TOE. Casual labor and self-employed have the highest incidence of poverty among urban workers. Figure 6 presents figures for poverty status across occupations taking national poverty line (labeled A), international poverty line of $1.9 (labeled B)
Table 4  Determinants of TOE for urban sample 2019–20-probit model (marginal effects)

|                          | Self Employed | RWS  | Casual Labor |
|--------------------------|---------------|------|--------------|
|                          | (1 = Yes; 0 = No) | (1 = Yes; 0 = No) | (1 = Yes; 0 = No) |
| Age category (Base < 25) |               |      |              |
| 26–35<sup>a</sup>        | 0.127*** (0.008) | −0.077*** (0.008) | −0.008*** (0.001) |
| 36–45<sup>a</sup>        | 0.236*** (0.008) | −0.167*** (0.008) | −0.011*** (0.001) |
| 46–55<sup>a</sup>        | 0.275*** (0.008) | −0.195*** (0.008) | −0.012*** (0.001) |
| 56–65<sup>a</sup>        | 0.272*** (0.013) | −0.162*** (0.013) | −0.012*** (0.001) |
| Male<sup>a</sup>         | −0.015** (0.006) | −0.007 (0.007)   | 0.005*** (0.001)  |
| Social group (Base—OBC)  |               |      |              |
| SCs<sup>a</sup>          | −0.112*** (0.012) | 0.108*** (0.015) | 0.001 (0.002)     |
| STs<sup>a</sup>          | −0.089*** (0.008) | 0.052*** (0.008) | 0.006*** (0.001)  |
| Other/general<sup>a</sup>| −0.013* (0.007)  | 0.004 (0.007)   | −0.003*** (0.001) |
| Education category (Base—Illiterate) |       |      |              |
| Up to primary<sup>a</sup> | 0.018* (0.009)  | 0.022*** (0.010) | −0.006*** (0.001) |
| Middle<sup>a</sup>       | 0.024*** (0.009) | 0.052*** (0.009) | −0.010*** (0.001) |
| Secondary and above<sup>a</sup> | −0.010 (0.009) | 0.124*** (0.009) | −0.031*** (0.002) |
| Technical/vocational training<sup>a</sup> | 0.033*** (0.007) | −0.185*** (0.009) | −0.003*** (0.001) |
| Technical education<sup>a</sup> | −0.081*** (0.010) | 0.134*** (0.011) | −0.013*** (0.001) |
| Engaged in industry (NIC) (base—trade) |       |      |              |
| Agriculture               | −0.042** (0.019) | −0.374*** (0.021) | 0.145*** (0.017)  |
| Mining and quarrying<sup>a</sup> | −0.334*** (0.005) | 0.342*** (0.022) | 0.022* (0.011)   |
| Manufacturing<sup>a</sup> | −0.212*** (0.007) | 0.213*** (0.009) | 0.007*** (0.002)  |
| Electricity and water supply<sup>a</sup> | −0.285*** | 0.344*** | −0.006*** |
| (0.010)                  | (0.014)          |      | (0.002)      |
| Construction<sup>a</sup> | −0.280*** (0.006) | −0.305*** (0.011) | 0.281*** (0.014)  |
| Transport<sup>a</sup>    | −0.045*** (0.012) | 0.031*** (0.013) | 0.009*** (0.003)  |
| Accommodation and food services<sup>a</sup> | −0.145*** (0.011) | 0.112*** (0.014) | 0.030*** (0.005)  |
| Other services<sup>a</sup> | −0.361*** (0.006) | 0.395*** (0.007) | −0.010*** (0.001) |
| Occupation category (base—manager) |       |      |              |
| Professionals<sup>a</sup> | −0.331*** (0.005) | 0.373*** (0.008) | 0.099*** (0.021)  |
| Technicians and associate professionals<sup>a</sup> | −0.375*** (0.004) | 0.449*** (0.006) | 0.168*** (0.029)  |
| Clerical support workers<sup>a</sup> | −0.405*** (0.003) | 0.511*** (0.004) | 0.105*** (0.027)  |
| Service and sales workers<sup>a</sup> | −0.444*** (0.005) | 0.488*** (0.006) | 0.196*** (0.022)  |
| Skilled agricultural, forestry and fishery workers<sup>a</sup> | −0.168*** (0.019) | 0.352*** (0.017) | 0.035*** (0.013)  |
| Craft and related trades workers<sup>a</sup> | −0.377*** (0.005) | 0.358*** (0.008) | 0.399*** (0.029)  |
| Plant and machine operators and assemblers<sup>a</sup> | −0.386*** (0.004) | 0.448*** (0.006) | 0.334*** (0.032)  |
| Elementary occupations<sup>a</sup> | −0.460*** (0.004) | 0.436*** (0.006) | 0.587*** (0.030)  |
| Income/hour (log)         | −0.127*** (0.002) | 0.088*** (0.002) | 0.012*** (0.001)  |
| Social security (SS) category (base—no SS) |       |      |              |
| Only job contract<sup>a</sup> | 0.397*** (0.011) |      |              |
| Only social security<sup>a</sup> | 0.390*** (0.014) |      |              |
and recommended living wage rate @INR 375/day (labeled C). Based on the different poverty lines, mining and construction workers followed by transport labor and freight handlers, and agricultural, fishery and related labors have high incidence of poverty among urban workers. A hypothesis test conducted between vulnerable category and poverty line to get the sense if the proportions in two or more populations are equal. In vulnerable category we have kept comparison with those workers who are engaged as housekeeping and restaurant services (Appendix Table 11).

In non-experimental settings, to assess how TOE affects wages and hours and ultimately earnings/poverty, an ideal would be longitudinal data where workers would switch from one TOE to another and outcomes in TOE could be recorded.

![Poverty across TOE (based on Tendulkar Approach). Source: PLFS Unit level data 2017–18, 2018–19 and 2019–20](image-url)
In the absence of such data, we use within sample matching methods to assess the implications of different TOE for outcomes such as earnings and poverty status. We match comparable workers based on observable characteristics to assess the effects of TOE on different labor market outcomes. The outcomes that we assess are (i) wages/day (ii) work hours/week (iii) per capita consumption expenditure (iv) poverty status based on the different poverty lines (Table 5).

The large data feature of PLFS renders laborers with similar characteristics in different TOE. By matching workers based on characteristics in different TOE, we assess the association of that specific TOE with outcomes relative to

Note: A=Tendulkar estimate; B=<1.9 USD; C=<Rs 375; Testing of equality of proportions between vulnerable category and poverty line is given in appendix table A2

Fig. 6 Poverty across elementary and service occupations for urban panel sample (%). A = Tendulkar estimate; B = < 1.9 USD; C = < Rs 375; Testing of equality of proportions between vulnerable category and poverty line is given in Appendix Table 11. Source: PLFS Unit level data 2017–18, 2018–19 and 2019–20
| Outcome indicators | PSM methods | Effect of TOE | 2017–18 | 2018–19 | 2019–20 | Shock period |
|-------------------|-------------|--------------|---------|---------|---------|--------------|
| Poverty status (%) | NN M=3 | 14.07*** (1.49) | −2.51*** (1.27) | 3.43*** (1.00) | 6.75*** (1.47) | −2.55*** (1.08) | −3.54*** (1.02) |
| Bootstrap (1000) | | 13.61*** (2.89) | −1.58*** (1.79) | 3.29** (1.66) | 8.00*** 2.87 | −2.51** (1.77) | −3.42*** 1.49 |
| Wage/day (in INR) | NN M=3 | −79.1*** (16.45) | 171.94*** (14.5) | −35.99*** (18.98) | −62.58*** (16.31) | 166.77*** (13.19) | −50.11*** (17.46) |
| Bootstrap (1000) | | −71.84*** (20.12) | 177.59*** (34.07) | −39.60*** (17.58) | −47.98*** 18.85 | 170.85*** 66.56 | −57.19*** 20.05 |
| Hours/week (in hours) | NN M=3 | −8.63*** (0.66) | 6.13*** (0.62) | 0.37ns (0.43) | −8.56*** (0.66) | 3.18*** (0.59) | 0.7*** (0.4) |
| Bootstrap (1000) | | −7.96*** (0.89) | 6.39*** (0.90) | 0.93ns (0.68) | −8.42*** 0.94 | 4.04*** 0.87 | −0.44ns 0.68 |
| Per capita expenditure (in INR) | NN M=3 | −21.4*** (2.68) | 13.74*** (2.32) | −5.11*** (2.43) | −18.07*** (2.52) | 16.99*** (2.4) | 2.70ns (2.46) |
| Bootstrap (1000) | | −19.92*** (3.09) | 11.48*** (4.37) | −6.41** (3.21) | −17.83*** 3.21 | 17.55*** 4.57 | 1.27*** 3.15 |
| Income/hour | NN M=3 | 10.35*** (2.56) | 13.28*** (2.58) | −11.22*** (2.79) | 13.4*** (2.78) | 21.83*** (3.36) | −11.21*** (2.79) |
| Bootstrap (1000) | | 11.38*** (2.64) | 14.02*** (5.04) | −11.45*** (2.99) | 16.92*** 2.75 | 21.28** 10.65 | −10.83*** 3.64 |

Table 5: Effect of TOE and technical training: nearest neighbor matching with analytical standard errors (Abadie and Imbens)
| Outcome indicators | PSM methods | Effect of TOE |
|--------------------|-------------|---------------|
|                    |             | 2019–20       | Shock period |
|                    |             | CL  | RWS  | SE   | CL  | RWS  | SE   |
| Income/hour NNM = 3|              | 20.67*** (3.29) | 18.65*** (2.53) | −19.92*** (3.81) | 23.82*** (3.57) | 19.92*** (5.53) | −20.86*** (3.24) |
| Bootstrap (1000)   |              | 19.50*** (3.05) | 16.71*** (8.39) | −22.19*** (7.89) | 20.47*** (3.74) | 22.17*** (10.23) | −23.09*** (5.54) |

Shock period means workforce interviewed during Apr–June 2020 quarter. Standard errors given in parenthesis.

*CL* casual labor, *RWS* regular wage/salaried, *SE* self-employed, *NNM* nearest neighborhood matching, *ns* not significant

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
the counterfactual. We use propensity score matching (PSM) and coarsened exact matching (CEM) to estimate the effects of TOE based on three rounds of PLFS. Results show that self-employed among urban workers earn about Rs 35 to 93 less per day and per capita expenditure of urban casual laborer is lower by about Rs 5 per day. Appendix Tables 12 estimates also show that technical training does matter even for casual labor and self-employed in India’s urban workforce. Urban workers with technical training are 5% less likely to be poor.

Table 6 shows that being a casual labor is associated with wages that are on average INR 56 lower per day in 2017–18 and 77 lower per day in 2018–19 i.e., about 15 to 20% less than the mean wage. Not only that, but casual laborer also gets work for less hours per week. The combination of lower wage rate and fewer working hours ultimately results in lower earnings. Similarly estimates from PSM, Appendix Table 13 show that technical training does matter even for casual labor and self-employed in India’s urban workforce. Workers with technical training are less likely to be poor.

Hence, we do find that being a casual labor or being self-employed significantly affects the probability of being urban poor. This probability is also a function of gender and caste of the worker. Since one of the expected impacts of any labor market shock would be shrinkage in the number of hours available to work, we also assess the “possible impact” of hours worked on earnings by estimating a dose response function (DRF) from Generalized Propensity Score Matching for working hours conjecturing that hour worked would likely shrink at least for some TOE in face of a shock. Estimates show significant positive association for urban casual labor and self-employed between hours worked and earning.

In all these exercises, the estimated effects could be different from the true “impacts” owing to the inability to account for unobserved factors like skill and motivation which are quite pertinent for labor market outcomes. We did generate Rosenbaum bounds in case of Propensity Score Matching estimates to see the possible extent of bias due to unobserved factors (see the appendix material). Tables 14 and 15 in the appendix provide results of PSM for the same counterfactual assessment that has been done for CEM. Tables 16, 17, 18 in the appendix material provide estimates and detailed discussion on Rosenbaum bounds approach for 2019–20.

Borowczyk-Martins and Lalé (2020) show that the share of workers employed part-time increases in economic downturns. This is partly because part-time jobs are more prevalent in sectors with lower sensitivity to business cycles. In stressed labor markets, there are reductions in working hours in jobs and that is part of adjustment to shock beyond casualization of labor.

With a shock, when economic output declines, it will lead to job losses, lower incomes, and can potentially increase poverty. The direct impacts can lead to other short-and medium-term effects in the labor market. Job losses affect future earnings due to interruptions, productivity loss, de-skilling with prolonged unemployment spells and missed opportunities to build human capital on the job (Fasih et al., 2020). Skills can protect against joblessness and protect against fall in earnings during shocks for certain TOE. Skilled labor can also better adapt to the changing needs of employment (for example—utilize digital technology).
### Table 6: Employment status and labor market outcomes—coarsened exact matching estimates

| Treatment Variable | Outcome variable | Effect of TOE 2017–18 |  |  |  | Effect of TOE 2018–19 |  |  |  |
|--------------------|-----------------|------------------------|---|---|---|------------------------|---|---|---|
| Poverty status     | Coef            | −0.001 (0.006)         | −0.030*** (0.006) | 0.079*** (0.010) | Coef            | 0.001 (0.003)         | −0.020*** (0.003) | 0.072*** (0.007) |
| Wage/day           | Coef            | −56.024*** (9.293)     | 125.475*** (10.841) | −36.102*** (6.638) | Coef            | −77.362*** (5.303)     | 144.221*** (6.378) | −12.652*** (3.846) |
| Hours/week         | Coef            | −0.459* (0.260)        | 4.773*** (0.284)   | −9.389*** (0.395)  | Coef            | 0.236 (0.161)          | 2.715*** (0.182)   | −7.485*** (0.255) |
| Per capita expenditure | Coef        | −5.721*** (1.918)     | 6.322*** (1.777)   | −10.282*** (1.168) | Coef            | −3.011*** (0.912)      | 7.802*** (0.888)   | −10.082*** (0.830) |
| Income/hour        | Coef            | −10.494*** (1.251)    | 9.959*** (1.478)   | 15.578*** (1.483)  | Coef            | −15.459*** (0.840)     | 15.721*** (1.504)  | 17.268*** (1.132) |
| Explanatory variable control | Yes         | Yes                    | Yes               | Yes               | Explanatory variable control | Yes         | Yes                    | Yes               | Yes               |
| District fixed effect | Yes         | Yes                    | Yes               | Yes               | Shock period 2019–20 | Yes         | Yes                    | Yes               | Yes               |
| Clustering at FSU level | Yes         | Yes                    | Yes               | Yes               | Treatment Variable | CL^a  | SE^a  | RWS^a  | CL^a  | SE^a  | RWS^a  | CL^a  | SE^a  | RWS^a  |
| Poverty status     | Coef            | 0.070*** (0.008)       | −0.005 (0.006)     | −0.018*** (0.003)  | Coef            | 0.071*** (0.009)       | 0.001 (0.005)      | −0.015*** (0.004) |
| Wage/day           | Coef            | 6.865 (4.481)          | −84.482*** (5.343) | 141.217*** (7.138) | Coef            | 4.172 (5.825)          | −89.957*** (7.166) | 138.783*** (8.470) |
| Hours/week         | Coef            | −7.100*** (0.266)      | −0.731*** (0.189)  | 3.944*** (0.190)   | Coef            | −6.846*** (0.382)      | −1.151*** (0.228)  | 4.376*** (0.254) |
| Per capita expenditure | Coef        | −11.044*** (0.851)    | −2.892*** (1.080)  | 5.184*** (1.420)   | Coef            | −11.540*** (0.970)     | −2.783*** (1.399)  | 4.318*** (1.774) |
| Income/hour        | Coef            | 20.681*** (1.474)      | −15.946*** (0.944) | 11.184*** (2.391)  | Coef            | 23.198*** (2.556)      | −17.407*** (1.331) | 7.974*** (3.790) |
| Explanatory variable control | Yes         | Yes                    | Yes               | Yes               | Explanatory variable control | Yes         | Yes                    | Yes               | Yes               |

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Note: CL^a, SE^a, and RWS^a indicate coefficients, standard errors, and robust standard errors, respectively.
| Treatment Variable | Effect of TOE 2019–20 | Shock period |
|--------------------|------------------------|--------------|
|                    | CL\textsuperscript{a}  | SE\textsuperscript{a} | RWS\textsuperscript{a} | CL\textsuperscript{a} | SE\textsuperscript{a} | RWS\textsuperscript{a} |
| Outcome variable   | Coef                   | Coef         | Coef                  | Coef                   | Coef         | Coef                  |
| District fixed effect | Yes                    | Yes          | Yes                   | Yes                    | Yes          | Yes                   |
| Clustering at FSU level | Yes                    | Yes          | Yes                   | Yes                    | Yes          | Yes                   |

Source: Author's estimates from PLFS 2017–18, 2018–19 and 2019–20

\textit{CL} casual labor, \textit{RWS} regular wage/salaried, \textit{SE} self-employed

\textsuperscript{a}(1 = Yes; 0 = Otherwise); Shock period means workforce interviewed during Apr–June 2020 quarter. Robust standard errors in parentheses

\(***p < 0.01, **p < 0.05, *p < 0.1\)
Since job search entails utilizing personal and institutional networks, educated workers are also better able to seek and process information about job opportunities. This implies that those lacking skills and restricted networks may suffer. Evidence exists from several earlier crises that less educated workers tend to take lower-paying jobs during a crisis, while more advantaged graduates tend to switch to better jobs more quickly. Real time surveys from the UK, US, Germany, Japan, and Canada show that the young, less educated workers, women, and minorities are for example also more affected by the recent COVID-19 shock.

5.1 Hours worked and earnings: estimates from generalized propensity score matching

We further estimate the relationship between hours worked and outcomes such as wages and earnings (per capita daily expenditure). The question that we address here is the following: what is the relationship between hours worked and income and the likelihood of being poor?

Obviously, answer to this question would vary by TOE—a stratification that we maintain in our analysis. The DRF establish the ranges in which hours worked is effective in influencing earnings and poverty status. Based on the estimated DRFs for different ranges of hours worked, casual labor and self-employed have the highest returns to hours worked in terms of per capita daily expenditure after a threshold (Fig. 7).

Hours worked for the lowest earning workers are quite important for maintaining a standard of living. Any reduction in hours worked that is likely in economic downturn can have significant negative effects on these workers. Other salient features of DRFs are: (i) these are estimated comparatively precisely with thin confidence intervals (ii) At high level of hours of work, DRFs are with wider intervals because of fewer observations.

5.2 Assessing job shifts and joblessness

Until now we have assessed the effects on workers in different TOE and the effects of hours worked. One of the principal effects of being in certain TOE is likelihood of job loss and its effects. Towards addressing the effects of losing jobs, we uniquely employ the panel data from the urban sample of PLFS to analyze the temporariness in work and high frequency of switching jobs.

Looking at frequent movement in and out of job and movement across jobs, its determinants and effects on outcomes can only be done using longitudinal data that the urban sample of PLFS provides. The urban panel of PLFS to the best of our knowledge has surprisingly not been used in any study to assess the short-term dynamics in urban labor market, relating to the issues of job loss or switching. Such labor market dynamics would not be possible in the NSS employment surveys.

In PLFS, subsample of the urban panel was revisited 2–4 times in a year based on their inclusion in each quarter labeled as panel 2, panel 3 and panel 4, respectively. Table 7 shows the pace of transition in urban labor market. Within merely a year, as much as 6–7% labor in low paying jobs switches status (shifting from workforce to non-workforce). This includes becoming jobless as well. In absolute terms, the
Casual Labor

Self-employed

Fig. 7 Impact of hours worked per day on per capita daily expenditure PLFS 2019–20. Source: Author’s estimates from PLFS
numbers are particularly striking with over 4–6 million workers (one quarter female and rest male) becoming jobless in urban sector within a year across all rounds of PLFS. The job shifts and joblessness was seen becoming worse during shocks like COVID-19. About 17% of workforce shift their job from workforce to non-force during shock period and in number close to 4 million lost their jobs in urban sector.

Table 8 (column 2 and 3) assesses the impact of changing status from in job to out of job status after controlling for worker and industry affiliation fixed effects. The effects on incomes are compounded by absence of any unemployment insurance in India. The costs of losing jobs are likely to be quite high from a development perspective as many of these job switching workers are precariously close to poverty to begin with. Depending on the duration of joblessness, the loss in earnings per day for a large majority is estimated to be higher than the living wage of INR 375/day determined by the Government of India.

The impacts of losing job are along the expected lines, earnings (in levels), smallest for casual labor but highest in percentage terms. Columns 4 and 5 of Table 8 look at outcomes after reentry into the labor force. Depending on the duration of joblessness (captured by transition based on panel 2,3 or 4), the impact is that reentry wages are comparatively small, during shock period i.e., expected as reentry here is most likely under distress and thus with lower wage bargaining power.

| Table 7 | Transition in jobs and joblessness in urban workforce |
|---|---|---|---|---|
| Categories | Unit | Panel 2 | Panel 3 | Panel 4 |
| Worker status—panel sample | Transition rate (%) | 11.8 | 15.3 | 16.6 |
| # of workforce (Mn) | 14.9 | 12.6 | 15.7 |
| Worker status—shock period | Transition rate (%) | 20.8 | 23.3 | 25.7 |
| # of workforce (Mn) | 4.2 | 4.9 | 5.0 |
| Shifting from workforce to non-workforce—panel sample | Transition rate (%) | 7.0 | 7.4 | 6.1 |
| # of workforce (Mn) | 4.4 | 4.5 | 5.8 |
| Male share (%) | 72.4 | 73.8 | 69.4 |
| Female share (%) | 27.6 | 26.2 | 30.6 |
| Shifting from workforce to non-workforce—shock period | Transition rate (%) | 17.5 | 17.8 | 17.2 |
| # of workforce (Mn) | 3.5 | 3.7 | 3.4 |
| Male share (%) | 75.2 | 77.0 | 74.7 |
| Female share (%) | 24.8 | 23.0 | 25.3 |

(i) Panel 2: subsample interviewed 2 times (quarter) in urban sample, (ii) Panel 3: subsample interviewed 3 times, (iii) Panel 4: subsample interviewed 4 times, (iv) transition rate—labor workforce shifting from existing status to new status, (v) Mn—million

Source: PLFS Urban unit level data 2017–18, 2018–19 and 2019–20

Worker status is classified as following: (a) self employed, (b) regular/salaried, (c) casual labor, (d) sickness, (e) seeking work, (f) domestic/education, (g) others/pensioners

Shock period means workforce interviewed during Apr–June 2020 quarter and who have been interviewed before in any quarter

6 Effects of transitions have also been estimated across occupations. They follow the three conjectures listed above and are available upon request.
Table 8 Impact of transition on wage per day (in Rupees)

| Panel       | In job to out of job status | Re-entry to the labor force | 
|-------------| ----------------------------|----------------------------|
|             | (1 = Shift from labor force to out of work 0 = Otherwise) | (1 = Shift from out of work to labor force; 0 = Otherwise) |
|             | Panel sample | Shock Period | Panel sample | Shock period |
| 1           | 2            | 3            | 4            | 5            |
| Panel 2     | −40.144*** (5.964) | −26.579*** (7.947) | −124.715*** (7.689) | −102.863*** (18.400) |
| Panel 3     | −46.767*** (6.246) | −38.692*** (8.620) | −103.267*** (6.934) | −55.803*** (18.115) |
| Panel 4     | −40.760*** (4.586) | −38.097*** (7.543) | −95.820*** (5.130) | −60.917*** (14.366) |
| Explanatory variable control | Yes | Yes | Yes | Yes |
| Industry fixed effect | Yes | Yes | Yes | Yes |
| Quarter fixed effect | Yes | Yes | Yes | Yes |
| Clustering at FSU level | Yes | Yes | Yes | Yes |

Source: PLFS Urban unit level data 2017–18, 2018–19 and 2019–20

Robust standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1
One of the most pressing economic challenges that India would face post large shocks like COVID-19 could be increasing income inequality. Looking at worker and employment characteristics, less well-off workers will be disproportionately affected. Additionally, contrary to the more affluent class, poorer laborers tend to have very low or no savings and limited access to credit.

We conduct a summary examination of likely distributional effects of a shock given the distribution of TOE, finding that the effects could exacerbate wage inequality. This includes minimizing employment prospects for the most vulnerable, low-skilled workers with low bargaining power and no job protection. Our analysis suggests that in the absence of attempts to protect the most vulnerable segments of workforce in India, labor market shocks could end up with significant aggravation of inequality that is related to TOE.

Table 9 gives the percentile ratios across income distribution for different types of employment and Fig. 8 gives the measure of inequality over the entire distribution in the form of Lorenz curve. Within the group of casual labor there is less inequality with majority being similarly poor. Ratios like 90–10 or 90–50 are much higher for RWS and self-employment class. With after-effects of shocks, more than within class inequality, across class inequality might be more affected implying a greater divide between rich and poor in the labor force in India.

The wage compression, demand shocks, losses from enterprise and unemployment happen differently across sectors and occupation due to shocks like the pandemic. The containment measures can aggravate both within and across income class inequality. The job loss and reduced incomes will have a negative feedback loop on aggregate demand.
which would further worsen the labor market outcomes. These effects would occur in diverse ways based on sectoral, occupational, worker and location heterogeneity.

7 Conclusions and policy options

The objective of this paper was to evaluate the possible impact of types of employment on outcomes for labor in India. We assess significant differences in worker outcomes by type of employment in wages, working hours and earning. Heterogeneity of workers by education, caste and class augments the differences in outcomes in the labor markets. Given the TOE, when hit by shocks, sharp increases in unemployment and enterprise closures can be anticipated given the TOE and there is significant likelihood of transient poverty particularly for certain TOE, losing jobs or having the work hours affected. The effects are also gendered and socially differentiated with women and lower caste wage earnings consistently lower in each TOE.

There are several possible policy options that follow for meeting the challenges in the labor market. The policies need to be customized for each TOE. Formalism and access to credit are important determinants for the self-employed workforce. The government would need to take a sectoral and occupation-based approach in identifying the most affected with changes and adopting strategies for reengaging and bringing reentry into the labor force accordingly. Towards this, the government might need to monitor the entry barriers in the labor market that force certain types of employment.

Understanding the importance of skill for earnings and resilience in the labor market preventing joblessness as assessed, given the size and heterogeneity of India’s labor force, large scale skills program can be recommended for movement across types of employment. The current level of training and skill development in India’s workforce is subpar particularly confining a vast majority to casual labor and distress driven entrepreneurship. Bandiera et al (2017) show how (i) poor can take on the work activities of the nonpoor but face barriers in doing so, and (ii) interventions that remove these barriers lead to sustainable poverty reduction. The authors find that credit and skill transfer programs transform the labor activity choices of ultra-poor women, important lessons for the labor market of India studied here.

Over the longer term the government might have to think about unemployment insurance and other similar support systems in India like comparatively rich countries. This is not a comprehensive list, and each policy in a poor country like India involves tradeoffs with budgetary implications and work incentives. Consider the recent large shock like COVID-19. Some countries such as Germany and Denmark adopted measures allowing workers to remain on their employers’ payroll during the COVID crisis despite working zero or reduced hours. In India with casual labor and self-employment at the scale that they are, there are physical limits to implementing anything similar. The health insurance schemes are also not in place tied to employment as in developed countries. The government would have little fiscal space for such policies unless economic growth is high and after the shock rebounds in a significant way.

There are other effects of types of employment that are beyond the scope of this paper such as occupational hazard or violence in workplace that could rise with stresses associated with types of employment. This work opens the field to the
question of the evaluation of policies that can be studied in future research for the complex labor market of India for identifying the effects of type of employment and trying to address them.

Appendix

See Tables 10, 11, 12, 13, 14, 15, 16, 17 and 18.
### Table 10  Sample size from urban panel

| # of times | Panel 2 | Panel 3 | Panel 4 | Total   |
|------------|---------|---------|---------|---------|
| 1          | 142,956 | 142,586 | 200,056 | 485,598 |
| 2          | 142,956 | 142,586 | 200,056 | 485,598 |
| 3          | 0       | 142,586 | 200,056 | 342,642 |
| 4          | 0       | 0       | 200,056 | 200,056 |
| Total      | 285,912 | 427,758 | 800,224 | 1,513,894 |

(i) Panel 2: subsample interviewed 2 times (quarter) in Urban sample, (ii) Panel 3: subsample interviewed 3 times, (iii) Panel 4: subsample interviewed 4 times

### Table 11  Testing of equality of proportions between vulnerable category and poverty line (Tendulkar based)

| Vulnerable occupation category | 2018–19 | 2019–20 |
|-------------------------------|---------|---------|
|                              | Chi square | p value | Chi square | p value |
| Base category: house keeping and restaurant services workers | 14.56 | 0.00 | 0.04 | 0.85 |
| Street vendors and related workers | 2.74 | 0.10 | 1.13 | 0.29 |
| Domestic and related helpers, cleaners | 0.03 | 0.86 | 0.12 | 0.73 |
| Building caretakers, window and related | 1.11 | 0.29 | 2.58 | 0.11 |
| Messengers, porters, door keepers | 5.54 | 0.02 | 0.91 | 0.34 |
| Garbage collectors and related labor | 42.77 | 0.00 | 18.35 | 0.00 |
| Agricultural, fishery and related labor | 105.58 | 0.00 | 52.42 | 0.00 |
| Mining and construction labor | 0.45 | 0.50 | 0.00 | 0.95 |
| Manufacturing labor | 34.45 | 0.00 | 2.74 | 0.10 |
| Transport labor and freight handler | 2.86 | 0.09 | 0.92 | 0.34 |
| Travel attendants, guides and related workers | 0.12 | 0.73 | 5.26 | 0.02 |
| Personal care and related workers | 0.35 | 0.55 | 0.13 | 0.72 |
| Other personal services workers | 3.51 | 0.06 | 2.07 | 0.15 |
| Shop salespersons and demonstrators | 7.62 | 0.01 | 0.72 | 0.40 |

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Table 12 Effect of technical training: nearest neighbor matching with analytical standard errors (Abadie and Imbens) for 2018–19 and 2019–20

| Outcome indicators | PSM methods | Effect of technical training 2018–19 | Effect of technical training 2019–20 | Shock period |
|--------------------|-------------|--------------------------------------|--------------------------------------|--------------|
|                    |             | CL | RWS | SE | CL | RWS | SE | CL | RWS | SE |
| Poverty status (%) | NNM = 3     | −4.96** (2.56) | −10.38*** (1.15) | −3.46*** (1.12) | −4.90** (2.4) | −0.31** (0.91) | −2.20*** (1.06) | −3.60** (2.34) | 1.48* (0.86) | 1.03ns (1.08) |
|                     | Bootstrap (1000) | −4.59** (4.14) | −9.03*** (1.48) | −2.72** (2.07) | −4.85** (3.93) | 0.06** (1.36) | −1.94** (1.91) | −1.11ns (3.91) | 1.49** (1.27) | 2.33** (1.76) |
| Wage/day (in INR)   | NNM = 3     | −27.93** (19.75) | 29.71ns (25.54) | 12.51ns (21.34) | 27.31*** (9.46) | −7.61*** (27.29) | 1.54** (15.16) | 15.22ns (10.61) | −9.25** (27.93) | 15.00** (15.64) |
|                     | Bootstrap (1000) | 14.72** (15.39) | 15.11ns (29.81) | 29.53ns (28.22) | 18.65ns (20.38) | 18.90ns (35.49) | 5.04** (32.32) | 9.92ns (23.51) | −19.63ns (32.65) | 2.78** (25.11) |
| Hours/week (in hours) | NNM = 3 | −13.81*** (0.95) | 5.74*** (0.76) | 3.03*** (0.63) | 0.32ns (0.87) | 2.19*** (0.51) | 0.02ns (0.65) | 0.23ns (0.91) | 1.51*** (0.5) | −0.62ns (0.64) |
|                     | Bootstrap (1000) | −2.36ns (1.50) | 6.67** (0.72) | 3.31** (0.89) | 1.20** (1.49) | 2.80** (0.73) | 0.80ns (0.89) | −0.76ns (1.55) | 1.85** (0.75) | −0.87ns (0.9) |
| Per capita expenditure (in INR) | NNM = 3 | −9.08*** (3.07) | 24.38*** (3.68) | 4.13ns (2.47) | 7.30*** (2.39) | 13.68*** (4.29) | 1.50** (3.53) | 7.14** (2.4) | 13.31*** (3.96) | 2.14% (3.3) |
|                     | Bootstrap (1000) | 2.87ns (2.89) | 19.81*** (5.51) | 5.44** (3.48) | 6.05** (3.58) | 11.61** (6.31) | 5.27** (3.89) | 4.90** (3.74) | 14.38*** (6.33) | 3.49** (3.63) |
| Income/hour         | NNM = 3     | 23.3** (3.84) | 12.35** (12.04) | −0.28ns (3.19) | 12.60** (5.54) | −5.32** (4.33) | 0.10ns (2.08) | 8.00** (6.97) | −4.30** (4.4) | 2.24% (2.13) |
|                     | Bootstrap (1000) | 10.92** (9.71) | −10.84*** (4.64) | 2.09** (3.93) | 15.51** (27.86) | −7.78** (4.99) | −0.61ns (3.97) | 8.30** (53.76) | −8.78** (4.49) | 1.38** (4.27) |

Shock period means workforce interviewed during Apr–June 2020 quarter. Standard errors given in parenthesis.

*CL* casual Labor, *RWS* regular wage/salaried, *SE* self-employed, *NNM* nearest neighborhood matching, *ns* not significant

***p < 0.01, **p < 0.05, *p < 0.1
Table 13  Effect of technical training on outcome indicators—using coarsened exact matching

| Treatment variable | 2018–19 |  |  | 2019–20 |  |  | Shock period |  |  |  |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                     | CL<sup>a</sup> | SE<sup>a</sup> | RWS<sup>a</sup> | CL<sup>a</sup> | SE<sup>a</sup> | RWS<sup>a</sup> | CL<sup>a</sup> | SE<sup>a</sup> | RWS<sup>a</sup> |
| Outcome variable   | Coef    | Coef    | Coef    | Coef    | Coef    | Coef    | Coef    | Coef    | Coef    |
| Poverty status     | −0.019*** (0.005) | −0.014*** (0.003) | −0.021* (0.012) | −0.026** (0.013) | −0.021*** (0.005) | −0.007*** (0.003) | −0.028** (0.013) | −0.013*** (0.004) | −0.003 (0.003) |
| Wage/day           | 14.500 (15.219) | 30.878*** (11.236) | 6.853* (3.751) | 6.978 (6.063) | −2.481 (7.871) | 11.094 (7.977) | 3.200 (8.571) | −2.468 (9.022) | 11.963 (8.291) |
| Hours/week         | 2.692*** (0.244) | 4.889*** (0.173) | 0.984* (0.562) | 0.620 (0.553) | −1.309*** (0.256) | −1.863*** (0.202) | 0.457 (0.607) | −1.239*** (0.286) | −2.216*** (0.210) |
| Per capita         | 2.503** (1.018) | 5.487*** (1.765) | 3.267*** (1.061) | 3.431** (1.557) | 1.870* (1.075) | 2.749* (1.587) | 3.710** (1.473) | −0.631 (1.162) | −0.688 (2.073) |
| expenditure        | Income/hour | 0.008 (2.555) | −4.208** (1.788) | 0.235 (2.886) | −2.024 (6.766) | 0.764 (1.178) | 5.864*** (1.249) | −22.812 (15.274) | 0.094 (1.660) | 6.810*** (1.284) |
| Explanatory        | Yes      | Yes      | Yes      | Yes      | Yes      | Yes      | Yes      | Yes      | Yes      |
| variable control   | District fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Clustering at FSU level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Source: Author’s estimates from PLFS 2018–19 and 2019–20

CL casual labor, RWS regular wage/salaried, SE self-employed

Robust standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1

<sup>a</sup>(1 = Yes; 0 = Otherwise); Shock period means workforce interviewed during Apr-June 2020 quarter
### Table 14: Effect of employment status on poverty/income/productivity/working hours using PSM Model (2018–19)

| Outcome indicators | Methods | Casual labor | Regular wage/salaried | Self employed |
|--------------------|---------|--------------|------------------------|---------------|
|                    |         | T | C | D | SE | T-Stat | T | C | D | SE | T-Stat | T | C | D | SE | T-Stat |
| Poverty | Kernel bandwidth (0.01) | 21.44 | 12.78 | 8.66 | 0.28 | 30.51 | 6.03 | 10.40 | -4.37 | 0.16 | -26.68 | 10.17 | 9.57 | 0.60 | 0.16 | 3.78 |
|         | Kernel bandwidth (0.05) | 21.44 | 12.61 | 8.82 | 0.28 | 31.20 | 6.03 | 10.48 | -4.45 | 0.16 | -27.82 | 10.17 | 9.56 | 0.61 | 0.16 | 3.93 |
|         | NNM = 1 | 21.44 | 13.44 | 8.00 | 2.55 | 3.14 | 6.03 | 8.54 | -2.51 | 1.88 | -1.34 | 10.17 | 13.59 | -3.42 | 1.79 | -1.91 |
|         | NNM = 3 | 21.44 | 14.68 | 6.75 | 1.47 | 4.58 | 6.03 | 8.58 | -2.55 | 1.08 | -2.36 | 10.17 | 13.71 | -3.54 | 1.02 | -3.46 |
|         | NNM = 5 | 21.44 | 14.33 | 7.10 | 1.17 | 6.06 | 6.03 | 9.72 | -3.69 | 0.87 | -4.25 | 10.17 | 12.95 | -2.78 | 0.79 | -3.53 |
|         | Radius Caliper (0.01) | 21.44 | 12.74 | 8.69 | 0.28 | 30.63 | 6.03 | 10.45 | -4.43 | 0.16 | -26.99 | 10.17 | 9.59 | 0.58 | 0.16 | 3.67 |
|         | Radius Caliper (0.05) | 21.44 | 12.51 | 8.92 | 0.28 | 31.58 | 6.03 | 10.52 | -4.49 | 0.16 | -28.37 | 10.17 | 9.55 | 0.63 | 0.16 | 4.03 |
|         | Local linear regression (0.05) | 21.44 | 12.82 | 8.61 | 2.55 | 3.38 | 6.03 | 10.34 | -4.31 | 1.88 | -2.30 | 10.17 | 9.65 | 0.52 | 1.79 | 0.29 |
|         | Bootstrap (1000) | 8.00 | 2.87 | 0.01 | -2.51 | 1.77 | 0.16 | -3.42 | 1.49 | 0.02 |
| Outcome indicators | Methods                          | Casual labor          | Regular wage/salaried | Self employed   |
|--------------------|----------------------------------|-----------------------|-----------------------|-----------------|
|                    |                                  | T  | C   | D   | SE | T-Stat | T  | C   | D   | SE | T-Stat | T  | C   | D   | SE | T-Stat |
| Wage per day       | Kernel bandwidth (0.01)          | 322.22 | 356.50 | 34.29 | 2.57 | −13.36 | 559.24 | 390.13 | 169.10 | 3.40 | 49.78 | 392.15 | 451.58 | −59.43 | 3.32 | −17.90 |
|                    | Kernel bandwidth (0.05)          | 322.22 | 360.58 | 38.37 | 2.51 | −15.27 | 559.24 | 387.80 | 171.44 | 3.32 | 51.66 | 392.15 | 453.65 | −61.50 | 3.29 | −18.67 |
|                    | NNM = 1                          | 322.22 | 370.19 | 47.98 | 28.21 | −1.70 | 559.24 | 388.58 | 170.65 | 24.43 | 6.99 | 392.15 | 449.34 | −57.19 | 29.45 | −1.94 |
|                    | NNM = 3                          | 322.22 | 384.80 | 62.58 | 16.31 | −3.84 | 559.24 | 392.46 | 166.77 | 13.19 | 12.64 | 392.15 | 442.26 | −50.11 | 17.46 | −2.87 |
|                    | NNM = 5                          | 322.22 | 381.00 | 58.78 | 13.03 | −4.51 | 559.24 | 396.70 | 162.53 | 10.36 | 15.69 | 392.15 | 435.54 | −43.40 | 13.25 | −3.27 |
|                    | Radius Caliper (0.01)            | 322.22 | 356.27 | 34.06 | 2.57 | −13.26 | 559.24 | 388.78 | 170.46 | 3.40 | 50.15 | 392.15 | 450.76 | −58.61 | 3.32 | −17.64 |
|                    | Radius Caliper (0.05)            | 322.22 | 363.66 | 41.45 | 2.49 | −16.67 | 559.24 | 390.38 | 168.86 | 3.28 | 51.43 | 392.15 | 454.77 | −62.62 | 3.29 | −19.06 |
|                    | Local linear regression (0.05)   | 322.22 | 361.59 | 39.37 | 28.21 | −1.40 | 559.24 | 386.34 | 172.89 | 24.43 | 7.08 | 392.15 | 444.61 | −52.46 | 29.45 | −1.78 |
|                    | Bootstrap (1000)                 | −47.98 | 18.85 | 0.01 |     |     | 170.85 | 66.56 | 0.01 |     |     | −57.19 | 20.05 | 0.00 |      |      |
| Outcome indicators     | Methods                        | Casual labor | Regular wage/salaried | Self employed |
|------------------------|--------------------------------|--------------|-----------------------|---------------|
|                        | T     | C     | D     | SE   | T-Stat | T     | C     | D     | SE   | T-Stat | T     | C     | D     | SE   | T-Stat |
| Hours per week         |       |       |       |      |        |       |       |       |      |        |       |       |       |      |        |
| Kernel bandwidth (0.01)| 43.85 | 53.16 | -9.30 | 0.10 | -90.13 | 52.40 | 48.80 | 3.60  | 0.07 | 49.29  | 52.60 | 51.81 | 0.80  | 0.07 | 11.36 |
| Kernel bandwidth (0.05)| 43.85 | 53.12 | -9.26 | 0.10 | -90.20 | 52.40 | 48.83 | 3.57  | 0.07 | 50.05  | 52.60 | 51.80 | 0.81  | 0.07 | 11.59 |
| NNM = 1                | 43.85 | 52.27 | -8.42 | 1.15 | -7.33  | 52.40 | 48.36 | 4.04  | 1.07 | 3.78   | 52.60 | 53.04 | -0.44 | 0.68 | -0.64 |
| NNM = 3                | 43.85 | 52.42 | -8.56 | 0.66 | -12.93 | 52.40 | 49.22 | 3.18  | 0.59 | 5.36   | 52.60 | 51.91 | 0.70  | 0.40 | 1.74  |
| NNM = 5                | 43.85 | 52.39 | -8.54 | 0.52 | -16.28 | 52.40 | 49.43 | 2.97  | 0.46 | 6.49   | 52.60 | 51.54 | 1.06  | 0.32 | 3.33  |
| Radius Caliper (0.01)  | 43.85 | 53.17 | -9.32 | 0.10 | -90.23 | 52.40 | 48.78 | 3.62  | 0.07 | 49.57  | 52.60 | 51.78 | 0.82  | 0.07 | 11.69 |
| Radius Caliper (0.05)  | 43.85 | 53.09 | -9.23 | 0.10 | -90.07 | 52.40 | 48.95 | 3.45  | 0.07 | 48.88  | 52.60 | 51.80 | 0.81  | 0.07 | 11.64 |
| Local linear regression (0.05) | 43.85 | 53.13 | -9.28 | 1.15 | -8.08  | 52.40 | 48.65 | 3.75  | 1.07 | 3.51   | 52.60 | 51.73 | 0.87  | 0.68 | 1.28  |
| Bootstrap (1000)        | -8.42 | 0.94  | 0.00  | 4.04 | 0.87   | 0.00  | -0.44 | 0.68  | 0.52 |
| Outcome indicators            | Methods                | Casual labor | Regular wage/salaried | Self employed |
|------------------------------|------------------------|--------------|-----------------------|---------------|
| Per capita expenditure       | Kernel bandwidth (0.01)| T  | C | D | SE | T-Stat | T  | C | D | SE | T-Stat | T  | C | D | SE | T-Stat |
|                              | 54.83                  | 69.80        | −14.96                | 0.32          | −46.19      | 99.90 | 84.52 | 15.38 | 0.34 | 44.63 | 79.89 | 83.94 | −4.05 | 0.37 | −11.05 |
|                              | Kernel bandwidth (0.05)| 54.83        | 70.61                 | −15.78        | 0.32        | −49.48 | 99.90 | 84.01 | 15.88 | 0.34 | 46.77 | 79.89 | 84.09 | −4.20 | 0.36 | −11.64 |
|                              | NNM = 1                | 54.83        | 72.66                 | −17.83        | 4.63        | −3.85  | 99.90 | 82.38 | 17.52 | 4.33 | 4.04  | 79.89 | 78.63 | 1.27  | 4.31 | 0.29  |
|                              | NNM = 3                | 54.83        | 72.91                 | −18.07        | 2.52        | −7.18  | 99.90 | 82.90 | 16.99 | 2.40 | 7.09  | 79.89 | 77.19 | 2.70  | 2.46 | 1.10  |
|                              | NNM = 5                | 54.83        | 71.87                 | −17.04        | 2.00        | −8.50  | 99.90 | 83.65 | 16.25 | 1.84 | 8.85  | 79.89 | 76.65 | 3.25  | 1.98 | 1.64  |
|                              | Radius Caliper (0.01)  | 54.83        | 69.82                 | −14.99        | 0.32        | −46.21 | 99.90 | 84.19 | 15.71 | 0.34 | 45.57 | 79.89 | 83.89 | −4.00 | 0.37 | −10.90 |
|                              | Radius Caliper (0.05)  | 54.83        | 71.11                 | −16.28        | 0.32        | −51.44 | 99.90 | 83.90 | 15.99 | 0.34 | 47.40 | 79.89 | 84.22 | −4.33 | 0.36 | −12.05 |
|                              | Local linear regression (0.05) | 54.83 | 70.97                | −16.14  | 4.63 | −3.48 | 99.90 | 84.67 | 15.23 | 4.33 | 3.51 | 79.89 | 83.43 | −3.54 | 4.31 | −0.82 |
|                              | Bootstrap (1000)        | −17.83       | 3.21                  | 0.00         | 17.55       | 4.57  | 0.00  | 1.27  | 3.15 | 0.69 |

Table 14 (continued)
Table 14 (continued)

| Outcome indicators | Methods                        | Casual labor | Regular wage/salaried | Self employed |
|--------------------|--------------------------------|--------------|-----------------------|---------------|
| Income per hour    | Kernel bandwidth (0.01)        | T: 66.58     | C: 48.12              | D: 18.46      | SE: 0.72      | T-Stat: 25.80 | T: 78.58 | C: 58.79 | D: 19.78 | SE: 0.58 | T-Stat: 33.86 | T: 52.15 | C: 66.56 | D: -14.41 | SE: 0.56 | T-Stat: -25.85 |
|                    | Kernel bandwidth (0.05)        | T: 66.58     | C: 48.71              | D: 17.87      | SE: 0.71      | T-Stat: 25.14 | T: 78.58 | C: 58.33 | D: 20.25 | SE: 0.57 | T-Stat: 35.53 | T: 52.15 | C: 66.85 | D: -14.70 | SE: 0.55 | T-Stat: -26.58 |
|                    | NNM = 1                        | T: 66.58     | C: 49.65              | D: 16.92      | SE: 4.19      | T-Stat: 4.04  | T: 78.58 | C: 57.32 | D: 21.26 | SE: 4.28 | T-Stat: 4.97 | T: 52.15 | C: 62.99 | D: -10.83 | SE: 4.52 | T-Stat: -2.40 |
|                    | NNM = 3                        | T: 66.58     | C: 53.18              | D: 13.40      | SE: 2.78      | T-Stat: 4.82  | T: 78.58 | C: 56.74 | D: 21.83 | SE: 3.36 | T-Stat: 6.49 | T: 52.15 | C: 63.36 | D: -11.21 | SE: 2.79 | T-Stat: -4.01 |
|                    | NNM = 5                        | T: 66.58     | C: 52.40              | D: 14.18      | SE: 2.17      | T-Stat: 6.53  | T: 78.58 | C: 57.25 | D: 21.33 | SE: 2.27 | T-Stat: 9.39 | T: 52.15 | C: 63.33 | D: -11.18 | SE: 2.13 | T-Stat: -5.24 |
|                    | Radius Caliper (0.01)          | T: 66.58     | C: 48.06              | D: 18.52      | SE: 0.72      | T-Stat: 25.87 | T: 78.58 | C: 58.62 | D: 19.96 | SE: 0.58 | T-Stat: 34.13 | T: 52.15 | C: 66.48 | D: -14.32 | SE: 0.56 | T-Stat: -25.68 |
|                    | Bootstrap (1000)               | T: 16.92     | C: 2.75               | D: 0.00       | SE: 21.28     | T-Stat: 10.65 | T: 52.15 | C: 65.70 | D: -13.55 | SE: 4.52 | T-Stat: -3.00 | T: -10.83 | C: 3.64  | D: 0.00   |

PSM Estimates for 2017–18 will be available upon request.

*T treatment, *C* control, *D* difference or average treatment on treated, *SE* standard error, *NNM* nearest neighborhood matching.
| Outcome indicators       | Methods                                                                 | Casual labor | Regular wage/salaried | Self employed |
|--------------------------|-------------------------------------------------------------------------|--------------|-----------------------|---------------|
|                          | T  | C  | D  | SE | T-Stat | T  | C  | D  | SE | T-Stat | T  | C  | D  | SE | T-Stat |
| Poverty Tendulkar         | 18.49 | 10.84 | 7.65 | 0.28 | 27.14 | 4.98 | 8.99 | −4.01 | 0.16 | −25.71 | 8.96 | 7.97 | 0.99 | 0.15 | 6.42  |
| Kernel bandwidth (0.01)  | 18.49 | 10.67 | 7.81 | 0.28 | 27.82 | 4.98 | 9.19 | −4.21 | 0.15 | −27.63 | 8.96 | 7.96 | 1.00 | 0.15 | 6.58  |
| Kernel bandwidth (0.05)  | 18.49 | 7.88  | 10.61 | 2.15 | 4.94  | 4.98 | 6.46 | −1.48 | 1.78 | −0.83  | 8.96 | 9.64 | −0.68 | 1.51 | −0.45 |
| NNM = 1                  | 18.49 | 6.66  | 11.83 | 1.25 | 9.46  | 4.98 | 6.58 | −1.60 | 1.05 | −1.52  | 8.96 | 8.90 | 0.06 | 0.86 | 0.07  |
| NNM = 3                  | 18.49 | 7.32  | 11.17 | 1.01 | 11.07 | 4.98 | 7.08 | −2.10 | 0.83 | −2.52  | 8.96 | 9.05 | −0.09 | 0.66 | −0.13 |
| NNM = 5                  | 18.49 | 10.90 | 7.59  | 0.28 | 26.92 | 4.98 | 9.00 | −4.02 | 0.16 | −25.73 | 8.96 | 7.99 | 0.97 | 0.15 | 6.26  |
| Radius Caliper (0.01)    | 18.49 | 10.61 | 7.87  | 0.28 | 28.06 | 4.98 | 9.27 | −4.29 | 0.15 | −28.35 | 8.96 | 7.95 | 1.00 | 0.15 | 6.64  |
| Radius Caliper (0.05)    | 18.49 | 10.81 | 7.67  | 2.15 | 3.57  | 4.98 | 9.05 | −4.07 | 1.78 | −2.28  | 8.96 | 8.09 | 0.87 | 1.51 | 0.57  |
| Local linear regression  | Bootstrap (1000)            | 10.61 | 2.60  | 0.00  | −1.48 | 1.57 | 0.34 | −0.68 | 1.40 | 0.63  |
Table 15 (continued)

| Outcome indicators | Methods                      | Casual labor | Regular wage/salaried | Self employed |
|--------------------|------------------------------|--------------|-----------------------|--------------|
|                    | T | C | D | SE | T-Stat | T | C | D | SE | T-Stat | T | C | D | SE | T-Stat |
| Wage per day       | Kernel bandwidth (0.01)      | 338.00       | 352.19                | −14.19      | 2.22 | −6.39 | 563.72 | 389.01 | 174.71 | 2.45 | 71.17 |
|                    | Kernel bandwidth (0.05)      | 338.00       | 355.77                | −17.77      | 2.18 | −8.16 | 563.72 | 381.58 | 182.14 | 2.42 | 75.24 |
|                    | NNM = 1                      | 338.00       | 360.57                | −22.57      | 37.68 | −0.60 | 563.72 | 410.06 | 153.66 | 24.53 | 6.26  |
|                    | NNM = 3                      | 338.00       | 361.32                | −23.32      | 19.72 | −1.18 | 563.72 | 403.61 | 160.11 | 15.67 | 10.22 |
|                    | NNM = 5                      | 338.00       | 364.80                | −26.80      | 14.60 | −1.84 | 563.72 | 406.26 | 157.46 | 11.40 | 13.82 |
|                    | Radius Caliper (0.01)        | 338.00       | 350.81                | −12.81      | 2.23 | −5.76 | 563.72 | 389.08 | 174.64 | 2.46 | 71.09 |
|                    | Radius Caliper (0.05)        | 338.00       | 359.11                | −21.11      | 2.16 | −9.76 | 563.72 | 380.54 | 183.18 | 2.41 | 76.07 |
|                    | Local linear regression (0.05)| 338.00       | 357.24                | −19.24      | 37.68 | −0.51 | 563.72 | 380.95 | 182.77 | 24.53 | 7.45  |
|                    | Bootstrap (1000)              | −22.57       | 19.02                 | 0.24        | 153.66 | 32.62 | 0.00  | −109.19 | 18.13 | 0.00  |
The table below provides outcomes indicators for different methods in two categories: Casual labor and Regular wage/salaried, as well as a separate category for Self employed. The table includes the following columns: T, C, D, SE, T-Stat. The methods listed are: Kernel bandwidth (0.01), Kernel bandwidth (0.05), NNM = 1, NNM = 3, NNM = 5, Radius Caliper (0.01), Radius Caliper (0.05), Local linear regression (0.05), and Bootstrap (1000).

| Outcome indicators | Methods                                      | Casual labor | Regular wage/salaried | Self employed |
|--------------------|----------------------------------------------|--------------|-----------------------|---------------|
|                    |                                              | T  | C    | D    | SE   | T-Stat | T  | C    | D    | SE   | T-Stat | T  | C    | D    | SE   | T-Stat |
| Hours per week     | Kernel bandwidth (0.01)                      | 44.42 | 52.95 | −8.52 | 0.11 | −77.94 | 53.11 | 48.77 | 4.34 | 0.08 | 57.16 | 51.67 | 52.27 | −0.60 | 0.08 | −7.80 |
|                    | Kernel bandwidth (0.05)                      | 44.42 | 52.93 | −8.51 | 0.11 | −78.26 | 53.11 | 48.72 | 4.38 | 0.07 | 59.02 | 51.67 | 52.33 | −0.66 | 0.07 | −8.81 |
|                    | NNM = 1                                      | 44.42 | 49.91 | −5.48 | 1.21 | −4.52 | 53.11 | 46.66 | 6.45 | 1.03 | 6.24 | 51.67 | 50.50 | 1.17  | 0.69 | 1.69 |
|                    | NNM = 3                                      | 44.42 | 50.88 | −6.46 | 0.68 | −9.55 | 53.11 | 47.97 | 5.14 | 0.59 | 8.75 | 51.67 | 50.86 | 0.81  | 0.41 | 1.98 |
|                    | NNM = 5                                      | 44.42 | 51.76 | −7.33 | 0.52 | −14.22 | 53.11 | 48.64 | 4.46 | 0.45 | 9.94 | 51.67 | 51.14 | 0.53  | 0.32 | 1.66 |
|                    | Radius Caliper (0.01)                        | 44.42 | 52.84 | −8.41 | 0.11 | −76.87 | 53.11 | 48.77 | 4.34 | 0.08 | 57.09 | 51.67 | 52.33 | −0.66 | 0.08 | −8.70 |
|                    | Radius Caliper (0.05)                        | 44.42 | 52.92 | −8.49 | 0.11 | −78.26 | 53.11 | 48.74 | 4.37 | 0.07 | 59.34 | 51.67 | 52.33 | −0.66 | 0.07 | −8.92 |
|                    | Local linear regression (0.05)               | 44.42 | 52.98 | −8.56 | 1.21 | −7.06 | 53.11 | 48.51 | 4.59 | 1.03 | 4.45 | 51.67 | 52.22 | −0.55 | 0.69 | −0.80 |
|                    | Bootstrap (1000)                              | −5.48 | 0.95  | 0.00  | 6.44 | 0.87  | 0.00  | 1.17 | 0.65 | 0.07 |
| Outcome indicators | Methods | Casual labor | Regular wage/salaried | Self employed |
|--------------------|---------|--------------|-----------------------|---------------|
|                    | T       | C            | D         | SE   | T-Stat | T       | C            | D         | SE   | T-Stat | T       | C            | D         | SE   | T-Stat |
| Per capita expenditure | Kernel bandwidth (0.01) | 57.89 | 73.66 | −15.77 | 0.37 | −42.06 | 104.78 | 89.83 | 14.95 | 0.40 | 37.35 | 83.09 | 88.46 | −5.37 | 0.44 | −12.30 |
|                     | Kernel bandwidth (0.05) | 57.89 | 74.60 | −16.72 | 0.37 | −45.42 | 104.78 | 88.48 | 16.31 | 0.39 | 41.30 | 83.09 | 88.54 | −5.44 | 0.43 | −12.75 |
|                     | NNM = 1 | 57.89 | 74.32 | −16.43 | 8.97 | −1.83 | 104.78 | 89.09 | 15.70 | 6.98 | 2.25 | 83.09 | 83.95 | −0.85 | 4.52 | −0.19 |
|                     | NNM = 3 | 57.89 | 74.23 | −16.34 | 5.12 | −3.19 | 104.78 | 91.96 | 12.82 | 4.03 | 3.18 | 83.09 | 82.50 | 0.60 | 2.70 | 0.22 |
|                     | NNM = 5 | 57.89 | 75.64 | −17.75 | 3.37 | −5.27 | 104.78 | 92.82 | 11.97 | 2.73 | 4.38 | 83.09 | 80.90 | 2.19 | 2.15 | 1.02 |
|                     | Radius Caliper (0.01) | 57.89 | 73.61 | −15.72 | 0.38 | −41.86 | 104.78 | 89.84 | 14.95 | 0.40 | 37.32 | 83.09 | 88.22 | −5.13 | 0.44 | −11.76 |
|                     | Radius Caliper (0.05) | 57.89 | 75.10 | −17.22 | 0.37 | −47.04 | 104.78 | 88.14 | 16.64 | 0.39 | 42.38 | 83.09 | 88.57 | −5.47 | 0.42 | −12.91 |
|                     | Local linear regression (0.05) | 57.89 | 75.04 | −17.15 | 8.97 | −1.91 | 104.78 | 89.62 | 15.16 | 6.98 | 2.17 | 83.09 | 87.71 | −4.62 | 4.52 | −1.02 |
|                     | Bootstrap (1000) | −16.43 | 3.33 | 0.00 | 15.68 | 4.73 | 0.00 | 83.09 | 87.71 | −4.62 | 4.52 | −1.02 | 83.09 | 87.71 | −4.62 | 4.52 | −1.02 |
Table 15 (continued)

| Outcome indicators | Methods                        | Casual labor | Regular wage/salaried | Self employed |
|--------------------|--------------------------------|--------------|-----------------------|---------------|
|                    |                                | T  | C  | D  | SE | T-Stat | T  | C  | D  | SE | T-Stat | T  | C  | D  | SE | T-Stat |
| Income per hour    | Kernel bandwidth (0.01)        | 71.19 | 47.56 | 23.63 | 1.34 | 17.61 | 78.10 | 59.21 | 18.89 | 0.54 | 34.69 | 50.01 | 66.78 | −16.77 | 0.54 | −30.87 |
|                    | Kernel bandwidth (0.05)        | 71.19 | 48.08 | 23.11 | 1.34 | 17.25 | 78.10 | 58.24 | 19.86 | 0.53 | 37.27 | 50.01 | 67.11 | −17.10 | 0.53 | −32.29 |
|                    | NNM = 1                        | 71.19 | 51.69 | 19.50 | 5.88 | 3.32  | 78.10 | 61.39 | 16.71 | 3.80 | 4.39  | 50.01 | 72.20 | −22.19 | 8.64 | −2.57  |
|                    | NNM = 3                        | 71.19 | 50.52 | 20.67 | 3.29 | 6.29  | 78.10 | 59.45 | 18.65 | 2.53 | 7.37  | 50.01 | 69.93 | −19.92 | 3.81 | −5.23  |
|                    | NNM = 5                        | 71.19 | 50.35 | 20.84 | 2.56 | 8.14  | 78.10 | 59.88 | 18.22 | 2.03 | 7.97  | 50.01 | 66.92 | −16.91 | 2.67 | −6.34  |
|                    | Radius Caliper (0.01)          | 71.19 | 47.43 | 23.76 | 1.34 | 17.71 | 78.10 | 59.19 | 18.91 | 0.55 | 34.68 | 50.01 | 66.63 | −16.61 | 0.54 | −30.60 |
|                    | Radius Caliper (0.05)          | 71.19 | 48.56 | 22.63 | 1.34 | 16.90 | 78.10 | 58.01 | 20.09 | 0.53 | 38.02 | 50.01 | 67.13 | −17.12 | 0.53 | −32.59 |
|                    | Local Linear Regression (0.05) | 71.19 | 48.27 | 22.92 | 5.88 | 3.90  | 78.10 | 58.94 | 19.16 | 3.80 | 5.04  | 50.01 | 66.06 | −16.04 | 8.64 | −1.86  |
|                    | Bootstrap (1000)               | 19.50 | 3.05  | 0.00  | 16.71 | 8.39  | 0.05  | −22.19 | 7.89  | 0.01 | −22.19 | 7.89  | 0.01 | −22.19 | 7.89 | 0.01 |

PSM Estimates for 2017–18 will be available upon request

*T treatment, C control, D difference or average treatment on treated, SE standard error, NNM nearest neighborhood matching
### Table 16: Rosenbaum Bounds for casual labor treatment effects

| Outcome indicators | Gamma | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 | 1.60 | 1.70 | 1.80 | 1.90 | 2.00 | 2.20/2.50 |
|--------------------|-------|------|------|------|------|------|------|------|------|------|------|------|-----------|
| Poverty Tendulkar   | Critical value | U    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.01** | 0.39 | 0.95 |
|                    |       | L    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 |
|                    | Hidden bias | U    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 |
|                    |       | L    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 |
|                    | Confidence interval | U    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 |
|                    |       | L    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 |
| Income per day     | Critical value | U    | 0.05 | **0.00** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 |
|                    |       | L    | 0.05 | **1.00** | 1.10 | 1.20 | 1.30 | 1.50 | 1.00 | 1.00 | **1.00** | 1.00 | 1.00 |
|                    | Hidden bias | U    | **-2.49** | **-12.20** | **-20.45** | **-29.43** | **-37.05** | **-44.50** | **-50.87** | **-57.36** | **-64.27** | **-69.83** | **-75.48** |
|                    |       | L    | **-2.49** | **7.13** | 14.96 | 22.94 | 29.93 | 36.87 | 42.39 | 48.38 | 53.87 | 58.85 | 63.34 |
|                    | Confidence interval | U    | **-4.99** | **-14.96** | **-23.51** | **-31.92** | **-39.90** | **-47.38** | **-54.20** | **-60.35** | **-67.33** | **-72.82** | **-79.09** |
|                    |       | L    | 0.00 | **9.98** | 17.62 | 25.15 | 32.42 | 39.69 | 44.89 | 50.59 | 55.88 | 60.92 | 65.55 |
| Hours worked per week | Critical value | U    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|                    |       | L    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|                    | Hidden bias | U    | **-6.33** | **-7.00** | **-7.67** | **-8.33** | **-9.00** | **-9.50** | **-10.00** | **-10.50** | **-11.00** | **-11.33** | **-11.83** | **-12.67** |
|                    |       | L    | **-6.33** | **-5.50** | **-4.83** | **-4.17** | **-3.67** | **-3.00** | **-2.50** | **-2.00** | **-1.67** | **-1.17** | **-0.83** | **0.00** |
|                    | Confidence interval | U    | **-6.50** | **-7.33** | **-8.00** | **-8.67** | **-9.17** | **-9.67** | **-10.33** | **-10.67** | **-11.17** | **-11.67** | **-12.00** | **-12.83** |
|                    |       | L    | **-6.00** | **-5.33** | **-4.67** | **-4.00** | **-3.33** | **-2.83** | **-2.33** | **-1.83** | **-1.33** | **-1.00** | **-0.67** | **0.17** |
| Per capita expendi- | Critical value | U    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ture              |       | L    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|                    | Hidden bias | U    | **-15.16** | **-16.74** | **-18.20** | **-19.54** | **-20.79** | **-21.96** | **-23.06** | **-24.10** | **-25.09** | **-26.00** | **-26.91** | **-30.80** |
|                    |       | L    | **-15.16** | **-13.58** | **-12.14** | **-10.83** | **-9.60** | **-8.46** | **-7.41** | **-6.41** | **-5.47** | **-4.57** | **-3.74** | **-0.06** |
|                    | Confidence interval | U    | **-15.59** | **-17.18** | **-18.63** | **-19.99** | **-21.24** | **-22.42** | **-23.52** | **-24.56** | **-25.54** | **-26.48** | **-27.37** | **-31.32** |
|                    |       | L    | **-14.72** | **-13.15** | **-11.71** | **-10.39** | **-9.16** | **-8.03** | **-6.96** | **-5.97** | **-5.02** | **-4.13** | **-3.29** | **0.41** |
Table 16 (continued)

| Outcome indicators | Gamma | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 | 1.60 | 1.70 | 1.80 | 1.90 | 2.00 | 2.20/2.50 |
|--------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------------|
| Income per hour    |       |      |      |      |      |      |      |      |      |      |      |      |            |
| Critical value     | U     | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 | 1.00 | 1.00 | 1.00 | 0.00       |
|                    | L     | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00       |
| Hidden bias        | U     | 9.22 | 7.49 | 5.93 | 4.50 | 3.19 | 1.98 | 0.84 | -0.22 | -1.23 | -2.18 | -3.09 | 9.22      |
|                    | L     | 9.22 | 10.97| 12.60| 14.11| 15.54| 16.90| 18.18| 19.41 | 20.59 | 21.73 | 22.83 | 9.22      |
| Confidence interval| U     | 8.75 | 7.02 | 5.47 | 4.04 | 2.73 | 1.51 | 0.37 | -0.70 | -1.71 | -2.67 | -3.58 | 8.75      |
|                    | L     | 9.69 | 11.45| 13.09| 14.62| 16.06| 17.43| 18.72| 19.97 | 21.16 | 22.31 | 23.42 | 9.69      |

U—upper limit, L—lower Limit and bold highlighted column cell means p value is not significant beyond that Gamma values and hidden bias (upper and lower limit) has reached close to zero value.
Table 17  Rosenbaum bounds for regular wage/salaried treatment effects

| Outcome indicators       | Gamma  |
|--------------------------|--------|
|                          | 1.00   | 1.10  | 1.20  | 1.30  | 1.40  | 1.50  | 1.60  | 1.70  | 1.80  | 1.90  | 2.00  | 2.10  |
| Poverty Tendulkar         | Critical value | U  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|                          |        | L  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 |
| Hidden bias               | Critical value | U  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|                          |        | L  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Confidence interval       | Critical value | U  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|                          |        | L  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Income per day            | Critical value | U  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 1.00 | 1.00 |
|                          |        | L  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hidden bias               | Critical value | U  | 104.74 | 89.78 | 74.81 | 60.35 | 49.38 | 37.91 | 27.81 | 19.12 | 9.98 | 2.49 | −4.99 |
|                          |        | L  | 104.74 | 122.70 | 139.65 | 154.62 | 169.58 | 184.54 | 197.01 | 209.48 | 222.95 | 234.42 | 246.89 |
| Confidence interval       | Critical value | U  | 103.49 | 86.78 | 72.32 | 59.35 | 46.98 | 35.74 | 25.65 | 16.96 | 8.19 | 0.00 | −7.48 |
|                          |        | L  | 107.23 | 124.69 | 142.15 | 157.11 | 172.07 | 186.94 | 199.50 | 213.64 | 225.24 | 238.04 | 249.38 |
| Hours worked per week     | Critical value | U  | 4.67 | 4.00 | 3.50 | 3.00 | 2.50 | 2.00 | 1.67 | 1.17 | 0.83 | 0.50 | 0.17 |
|                          |        | L  | 4.67 | 5.33 | 6.00 | 6.50 | 7.00 | 7.50 | 8.00 | 8.33 | 8.67 | 9.17 | 9.50 |
| Hidden bias               | Critical value | U  | 4.67 | 4.00 | 3.33 | 2.83 | 2.33 | 2.00 | 1.50 | 1.17 | 0.67 | 0.33 | 0.00 |
|                          |        | L  | 4.83 | 5.50 | 6.00 | 6.67 | 7.00 | 7.50 | 8.00 | 8.50 | 8.83 | 9.17 | 9.50 |
| Confidence interval       | Critical value | U  | 4.67 | 4.00 | 3.33 | 2.83 | 2.33 | 2.00 | 1.50 | 1.17 | 0.67 | 0.33 | 0.00 |
|                          |        | L  | 4.83 | 5.50 | 6.00 | 6.67 | 7.00 | 7.50 | 8.00 | 8.50 | 8.83 | 9.17 | 9.50 |
| Per capita expenditure    | Critical value | U  | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
|                          |        | L  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hidden bias               | Critical value | U  | 9.27 | 6.67 | 4.31 | 2.15 | 0.15 | −1.69 | −3.42 | −5.04 | −6.57 | −8.00 | −9.39 |
|                          |        | L  | 9.27 | 11.90 | 14.33 | 16.58 | 18.70 | 20.67 | 22.56 | 24.33 | 26.03 | 27.65 | 29.21 |
| Confidence interval       | Critical value | U  | 8.93 | 6.32 | 3.95 | 1.81 | −0.18 | −2.03 | −3.76 | −5.38 | −6.91 | −8.36 | −9.77 |
|                          |        | L  | 9.61 | 12.25 | 14.68 | 16.94 | 19.05 | 21.04 | 22.92 | 24.72 | 26.44 | 28.05 | 29.63 |
U—upper limit, L—lower limit and bold highlighted column cell means p value is not significant beyond that Gamma values and hidden bias (upper and lower limit) has reached close to zero value. The maximum gamma values for hours worked per week, per capita expenditure, and poverty rate (Tendulkar) are 2.10, 2.30, and 2.90, respectively.

| Outcome indicators          | Gamma | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 | 1.60 | 1.70 | 1.80 | 1.90 | 2.00 | 2.10 |
|-----------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Income per hour             | Critical value | U    | 0.00 | 0.00 | 0.00 | 0.00 | **0.08** | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
|                             |       | L    | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hidden bias                 | U    | 9.98 | 7.59 | 5.46 | 3.55 | 1.83 | **0.25** | -1.20 | -2.54 | -3.79 | -4.96 | -6.05 |
|                             | L    | 9.98 | 12.47 | 14.81 | 17.02 | 19.13 | **21.14** | 23.07 | 24.92 | 26.69 | 28.40 | 30.04 |
| Confidence interval         | U    | 9.67 | 7.27 | 5.15 | 3.25 | 1.53 | **-0.04** | -1.49 | -2.82 | -4.07 | -5.24 | -6.33 |
|                             | L    | 10.31 | 12.80 | 15.15 | 17.38 | 19.49 | **21.52** | 23.46 | 25.31 | 27.11 | 28.82 | 30.48 |
### Table 18: Rosenbaum Bounds for self-employed treatment effects

| Outcome indicators | Gamma | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 | 1.60 | 1.70 | 1.80 | 1.90 | 2.00 | 2.20 |
|-------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Poverty Tau−dulkar | Critical value | U | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | L | 1.00 | 1.00 | 1.00 | 1.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hidden bias | U | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Confidence interval | U | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Income per day | Critical value | U | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hidden bias | U | −87.28 | −101.42 | −114.72 | −126.19 | −137.16 | −147.63 | −157.11 | −167.09 | −175.56 | −184.54 | −192.02 |
| | L | −87.28 | −73.32 | −59.85 | −49.04 | −37.41 | −27.43 | −17.96 | −9.98 | 0.00 | 7.48 | 14.96 |
| | Confidence interval | U | −89.78 | −103.74 | −116.36 | −128.32 | −139.65 | −149.63 | −159.60 | −169.58 | −178.26 | −186.89 | −194.52 |
| | L | −84.79 | −71.07 | −58.60 | −46.55 | −34.91 | −24.94 | −15.61 | −7.48 | 0.75 | 9.98 | 16.96 |
| Hours worked per week | Critical value | U | 0.00 | 0.00 | 0.80 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hidden bias | U | 1.33 | 0.50 | 0.00 | −0.67 | −1.17 | −1.67 | −2.17 | −2.67 | −3.00 | −3.50 | −3.83 |
| | L | 1.33 | 2.00 | 2.67 | 3.17 | 3.67 | 4.17 | 4.67 | 5.17 | 5.50 | 5.83 | 6.17 |
| | Confidence interval | U | 1.17 | 0.50 | −0.17 | −0.83 | −1.33 | −1.83 | −2.33 | −2.83 | −3.17 | −3.67 | −4.00 |
| | L | 1.33 | 2.00 | 2.67 | 3.33 | 3.83 | 4.33 | 4.83 | 5.17 | 5.67 | 6.00 | 6.33 |
| Per capita expenditure | Critical value | U | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | L | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hidden bias | U | −1.43 | −3.53 | −5.46 | −7.22 | −8.84 | −10.36 | −11.78 | −13.12 | −14.38 | −15.57 | −16.72 |
U—upper limit, L—lower limit and highlighted column cell means p value is not significant beyond that Gamma values and hidden bias (upper and lower limit) has reached close to zero value. The maximum gamma values for income per day, poverty rate (Tendulkar) and income per hour are 2.70, 2.90, and 3.40, respectively.

| Outcome indicators | Gamma 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 | 1.60 | 1.70 | 1.80 | 1.90 | 2.00 | 2.20 |
|--------------------|-----------|------|------|------|------|------|------|------|------|------|------|------|
|                   | L         | U    | L    | U    | L    | U    | L    | U    | L    | U    | L    | U    |
| Confidence interval |           |      |      |      |      |      |      |      |      |      |      |      |
| Income per hour    |           |      |      |      |      |      |      |      |      |      |      |      |
| Critical value     | 1.14 0.98 | 2.92 4.71 | 6.39 7.95 | 9.42 10.81 | 12.13 13.39 | 14.59 0.00 |
| Confidence interval |           |      |      |      |      |      |      |      |      |      |      |      |
| Hidden bias        | -16.55 -18.68 | -20.65 -22.50 | -24.23 -25.87 | -27.42 -28.91 | -30.34 -31.72 | -33.06 -35.61 |
| Critical value     | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.00 | 0.00 0.61 |
| Confidence interval |           |      |      |      |      |      |      |      |      |      |      |      |
| L                  | -16.25 -14.17 | -12.30 -10.60 | -9.03 -7.59 | -6.23 -4.97 | -3.79 -2.67 | -1.61 0.35 |
Rosenbaum bounds for PSM estimates

In general, the conjecture of randomization is not valid with observational data. Hence without randomization of a treatment, one cannot assume that the data points are exchangeable due to the probability of treatment being equal across treated and control groups. Matching methods are thus not robust against “hidden bias” arising from the existence of unobserved variables that simultaneously affect assignment to treatment and the outcome variable (Di Prete and Gangl 2004). One strategy for addressing this problem is the Rosenbaum bounds approach, which allows to determine how strongly an unmeasured confounding variable must affect selection into treatment to undermine the implications of a matching analysis.

In the Rosenbaum bounds approach, the starting point is estimating the average treatment effect on the treated (ATT) using matching methods based on standard ignorability assumption. In the second step, as analyst, one postulates the existence of a confounding variable W, which is associated with the odds of being assigned to the treatment \((D = 1)\), conditional on covariates. With the potential impact of \(W\) on \(D\) (in terms of odds ratios) becomes stronger, the confidence interval on the estimated effect becomes wider. Alternatively, the significance level of the test of null hypothesis of no effect of treatment on outcomes (i.e., the \(p\) value goes up). For each assumed level of association between \(W\) and \(D\), there are associated end points on the bounds for significance level of the test of the null hypothesis for the case where \(W\)’s effect on the outcome is so strong that knowledge of \(W\) would perfectly predict which of a pair of matched cases would have the higher response regardless of which case received the treatment (Di Prete and Gangl 2004).

Estimation of Rosenbaum bounds

Rosenbaum’s method of sensitivity analysis relies on the sensitivity parameter \(\gamma\) (gamma) that measures the degree of departure from random assignment of treatment. This implies that two known distributions with the same observed characteristics may differ in the odds of receiving the treatment by at most a factor of \(\gamma\). In a randomized experiment, randomization of the treatment ensures that \(\gamma = 1\). In an observational study, if \(\gamma = 2\), and two known distributions are identical on matched covariates then one might be twice as likely as the other to receive the treatment because they differ in terms of an unobserved covariate (Rosenbaum 2005).

While values of \(\gamma\) are unknown, we try several values of \(\gamma\) and see if the conclusions change. The hidden bias estimates are provided in tables below. The unobserved heterogeneity has varied for all five outcome indicators of three different set of treatment variables. We compare Rosenbaum bounds on treatment effects at different level of \(\gamma\) and compare Rosenbaum bounds on treatment effects at different level of \(\gamma\) values in the steps of 0.10, starting from 1. Hence, in all three treatment equations for all seven outcome variables, the \(\gamma\) values ranging from 1.00 to 2.50 in the case of casual labor treatment function (Table 16). The critical level of \(\gamma\) at which we would have to question our conclusion of a negative effect of casual labor employment status is between 1.00 and 1.10 (income per day) i.e., is attained
if an unobserved covariate caused the odds ratio of treatment assignment to differ between treatment and control cases by a factor of about 1.00. For self-employed and regular wage/salaried, $\gamma$ values range is 1.90 (Tables 17, 18).

However, we have provided values of lower bound, but this is not significant since it is always lower than the observed $p$ value. Hence, for instance $\gamma = 2.20$ in self-employed case, this means that self-employed worker in the matched pair may be 2.20 times likely to earn more income per hour as the other due to different values on an unobserved covariate and the effect we observe here would still be significant at ($\gamma - 0.10$) level. This is a high value of $\gamma$ and higher value greater than one implies that the hidden bias is increasing the likelihood of the being assigned to one group compared to being assigned to the other group.

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**Conflict of interest** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Ethical statement** This research did not require ethics approval being based on secondary data that were collected by government agencies and are publicly available for use.

**Consent to participate** The households were surveyed by data collection agencies with consent to participate.

**Consent to publish** All three authors in the manuscript gives the consent to publish: Signed—Devesh Roy, Sunil Saroj and Mamata Pradhan.

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