COVID-19, Government Transfer Payments, and Investment Decisions in Farming Business: Evidence from Northern India

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Abstract
Although the COVID-19 pandemic resulted in about a 24% decline in India’s GDP during the April–June 2020 quarter, the nation’s agricultural sector, somewhat surprisingly, seems to have done remarkably well. This paper examines whether the public transfer program Pradhan Mantri Garib Kalyan Yojana (PMGKY), announced immediately after the lockdown, benefited farmers in dealing with the COVID shock. Overall, 95% of the smallholders received support from at least one of PMGKY’s four components. Direct cash transfers had significantly more impact than in-kind transfer schemes. The result shows that farmers receiving cash transfers under PM-KISAN, one component of PMGKY, were more likely to invest in buying seeds. In contrast, farmers receiving cash transfers under PM-UY, another piece of PMGKY, were more likely to invest in fertilizer and pesticides. Finally, smallholders who received benefits from all four components of...
PMGKY were more likely to invest in purchasing seeds, fertilizer, and pesticides. Findings suggest the fungibility of public cash transfers from the recent PMGKY scheme is significant in alleviating credit constraints and increasing future investments in modern inputs.

**KEYWORDS**

agricultural policy, COVID-19, input usage, liquidity constraint, smallholders

**JEL CLASSIFICATION**

I38; Q12; Q18

The COVID-19-induced lockdown announced by India’s prime minister in March 2020 most likely triggered the most significant disruption of livelihoods in human history. Images in popular media—such as bustling cities coming to a halt and the plight of migrant workers walking 100 of miles on empty highways—made it abundantly clear that the COVID-19 pandemic would be a significant blow to the Indian economy. So it is no surprise that both the World Bank and the International Monetary Fund drastically revised downward the growth projections for 2020–21, expecting the economy to shrink 3%–5% in a financial year. What has surprised most experts in India is the agricultural sector, which is estimated to grow 3% during the same period. This is good news for the country—especially from the poverty and food security points of view—as almost two-thirds of Indians live in rural areas and depend on agriculture and allied services for their livelihoods (Chandramouli and Registrar General, 2011).

Evidence on prices and output suggests that Indian agriculture has performed well so far amid an unprecedented pandemic (Varshney et al., 2020). This has captivated experts advocating for reforming agricultural policies, development partners looking into repurposing their investments, and the popular media (Reardon et al., 2020). Proximate explanations include the resilience of Indian agriculture, the timing of pandemic, public policy responses, and robust existing rural infrastructure for social transfers. In terms of prices, the role of the government’s price stabilization policies is critical, and cereal prices did not crash initially. Prices of essential commodities remained stable in May and June 2020 (Varshney et al., 2020), and the public procurement program picked up in May and June, albeit with a slow start (Low & Roth, 2020). However, the impact on prices after that is still unknown. Further, the possibility of a price crash cannot be ruled out completely. Looking at production, India had a bumper harvest during the 2019–2020 Rabi season, registering 5% growth (an increase in production from 129.7 million tons to 136.2 million). Note that before the lockdown was announced, most of the farming activities (sowing and transplantation) were completed. Of particular concern was the 2019–20 Rabi season harvesting, which was alleviated by migrant workers returning to their rural homes. More importantly, for the 2020 Kharif season (summer crop), which was expected to be most impacted by the COVID lockdown, the data suggest that the area sown has gone up significantly. For instance, the area under cultivation for Kharif crop has increased 10% compared with 2019, with cereals up 17%, oilseeds up 15%, and pulses up 5%. How the cultivation activities of the 2020 Kharif season have mitigated the COVID-19 shock remains a pertinent issue.
Against this backdrop, this paper examines the role of a large package of public transfer programs (worth US$25 billion) called Pradhan Mantri Garib Kalyan Yojana (PMGKY). The policy, announced immediately after the lockdown, included cash transfers for farmers and women, conditional cash transfers for low-income families to buy cooking gas in tanks, and free food rations for the vulnerable. The analysis is based on a unique phone survey jointly conducted by the International Food Policy Research Institute (IFPRI) and the Indian Council of Agricultural Research Council (ICAR) during April and May 2020 in three northern states of India: Rajasthan, Madhya Pradesh, and Uttar Pradesh. The survey included 1789 farmers from an IFPRI survey conducted in 2017–18 and an ICAR 2018–19, respectively.

Two primary objectives of this study are to examine (a) whether the PMGKY program benefited the farmers and (b) to what extent PMGKY contributed to farmers' investment decisions for the 2020 Kharif season. The study also assesses the complementary role of other program components (cash transfers for women, conditional cash transfers for low-income families to buy cooking gas, and free food rations) in the procurement of agricultural inputs for the 2020 Kharif season. Overall, results show that 95% of the smallholders received support from at least one of the PMGKY scheme components. The PMGKY had a significant association with farm households' decision to invest in modern inputs amid the COVID pandemic.

The study contributes to the literature in several ways. It is the incipient study to examine the effectiveness of the relief package (PMGKY). Thus, it contributes to studies focused on the implementation and appraisal of PMGKY (Agrawal et al., 2020; Khan, 2020). The study improves knowledge by exploring government support in agricultural production decisions in the agricultural sector amid the COVID-19 crisis. Therefore, it provides insights on policy options during the COVID-19 crisis (Gerard et al., 2020; Hepburn et al., 2020). The study is arranged as follows. The second section presents a brief review of PMGKY. The third section offers the data used in this study, the fourth section presents the methodology used, and the fifth section presents the results and discusses the findings. The paper ends with the conclusion and implications section.

PRADHAN MANTRI GARIB KALYAN YOJANA (PMGKY): A PUBLIC CASH TRANSFER INITIATIVE

The INR 1.7 lac crore (about US$25 billion) relief package under the PMGKY was announced in March 2020 to help the vulnerable battle the COVID-19 crisis. In India, most farmers are vulnerable and are more likely to be affected by the COVID-19 pandemic (Joshi, 2015). Of particular concern were the supply chain disruptions in agriculture due to the pandemic in developing countries. For example, the trading in Indian agricultural markets is mainly physical and cash based, and even without a crisis, delays in payments exist, which has magnifying implications for farmers’ liquidity in the event of a crisis (Reddy, 2017). Government, through this package, provides direct benefit transfers (DBT) and in-kind support (IKS) for the vulnerable. Therefore, it is likely to ease incumbent credit and liquidity constraints in purchasing agricultural inputs, extremely pertinent in India, where more than 50% of farmers rely on informal credit (Varshney et al., 2019). At the same time, one-fifth of farmers buy inputs on credit in usual times. In the event of a pandemic, the availability of agricultural inputs on credit is uncertain. We hypothesize that the PMGKY may ease farmers’ liquidity constraints for investment in the 2020 Kharif season. We specifically focus on four critical schemes of the package, covering 70%
of the total allocation, to assess whether the intended beneficiary received the benefit for April 2020. We briefly review the eligibility, entitlement, and design of the scheme as follows:

1. **Pradhan Mantri Kisan Samman Nidhi (PM-KISAN):** The government provided INR 2 thousand to all eligible farmers in April 2020. In the scheme, all farmers qualify with few exclusions, such as farmer families with professionals (doctors, engineers, etc.), income taxpayers, and employees of the central and state governments (for details see Varshney et al., 2020). Benefits are transferred directly into the farmer’s bank account.

2. **Pradhan Mantri Ujjwala Yojana (PM-UY):** The government transferred cash in three installments to 80 million low-income families to buy cooking gas (liquid petroleum gas) in tanks for April, May, and June 2020. Eligibility under this scheme is decided based on socio-economic caste census deprivation criteria to identify poor families. This is a conditional transfer, and the first installment was intended for all eligible beneficiaries. However, the second installment was made only when beneficiaries of the first installment refilled their LPG tanks. For buying cooking gas for each month, the government intended to transfer INR 0.74 thousand into beneficiaries’ bank accounts.

3. **Pradhan Mantri Jan Dhan Yojana (PM-JDY):** The government allocated payments in three installments of INR 0.50 thousand each in April, May, and June 2020 for 204 million women account holders, made directly into their bank accounts. Any adult without a bank account was eligible to open a bank account under this scheme. However, benefits under the relief package were provided only to women account holders. The scheme covered more than 60% of vulnerable families of India, and vulnerable farmers also were likely to get benefits through this component.

4. **Pradhan Mantri Garib Ann Vitran Yojana (PM-AVY):** This program provides 5 kg of free wheat/rice to individuals and 1 kg of pulses to households. Households with ration cards under the existing public distribution system were eligible to get benefits under this component. The program intended to serve 235 million families (60% of India’s total population) from April to November 2020.

Although PM-GKY’s primary component intended to support agriculture was PM-KISAN, it is also likely that farmers may use the other cash transfer programs (PM-UY, PM-JDY, and PM-AVY) to leverage future investments in agriculture. This is primarily motivated by the concept of fungibility. Empirical studies on fungibility in microfinance for Bangladesh and India suggest that the credit was diverted from intended to unintended purposes (for examples, see Mahajan & Ramola, 1996; Sharma & Zeller, 1997). As three of the four schemes under PMGKY are direct benefit transfers, and the fourth is in-kind support for free rations, it is likely that farmers facing liquidity constraints may divert the resources of these schemes to leverage their productive investment.

### DATA AND DESCRIPTIVE STATISTICS

Our study area comprises Rajasthan, Madhya Pradesh, and Uttar Pradesh, three large states of northern India that together account for 28% of the country’s total population and are home to 93.5 million poor households. In terms of total cropped area, these states account for 38% of the country’s agricultural area, reflecting the states’ importance in Indian agriculture. Agro-ecological conditions and cropping patterns vary both within and across states (See Table A1).
Overall, these states together account for more than 50% of India’s total production of wheat, pearl millet, soybean, and mustard.

For the phone survey, we took advantage of earlier surveys conducted by IFPRI and ICAR. In 2017–18, a primary representative study was conducted with a sample of 1560 households in Rajasthan and 2280 households in Madhya Pradesh. A sample of 3420 households in the state of Uttar Pradesh was conducted in 2018–19. The survey is representative of all agro-ecological zones (AEZs) within each state. From each zone, districts were selected randomly, and the number of districts per zone was decided based on the total cropped area of selected crops. Three blocks from each district and two villages from each block were selected randomly. To select households, a complete household listing was developed for each selected village, the households were divided into four quintiles based on total cultivable land, and five families were selected randomly from each quintile. Selection of crops for the earlier surveys are varied by state: Rajasthan crops selected were wheat, mustard, gram, pearl millet, and maize; Madhya Pradesh crops selected were wheat, mustard, gram, soybean, and maize; and Uttar Pradesh crops selected were wheat, mustard, gram, sugarcane, and paddy.

The phone survey used in this study was conducted in April–May 2020, using phone numbers from the earlier surveys. One-third of the sample from the previous surveys was selected for this survey. To ensure representativeness of coverage in terms of the village, district, block, and agro-ecological zones, six to seven households from each village were sampled. Overall, the survey included 1789 families from 327 villages of 51 districts, representing all agro-ecological zones in the three states. The focus of the present phone survey was to gather information on: (a) whether the intended beneficiaries received assistance under the critical components of PMGKY and (b) whether they procured agricultural inputs (seeds, fertilizers, and pesticides) immediately after receiving the assistance under PMGKY for the 2020 Kharif season. Table 1 presents the variable definitions and summary statistics. Data show that 92% of the sample farmers were men and the average age of the head of the household (HH) is 44 years. The household head averaged 6 years of schooling, and the average family size is six. The average farmer has 21 years of farming experience, and 19% of the farming families have access to tractors. Table 1 shows that 3% of farmers have access to extension services, 11% have soil health cards, and 46% participate in crop insurance schemes.

Figure 1 shows that in the 2019–20 Rabi season, 79% of farmers grew wheat, followed by mustard (7%), and gram (2%), and 12% of farmers grew other crops. In the 2020 Kharif season, 40% of farmers grew paddy, followed by pearl millet (22%), soybean (13%), and maize (8%), and the remaining 17% of farmers grew other crops. Because the present phone survey excluded information on the cost of cultivation, the investment requirement of seed, fertilizers, and manures for the Kharif season crops is assessed using data for 2017–18. For seed, paddy requires an investment of INR 4070 per hectare in Uttar Pradesh. Pearl millet production requires an investment of INR 1180 per hectare in Rajasthan. Similarly, soybean involves an investment of INR 5200 per hectare, and maize production requires INR 1710 thousand in Rajasthan. In sum, soybean requires the highest investment, followed by paddy, maize, and pearl millet. For fertilizer and manure, paddy requires an investment of INR 4570 per hectare in Uttar Pradesh. Pearl millet and soybean requires an investment of INR 870 per hectare and INR 380 per hectare, respectively, in Rajasthan. Maize involves an investment of INR 2390 per hectare in Rajasthan. Paddy requires the highest investment, followed by maize, pearl millet, and soybean. Overall, the investment requirements differ significantly among crops and type of agricultural inputs.
Table 2 presents a comparison of beneficiaries and non-beneficiaries of cash transfers under the PM-KISAN scheme. In the case of PM-KISAN (Columns 2–4, Table 2), a higher share of beneficiaries than of non-beneficiaries had farming as the primary source of income (75%...
versus 68%) and owned tractors (20% versus 15%), and beneficiaries traveled farther than non-beneficiaries for input procurement (7 km versus 6.4 km) in input markets. In contrast, a higher share of non-beneficiaries than of beneficiaries had livestock as the primary source of income (24% versus 16%), had smartphones (25% versus 20%), and participated in a crop insurance program (51% versus 44%), and non-beneficiaries traveled farther for banking services than beneficiaries (5.8 km versus 5.2 km).

Similarly, Columns 5–7 of Table 2 compare beneficiaries and non-beneficiaries of cash transfers under the PM-UY scheme. Table 2 shows a higher share of beneficiaries than of non-beneficiaries belonged to Scheduled Castes and Tribes (35% versus 31%) and relied on rainfall for irrigation (47% versus 43%), and beneficiaries traveled farther than non-beneficiaries for input procurement (7.1 km versus 6.4 km) in input markets. In contrast, non-beneficiaries had more schooling (6.4 versus 6.0 years) and more farming experience (22 versus 21 years) than beneficiaries; non-beneficiaries traveled farther than beneficiaries for banking services (5.6 km vs. 5.2 km); and a higher share of non-beneficiaries than beneficiaries had smartphones (23% versus 20%) and participated in a crop insurance program (49% versus 44%).

Table 3 presents the summary statistics by the beneficiary status of farmers under the PM-JDY scheme. Column 2–4 of Table 3 shows that beneficiaries traveled farther than non-beneficiaries for input procurement (7 km versus 6.2 km) in input markets. In contrast, non-beneficiaries had more schooling (6.9 versus 5.9 years) and higher land acreage (1.4 versus 1.2 hectares) and greater wealth (~0.7 vs. 0.18) than beneficiaries; a higher share of non-beneficiaries than of beneficiaries had access to Kisan credit cards (45% versus 41%), soil health cards (14% versus 10%), and smartphones (28% versus 19%); a higher share of non-beneficiaries than of beneficiaries participated in a crop insurance program (53% versus 44%); and non-beneficiaries traveled farther than beneficiaries for banking services (5.8 km versus 5.2 km).

Similarly, Columns 5–7 of Table 3 compare beneficiaries and non-beneficiaries of cash transfers under the PM-AVY scheme. Table 3 shows a higher share of beneficiaries than of non-beneficiaries belonged to Scheduled Castes and Tribes (35% vs. 28%), had livestock income as their primary source of income (19% versus 15%), engaged in a social network (41% versus 33%), and relied on rainfall for irrigation (47% versus 38%). In contrast, non-beneficiaries had more schooling (6.6 versus 6.0 years) and more land acreage (1.7 versus 1.2 hectares) than beneficiaries.
Table 2: Summary Statistics of Recipient and Non-Recipient Farmers in PM-KISAN and PM-UY, India 2020

| Variable                                           | PM-KISAN | Non-recipient | Difference 1–2 | PM-UY | Non-recipient | Difference 1–2 |
|----------------------------------------------------|----------|---------------|----------------|-------|---------------|----------------|
| **Socio-economic and agricultural attributes**     |          |               |                |       |               |                |
| Gender (male = 1)                                   | 0.93     | 0.92          | 0.01           | 0.921 | 0.924         | −0.002          |
| Age (year)                                          | 44       | 43            | 1              | 43    | 44            | −1             |
| Age squared (year)                                  | 2085     | 2039          | 47             | 2042  | 2116          | −74            |
| Education (year)                                    | 6.22     | 6.03          | 0.19           | 5.97  | 6.45          | −0.48**         |
| Household size (#)                                  | 5.80     | 5.96          | −0.16          | 5.81  | 5.88          | −0.073          |
| Religion (Hindu = 1)                                | 0.94     | 0.94          | 0.00           | 0.94  | 0.95          | −0.01           |
| Schedule caste and tribe (yes = 1)                  | 0.32     | 0.35          | −0.03          | 0.35  | 0.31          | 0.04*           |
| Kisan credit card (yes = 1)                         | 0.43     | 0.39          | 0.04           | 0.41  | 0.43          | −0.014          |
| Land size (hectare)                                 | 1.34     | 1.18          | 0.16           | 1.24  | 1.39          | −0.147          |
| Farming primary source of income                    | 0.75     | 0.68          | 0.068**        | 0.72  | 0.75          | −0.029          |
| Livestock primary source of income                  | 0.16     | 0.24          | −0.07***       | 0.19  | 0.18          | 0.015           |
| Non-farm income primary                             | 0.08     | 0.07          | 0.01           | 0.08  | 0.07          | 0.016           |
| Farm experience, head of household (year)           | 21.06    | 21.28         | −0.22          | 20.62 | 21.84         | −1.224**        |
| Smartphone (yes = 1)                                | 0.20     | 0.25          | −0.05**        | 0.20  | 0.23          | −0.033*         |
| Tractor ownership (yes = 1)                         | 0.20     | 0.15          | 0.05**         | 0.18  | 0.19          | −0.009          |
| Asset index (#)                                     | 0.00     | 0.00          | −0.01          | −0.08 | 0.12          | −0.198**        |
| Soil health card (yes = 1)                          | 0.11     | 0.11          | −0.01          | 0.10  | 0.12          | −0.015          |
| Crop insured (yes = 1)                              | 0.44     | 0.51          | −0.07**        | 0.44  | 0.49          | −0.052**        |
| Access to extension services (yes = 1)              | 0.03     | 0.03          | 0.00           | 0.03  | 0.03          | −0.001          |
| **Social network**                                  |          |               |                |       |               |                |
| Social network of friends/neighbors/relatives       | 0.38     | 0.42          | −0.04          | 0.38  | 0.41          | −0.024          |
| **Village characteristics**                         |          |               |                |       |               |                |
| Distance to nearest input market (km)               | 7.0      | 6.4           | 0.6**          | 7.06  | 6.42          | 0.641**         |
| Distance to nearest output market (km)              | 9.2      | 9.3           | −0.1           | 9.29  | 9.03          | 0.26            |
| Distance to nearest bank (km)                        | 5.2      | 5.8           | −0.6**         | 5.24  | 5.62          | −0.377*         |
| Distance to block headquarter (km)                  | 9.5      | 9.7           | −0.2           | 9.58  | 9.60          | −0.024          |

(Continues)
beneficiaries; a higher share of non-beneficiaries than of beneficiaries had access to Kisan credit cards (47% versus 40%), farming as the primary source of income (78% versus 71%), smartphones (25% versus 20%), tractor ownership (23% versus 17%), and access to extension services (6% versus 2%); and non-beneficiaries traveled greater distances than beneficiaries to district headquarters (28.8 km versus 26 km) and banking services (6.3 km versus (5.1 km).

**METHODOLOGY**

The phone survey queried farmers on the benefit they received through PM-KISAN, PM-UY, PM-JDY, and PM-AVY and on their eligibility status. Recall that under the direct benefit transfer schemes (PM-KISAN, PM-UY, and PM-JDY), smallholder families received cash transfers of INR 2000, INR 740, and INR 500, respectively. For the in-kind support scheme, PM-AVY, we impute monetary terms’ benefit using the state-level prices of wheat, rice, and pulses, and the entitled quantity per household.\(^{13}\) Thus, benefits under PM-AVY vary by family depending on the household size. On average, PM-AVY beneficiaries received INR 840.

To assess the effectiveness of PMGKY, we conduct three sets of descriptive analysis. First, we provide summary statistics on a range of household and village characteristics by the recipiency status for each scheme. Second, we estimate the eligible farmers and whether they received the scheme’s benefit, by scheme and state. Third, we estimate the benefits the farmers received under multiple schemes. To assess the second objective, we employ a simple probit model framework to examine the association between the PMGKY benefits received and the farmers’ investment decision in the 2020 Kharif season. The survey queried farmers on purchasing agricultural inputs for the 2020 Kharif season immediately after receiving the assistance. Thus, the dependent variable equals one if the farmer procured the agricultural input directly after receiving the assistance, zero otherwise. The independent

| Variable                          | PM-KISAN | Non-recipient | Difference (1–2) | PM-UY | Non-recipient | Difference (1–2) |
|-----------------------------------|----------|--------------|-----------------|-------|--------------|-----------------|
| Distance to district headquarters (km) | 26.3     | 27.7         | −1.3            | 26.21 | 27.44        | −1.23           |

**Plot characteristics**

| Soil type (loam = 1) | 0.31 | 0.32 | −0.01 | 0.31 | 0.32 | −0.006 |
|----------------------|------|------|-------|------|------|-------|
| Soil type (sandy = 1) | 0.17 | 0.19 | −0.02 | 0.16 | 0.19 | −0.026 |
| Soil type (sandy loam = 1) | 0.06 | 0.07 | −0.01 | 0.06 | 0.07 | −0.011 |
| Rainfed cultivation (yes) | 0.46 | 0.43 | 0.04 | 0.47 | 0.43 | 0.043* |
| Observations | 0.41 | 0.39 | 0.02 | 0.39 | 0.43 | −0.033 |

Number of farmers | 1,282 | 507 | 1,056 | 733 |

Source: ICAR-IFPRI Survey 2017–18 and 2018–19.

***Significant at 1%.
**Significant at 5%.
*Significant at 10%.
## Summary Statistics of Recipient and Non-Recipient Farmers, PM-JDY and PM-AVY, India 2020

| Variables                              | PM-JDY Recipient (1) | Non-recipient (2) | Difference (1–2) | PM-AVY Recipient (1) | Non-recipient (2) | Difference (1–2) |
|----------------------------------------|----------------------|-------------------|------------------|----------------------|-------------------|------------------|
| **Socio-economic and agricultural attributes** |                      |                   |                  |                      |                   |                  |
| Gender (male = 1)                      | 0.92                 | 0.93              | −0.01            | 0.92                 | 0.93              | −0.01            |
| Age (year)                             | 44                   | 44                | 0                | 44                   | 45                | −1               |
| Age squared (year)                     | 2072                 | 2073              | −1               | 2045                 | 2159              | −114*            |
| Education (year)                       | 5.90                 | 6.89              | −0.99***         | 6.01                 | 6.65              | −0.64**          |
| Household size (#)                     | 5.84                 | 5.84              | 0.00             | 5.79                 | 5.99              | −0.20            |
| Religion (Hindu = 1)                   | 0.94                 | 0.96              | −0.02            | 0.94                 | 0.96              | −0.02**          |
| Schedule caste and tribe (yes = 1)     | 0.34                 | 0.32              | 0.02             | 0.35                 | 0.28              | 0.07**           |
| Kisan credit card (yes = 1)            | 0.41                 | 0.45              | −0.05*           | 0.40                 | 0.47              | −0.06**          |
| Land size (hectare)                    | 1.25                 | 1.43              | −0.17*           | 1.17                 | 1.70              | −0.53***         |
| Farming primary source of income       | 0.73                 | 0.73              | 0.00             | 0.71                 | 0.78              | −0.07**          |
| Livestock primary source of income     | 0.18                 | 0.18              | 0.00             | 0.19                 | 0.15              | 0.05**           |
| Non-farm income primary                | 0.08                 | 0.08              | 0.00             | 0.08                 | 0.06              | 0.02*            |
| Farm experience, head of household (year) | 21                 | 22                | −1               | 21                   | 22                | −1*              |
| Smart phone (yes = 1)                  | 0.19                 | 0.28              | −0.09***         | 0.20                 | 0.25              | −0.05**          |
| Tractor ownership (yes = 1)            | 0.18                 | 0.21              | −0.03            | 0.17                 | 0.23              | −0.06**          |
| Asset index (#)                        | −0.07                | 0.18              | −0.24**          | −0.04                | 0.11              | −0.15*           |
| Soil health card (yes = 1)             | 0.10                 | 0.14              | −0.04**          | 0.11                 | 0.11              | 0.00             |
| Crop insured (yes = 1)                 | 0.44                 | 0.53              | −0.09***         | 0.46                 | 0.46              | 0.00             |
| Access to extension services (yes = 1) | 0.03                 | 0.04              | −0.01            | 0.02                 | 0.06              | −0.03**          |
| **Social network**                     |                      |                   |                  |                      |                   |                  |
| Social network of friends/neighbors/relatives | 0.38                 | 0.42              | −0.04            | 0.41                 | 0.33              | 0.07**           |
| **Village characteristics**            |                      |                   |                  |                      |                   |                  |
| Distance to nearest input market (km)  | 7.00                 | 6.26              | 0.74**           | 6.78                 | 6.85              | −0.07            |
| Distance to nearest output market (km) | 9.19                 | 9.17              | 0.018            | 9.17                 | 9.23              | −0.07            |
| Distance to nearest bank (km)          | 5.25                 | 5.78              | −0.53**          | 5.09                 | 6.34              | −1.24***         |
| Distance to block headquarters (km)    | 9.52                 | 9.78              | −0.25            | 9.43                 | 10.11             | −0.68*           |

(Continues)
variables include, among others, the benefit the farmers received through the various PMGKY schemes.

The independent variables include factors suggested by the previous theoretical and empirical literature (Feder et al. 1985; Diagne 1999; Covarrubias et al. 2012; Abate et al. 2016; Varshney et al. 2019; among others). We include gender, age, education, household size, religion, social group, access to formal credit, land size, primary occupation, farm experience, access to a smartphone, access to a tractor, and a wealth indicator.14 Farming experience is an essential indicator that drives agricultural investments (Mueller & Jansen, 1988). Finally, about 21% of households have access to smartphones. Access to the phone is an essential communication device (social network with other farmers), and farmers with phones are in a better position to make investment decisions than those without phones. Bandiera and Rasul (2006) and Conley and Udry (2010), in their seminal work, show that social networks are important for agriculture technology-related decisions. Only 39% of farmers have social networks of friends, relatives, and neighbors.

Regarding social classification, 94% of the households are Hindus, and 33% belonged to the Scheduled Castes (SCs) or Scheduled Tribes (STs). Both SCs and STs are less likely than households classified as general category to use the recommended quantity of seeds and fertilizers (Mohanty, 2001). During the pandemic, liquidity is a significant concern for investment in agriculture. About 42% of farmers have access to formal credit through the Kisan credit card (KCC) scheme. Access to formal credit facilities is a positive correlate of agricultural investments (Varshney et al., 2019). The average family operated about 1.3 hectares of land, and 73% of farmers reported farming as their primary income source. In contrast, only 8% of the households reported non-farm income as their primary source of income.

To control for location, access to markets, and other facilities, the study considers the distance from the village to the nearest input market, output market, bank branch, block

### TABLE 3 (Continued)

| Variables                          | PM-JDY Recipient (1) | PM-JDY Non-recipient (2) | Difference (1-2) | PM-AVY Recipient (1) | PM-AVY Non-recipient (2) | Difference (1-2) |
|-----------------------------------|----------------------|--------------------------|-----------------|----------------------|--------------------------|-----------------|
| Distance to district headquarter (km) | 26.86                | 26.32                    | 0.54            | 26.06                | 28.78                    | -2.72**         |
| Plot characteristics              |                      |                          |                 |                      |                          |                 |
| Soil type (loam = 1)              | 0.30                 | 0.34                     | -0.03           | 0.28                 | 0.41                     | -0.13***        |
| Soil type (sandy = 1)             | 0.17                 | 0.19                     | -0.02           | 0.18                 | 0.16                     | 0.015           |
| Soil type (sandy loam = 1)        | 0.07                 | 0.06                     | 0.01            | 0.07                 | 0.05                     | 0.017           |
| Rainfed cultivation (yes)         | 0.46                 | 0.42                     | 0.05*           | 0.47                 | 0.38                     | 0.09***         |
| Observations                      | 0.41                 | 0.41                     | -0.01           | 0.38                 | 0.50                     | -0.13***        |

Source: ICAR-IFPRI Survey 2017–18 and 2018–19.

Note.

***Significant at 1%.
**Significant at 5%.
*Significant at 10%.

14. Farming experience is an essential indicator that drives agricultural investments (Mueller & Jansen, 1988).
headquarters, and district headquarters. The average distance from the village to the nearest input and output markets is about 7 and 9 km, respectively. The distance to the nearest bank branch is about 5 km, to block headquarters 10 km, and to district headquarters 27 km. Soil type plays a significant role in crop choices and hence investment in agriculture inputs. Thus, this study includes plot-level characteristics in the empirical model. These characteristics include type of soil and the availability of irrigation facilities. For example, 45% of farmers report their soil type as sandy loam, 31% as clay, 17% as loam, and 6% as sandy. Access to extension services and soil health cards may affect a farmer's investment decision on agricultural inputs. Similarly, participation in crop insurance reveals a farmer's risk behavior and income security. The empirical model also included information on farmers' access to agriculture extensions, access to soil health cards (which guide the appropriate use of seeds and fertilizers), and use of crop insurance.

We estimate the following specification of the model to assess the association between the procurement of agricultural inputs and the benefits the farmers received under each scheme:

\[ Y_{is} = \alpha_0 + \alpha_1 PMKISAN_{is} + \alpha_1 X_{is} + \eta_s + \epsilon_{is} \]  

where \( i \) denotes farmer and \( s \) represents a state in which the farmer resides. \( Y \) takes a value of 1 if the farmer procures agricultural input (seeds or fertilizers and pesticides), 0 otherwise. \( PMKISAN \) is the amount of money the farmer received under the PM-KISAN scheme. \( X \) is a vector of household and village characteristics listed in Table 1. \( \eta \) is the state fixed effects. \( \epsilon \) is the error term. We estimate similar specifications for the remaining three schemes, namely, PM-UY, PM-JDY, and PM-AVY.

To gain further insights on the heterogeneity in the future purchases of farming inputs, we estimated the above specification for the purchase of seeds, fertilizers and pesticides separately. In this case, the dependent variable \( seed \) takes a value of 1 if the farmer purchased seeds, 0 if the farmer did not purchase agricultural inputs. Similarly, the dependent variable \( fertilizers and pesticides \) takes a value of 1 if the farmer purchased fertilizers and pesticides, 0 if the farmer did not buy agricultural inputs. Data show that only 20% of farmers indicated using the cash transfers immediately after receiving the assistance to purchase agricultural inputs for the Kharif 2020 season. Of those, 82% purchased seeds, and 18% purchased fertilizers and pesticides. Next, we estimate the relationship between cash transfer benefits received by the farmers under the entire PM-GKY scheme (all four schemes: PM-KISAN, PM-UY, PM-JDY, and PM-AVY) and the decision to purchase seeds, fertilizer, and pesticides. The analysis is motivated by the concept of fungibility of cash transfer program benefits. In theory, the fungibility of assets is examined in the context of behavioral and conventional lifecycle models (Thaler, 1990). Levin (1998) shows that spending is more sensitive to income and liquid assets than to assets. In the context of the present study, in which three of the four schemes under PMGKY, namely PM-KISAN, PM-PDY, and PM-UY, are direct benefit transfers and PM-AVY is in-kind support, farmers may likely divert the resources of other schemes to leverage the purchase of agricultural inputs for the upcoming farming season. Specifically, we estimate the following:

\[ Y_{is} = \alpha_0 + \alpha_1 PMGKY_{is} + \alpha_1 X_{is} + \eta_s + \epsilon_{is} \]  

All the notions in the above equation have been defined above. \( PMGKY \) is the amount of money that a farmer received under the PMGKY scheme (that is, the sum of money received in
PM-KISAN, PM-UY, PM-JDY, and PM-AVY). An important caveat of the analysis is that it is associative and does not provide a causal interpretation.

**RESULTS AND DISCUSSION**

**Effectiveness of the PMGKY scheme**

Table 4 presents the state-wise comparison of beneficiaries (out of the eligible farmers) for the four components of the PMGKY emergency relief package. In the PM-KISAN program, results in Table 4 show that 81% of farmers in the sampled states were eligible to receive the benefits and that 89% of eligible farmers received cash transfers of about INR 2000. Note that the share of farmers receiving PM-KISAN benefits is not 100% because farmers may not have met the requirements (such as data entry errors in a beneficiary’s account number and delay in uploading beneficiary information) to receive the program’s benefits. The share of cash transfer recipients in the PM-KISAN scheme was highest for Uttar Pradesh (93%), followed by Rajasthan (88%), and Madhya Pradesh (83%). In the current situation, in which liquidity is a concern for farmers, the emergency cash transfer under the PM-KISAN program in the form of a lump-sum payment is likely to provide much-needed support for ongoing agricultural activities, mostly to crop farmers. The PM-UY program results in Table 4 show that 63% of households were eligible to receive conditional cash transfers. In terms of beneficiaries, 94% of the farming households received direct cash benefits under the PM-UY scheme. The number of recipients under the PM-UY program was highest in Uttar Pradesh (96%), followed by Madhya Pradesh (94%) and Rajasthan (92%). Recall that payment under the PM-UY is a conditional transfer, and the first installment was provided to all PM-UY beneficiaries. However, to receive the second installment, the household needed to have purchased the cooking gas tank from the money it received in April. Therefore, the findings need to be interpreted carefully.

In the case of cash payments for women in the household under the PM-JDY program, results in Table 4 show that 78% of households (women account holders in the family) were eligible to receive benefits under the PM-JDY scheme, and 93% of eligible beneficiaries received about INR 500 in cash transfer payments. The number of recipients in the PM-JDY program was highest in Uttar Pradesh (95%), followed by Rajasthan (95%) and Madhya Pradesh (89%).

In the PM-AVY program, Table 4 shows that 98% of farmers were eligible to receive free food rations. In terms of beneficiaries, 76% of the eligible farm households received free food rations of wheat/rice and pulses. The share of recipients of free food rations under the PM-AVY scheme was highest in Uttar Pradesh (82%), followed by Rajasthan (80%) and Madhya Pradesh (60%). Our finding is comparable with PMGKY allocation and actual distribution data published by the Ministry of Consumer Affairs and Public Distribution, Government of India. Note that PM-UY and PM-AVY schemes are critical in smoothening consumption by poor Indian households in the time of crisis in general and the COVID-19 crisis in particular.

Figure 2 presents the distribution of farmers by the recipient status of multiple schemes. The result reveals that farming households received benefits from all four schemes. The percentage of farming households receiving benefits from only one scheme was 12%, two schemes were about 21%, three schemes about 24%, and four schemes were about 38%. In contrast, a meager 5% of farmer households did not receive any cash transfer benefits. In other words, 95% of smallholders received benefits from at least one component of the PMGKY emergency relief package. Table 5 presents the distribution of farming households and the average amount of
## TABLE 4
Beneficiaries of PM-KISAN, PM-UY, PM-JANDHAN and PM-AVY, by States, India, 2020

| States              | No. of Farmers (#) | PM-KISAN | PM-UY | PM-JDY | PM-AVY |
|---------------------|--------------------|----------|-------|--------|--------|
|                     |                    | Eligible farmers (%) | Recipient farmer (%) | Eligible farmers (%) | Recipient farmer (%) | Eligible farmers (%) | Recipient farmer (%) | Eligible farmers (%) | Recipient farmer (%) |
| Rajasthan           | 449                | 82       | 88    | 63     | 92     | 83     | 95    | 99     | 80     |
| Madhya Pradesh      | 483                | 89       | 83    | 63     | 94     | 79     | 89    | 97     | 60     |
| Uttar Pradesh       | 857                | 76       | 93    | 62     | 96     | 76     | 95    | 99     | 82     |
| All states          | 1,789              | 81       | 89    | 63     | 94     | 78     | 93    | 98     | 76     |

Source: ICAR-IFPRI Survey 2020.

Note: The percentage of recipient farmer is calculated out of the eligible number of farmers for the scheme.
cash received under each transfer scheme and each combination of cash transfer schemes in the PMGKY emergency relief package. Table 5 shows that the cash transfers received by farmers under one scheme received payment of about INR 500 under PM-JDY, PM-UY (INR 744), PM-AVY (INR 840), and PM-KISAN (INR 2000). Similarly, payments cash transfers received by farmers from two schemes ranged between INR 1240 and INR 2840, depending on the combination of the scheme they received. Finally, farmers received about INR 4080 in cash transfer payments if they participated in all four schemes received. Overall, it appears that the components of the PMGKY emergency relief package were able to reach the maximum number of farming households and the intended recipients of the cash transfer programs, at least as of April 2020.

**Impact of components of PMGKY scheme on the decision to purchase farming inputs**

Table 6 presents the marginal effects of the benefit received under the components of the PMGKY emergency relief package and input investment decision by smallholders. Panel A of Table 6 presents the marginal effects on overall input decisions on seeds or fertilizers and pesticides. In contrast, Panel B shows the marginal effects on seeds, and Panel C shows the marginal effects on fertilizers and pesticides. Findings in Panel A (Column 1) show a positive and significant impact of the PM-KISAN scheme on agricultural inputs’ procurement. In terms of magnitude, the marginal effect indicates that an additional INR 1000 in PM-KISAN benefits increased the likelihood of investment in seeds, fertilizer, and pesticides by about 6.8% immediately after receiving the assistance. In the PM-UY scheme, the marginal effect (Column 2) indicates that an additional INR 1000 in PM-UY payments increased the likelihood of purchasing seeds, fertilizer, and pesticides by about 9.8% immediately after receiving the assistance. This finding is not surprising. The payments under the PM-UY, unlike the expected payments made under PM-KISAN, are indirect, one-time, lump-sum payments, and farmers are more likely to use the money to secure inputs for the upcoming cropping season (2020 Kharif season). Finally, in the PM-JDY scheme, the marginal effect (Column 3) indicates that an additional INR 1000 in PM-JDY payments increased the likelihood of purchasing seeds, fertilizer, and pesticides by about 8.4% immediately after receiving the assistance.

Findings in Panel B (Column 1) show a positive and significant effect of the PM-KISAN scheme on the procurement of seeds. Results reveal that the cash transfer programs PM-KISAN and PM-UY have a positive and significant effect on the likelihood of investment in seeds for the
2020 Kharif cropping season. Additionally, the marginal effect of these program payments is about the same as those in Panel A. However, the marginal effect of PM-JDY payments indicates that an additional INR 1000 in PM-JDY benefits increased the likelihood of purchasing seeds by about 12% immediately after receiving the assistance. Our finding is consistent with other studies (Jack, 2013; Tshikala et al., 2019). Last, Panel C reports the marginal effects of program payments on the procurement of fertilizers and pesticides. The marginal effect of the result of the benefit received under PM-UY shows a significant coefficient. Thus, the results for increased procurement of agricultural inputs may be driven primarily by the increased purchase of seed. Moreover, the result suggests that the cash transfer Schemes (PM-KISAN, PM-UY, and PM-JDY) show a positive and significant effect on agricultural input procurement, but the in-kind support (PM-AVY) did not. Overall, the above findings underscore the importance of the Indian government’s relief package under COVID-19 to Indian farmers’ purchasing decisions on farming inputs.

**Impact of overall PM-GKY scheme on the decision to purchase farming inputs**

Table 7 presents the marginal effect of the PMGKY benefit on the decision to purchase agricultural inputs for the 2020 Kharif season. Findings in Columns 1 and 2 of Table 7 show the

| Recipient farmers (#) | Percentage of recipient farmers (%) | Benefit received for recipient farmers (INR thousand) |
|-----------------------|-------------------------------------|-----------------------------------------------------|
| PM-KISAN              | 1,282                               | 72                                                  | 2.00                                     |
| PM-UY                 | 1,056                               | 59                                                  | 0.74                                     |
| PM-JDY                | 1,309                               | 73                                                  | 0.50                                     |
| PM-AVY                | 1,358                               | 76                                                  | 0.84                                     |
| PM-KISAN & PM-UY      | 818                                 | 46                                                  | 2.74                                     |
| PM-KISAN & PM-JDY     | 1,036                               | 58                                                  | 2.50                                     |
| PM-KISAN & PM-AVY     | 1,006                               | 56                                                  | 2.84                                     |
| PM-UY & PM-JDY        | 901                                 | 50                                                  | 1.24                                     |
| PM-UY & PM-AVY        | 952                                 | 53                                                  | 1.58                                     |
| PM-JDY & PM-AVY       | 1,090                               | 61                                                  | 1.34                                     |
| PM-KISAN & PM-UY & PM-JDY | 734                               | 41                                                  | 3.24                                     |
| PM-UY & PM-JDY & PM-AVY | 836                               | 47                                                  | 2.08                                     |
| PM-JDY & PM-AVY & PM-KISAN | 866                               | 48                                                  | 3.33                                     |
| PM-AVY & PM-KISAN & PM-UY | 749                               | 42                                                  | 3.58                                     |
| PM-KISAN & PM-UY & PM-JDY & PM-AVY | 687                               | 38                                                  | 4.08                                     |

Source: ICAR-IFPRI Survey 2020.

Note: PM-KISAN is the income support scheme for farmers. PM-UY is the conditional cash transfer for buying cooking gas. PM-JDY is the cash transfer for women. PM-AVY is the in-kind support that provides free food ration to the family that is 5 kg of wheat/rice to per member and 1 Kg pulse for the whole family. Benefit for PM-AVY is calculated using state level market price of these commodities.
TABLE 6 Marginal Effects of Benefits Received and Input Purchasing Decision, by Schemes of PM-GKY, India 2020

Panel A- Agricultural inputs

| Variable                  | Dep. variable: Ag. Input = 1 if farmer invests in buying seeds or fertilizers and pesticides; 0 otherwise |
|---------------------------|-----------------------------------------------------------------------------------------------------------|
| (1) (2) (3) (4)           |                                                                                                           |
| PM-KISAN benefit (INR thousand) | 0.068*** (0.011)                                                                                         |
| PM-UY benefit (INR thousand)     | 0.098*** (0.025)                                                                                         |
| PM-JDY benefit (INR thousand)     | 0.084* (0.043)                                                                                           |
| PM-AVY benefit (INR thousand)     | 0.032 (0.026)                                                                                           |
| Socio-economic and agriculture profile | Yes                                                                                                    |
| Social network             | Yes                                                                                                      |
| Village and plot characteristics | Yes                                                                                                    |
| State fixed effect         | Yes                                                                                                      |
| Prob > chi²                | 0.000                                                                                                    |
| Pseudo R²                  | 0.101                                                                                                    |
| No. of observation         | 1,789                                                                                                    |

Panel B- Seeds

| Variable                  | Dep. variable: Seeds = 1 if farmer invests in buying seeds; 0 otherwise |
|---------------------------|------------------------------------------------------------------------|
| (5) (6) (7) (8)           |                                                                         |
| PM-KISAN benefit (INR thousand) | 0.070*** (0.011)                                                      |
| PM-UY) benefit (INR thousand)     | 0.091*** (0.024)                                                      |
| PM-JDY benefit (INR thousand)     | 0.121** (0.042)                                                      |
| PM-AVY benefit (INR thousand)     | 0.028 (0.025)                                                      |
| Socio-economic and agriculture profile | Yes                                                                 |
| Social network             | Yes                                                                    |
| Village and plot characteristics | Yes                                                                 |
| State fixed effect         | Yes                                                                    |
| Prob > chi²                | 0.000                                                                  |
| Pseudo R²                  | 0.1096                                                                 |
| No. of observation         | 1,727                                                                 |

Panel C- Fertilizer and pesticides

| Variable                  | Dep. variable: Fertilizer & pesticides = 1 if farmer invests in buying fertilizer and pesticides; 0 otherwise |
|---------------------------|-----------------------------------------------------------------------------------------------------------|
| (9) (10) (11) (12)       |                                                                                                           |
| PM-KISAN benefit (INR thousand) | 0.009 (0.006)                                               |
| PM-UY benefit (INR thousand)     | 0.035** (0.013)                                              |
| PM-JDY benefit (INR thousand)     | -0.016 (0.020)                                               |
| PM-AVY benefit (INR thousand)     | 0.018 (0.014)                                               |
PMGKY scheme had a positive and significant effect on the decision to purchase agricultural inputs. In terms of magnitude, the marginal effect indicates that an additional INR 1000 in PMGKY benefits increased the likelihood of investment immediately after receiving assistance in seeds, fertilizer, and pesticides by about 4.8% and in seeds by 4.9%. Note that the magnitude of PMGKY’s impact on the purchase decision of farming inputs is significantly higher than those obtained under the PM-KISAN scheme—a component of PMGKY. A plausible explanation is that when smallholders receiving multiple benefits under PMGKY (such as PM-JDY, the cash transfer to women; PM-UY, the conditional cash transfer for buying cooking gas; and PM-AVY, the free food rations), they buy expensive agricultural inputs such as quality seeds, fertilizer, and pesticides. Farming households could afford to shift additional spending (due to wealth effect) to purchasing agricultural inputs for the upcoming cropping season. In other words, financial assistance under the PMGKY scheme significantly relaxed the liquidity constraint on smallholders. Our finding is consistent with Kumar et al. (2020), who found that access to credit increased farmers’ expenditures on farm-related activities. The above analysis accentuates the importance of enacting the Indian government’s public cash transfers under the PMGKY scheme to procure agricultural inputs for the 2020 Kharif farming season.

**CONCLUSION AND IMPLICATIONS**

The COVID-19 pandemic hit the Indian economy hard. After the national lockdown in March 2020, major economic sectors of the Indian economy came to a grinding halt. The unemployment rate skyrocketed, and it became evident that the nation’s economy was heading for an unprecedented contraction. During the second quarter of 2020, the economy shrank by almost 24%, which was the worst since the country started publishing quarterly data. During this massive economic slowdown, somewhat surprisingly, the agricultural sector experienced a 3.5% growth over the same period. This paper examined whether the PMGKY program, a public cash transfer program announced immediately after the lockdown, assisted farmers in dealing with
the COVID-related shock and in deciding to invest in agricultural inputs (seeds, fertilizer, and pesticides). The analysis was based on a unique phone survey conducted by IFPRI and ICAR of previously interviewed farm households in three northern states of India.

The findings revealed that the public cash transfer program, PMGKY, consisting of four main components, succeeded in reaching the intended beneficiaries. Overall, 95% of the farmers received support from at least one of the PMGKY scheme’s four elements. Direct cash transfer schemes, namely PM-KISAN, PM-UY, and PM-JDY, performed better than the food transfer Scheme (PM-AVY). On average, 89% of eligible beneficiaries of the PM-GKY’s main component, PM-KISAN, reported receiving the full amount of cash benefits. However, the study found variations across states ranging from 83% in Madhya Pradesh to 93% in Uttar Pradesh. Of relevance was the PM-JDY scheme designed for poor women. Under the PM-JDY scheme, 93% of the eligible beneficiaries received cash transfers. In PM-UY, of the 63% eligible households, 94% of the families received the benefits. In sum, the PMGKY emergency relief package was timely and met the goals of helping a maximum number of farming households. The direct benefit schemes, like PM-KISAN, PM-UY, and PM-JDY, were efficient in reaching beneficiaries, compared with the in-kind support scheme (PM-AVY) of the PMGKY emergence relief package.

The study found smallholders who received payments under the PM-KISAN component of the PMGKY scheme were more likely to invest in the procurement of seeds but not in fertilizer and pesticides. The study found that unexpected payments both in the form of direct transfers (PM-JDY) and in-kind support (PM-UY) had a significant effect on relaxing the liquidity constraint on smallholders. In contrast, payments under the PMGKY scheme (PM-KISAN, PM-UY, PM-JDY, and PM-AVY) significantly induced smallholders to buy seeds, fertilizers, and

### Table 7 Marginal Effects of Benefits Received from PM-GKY and Input Purchasing Decision, India 2020

| Variable                                      | (1) Agricultural input (seed or fertilizers and pesticides) | (2) Seeds | (3) Fertilizer and pesticides |
|------------------------------------------------|-----------------------------------------------------------|-----------|------------------------------|
| Benefit from PM-GKY (INR thousand)            | 0.048*** (0.008)                                           | 0.049*** (0.007) | 0.009 (0.004) |
| Socio-economic and agriculture profile        | Yes                                                       | Yes       | Yes                          |
| Social network                                | Yes                                                       | Yes       | Yes                          |
| Village characteristics                        | Yes                                                       | Yes       | Yes                          |
| Plot characteristics                          | Yes                                                       | Yes       | Yes                          |
| State fixed effect                            | Yes                                                       | Yes       | Yes                          |
| Prob > chi$^2$                                 | 0.000                                                     | 0.000     | 0.000                        |
| Pseudo R$^2$                                   | 0.101                                                     | 0.109     | 0.194                        |
| No. of observation                            | 1,789                                                     | 1,727     | 1,455                        |

*Note: Each column is a result from separate probit regression. The left hand side variable in column 1 is agricultural input that takes value 1 if farmer procured either seed or fertilizer and pesticides and 0 otherwise. In column 2, the LHS variable seed takes value 1 if farmer procured seed and 0 if not procured agricultural input. In column 3, the LHS variable fertilizer and pesticides takes value 1 if farmer procured fertilizers and pesticides and 0 if not procured agricultural input. The right hand side variable of interest is benefit from all four schemes: the amount that farmer received through all the four schemes.***Significant at 1%. Robust standard errors in the parentheses.
pesticides for the upcoming farming season. A key insight from this analysis is the fungibility of benefits under PMGKY. In other words, smallholders showed the ability to mitigate liquidity constraints through multiple components of PMGKY. The results from this study are impressive for any public cash transfer program, let alone the challenges of executing them during an unprecedented lockdown of the economy. The success of PMGKY, one would argue, is a testament to India’s investments in direct benefit transfer infrastructure (for example, the Digital India flagship program of the government of India) in recent years and in the safety nets infrastructure (Thomas, 2012) over the recent decades.

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ENDNOTES
1 The nationwide lockdown was announced on March 23, 2020.
2 https://economictimes.indiatimes.com/news/economy/indicators/indias-economy-to-contract-by-3-2-per-cent-in-fiscal-year-2020-21-world-bank/articleshow/76266999.cms?from=mdr. https://www.thehindu.com/business/Economy/imf-projects-sharp-contraction-of-45-in-indian-economy-in-2020/article31907715.ece
3 https://economictimes.indiatimes.com/news/economy/agriculture/farming-sector-will-not-be-impacted-by-coronavirus-agriculture-minister/articleshow/75450174.cms?from=mdr
4 https://eands.dacnet.nic.in/Advance_Estimate/3rd_Adv_Estimates2019-20_Eng.pdf
5 There is no requirement to maintain any minimum balance in accounts, interest is earned on the deposit, and accidental insurance cover for INR 1 Lac.
6 The state governments issued ration cards based on the deprivation criteria. For example, Uttar Pradesh excludes income taxpayers and owners of four wheelers, pucca houses, etc., and includes households with kutcha houses, etc.
7 https://www.rbi.org.in/scripts/PublicationsView.aspx?id=16603
8 Earlier surveys were focused on technology adoption.
9 Wheat, mustard, and gram are Rabi season (spring) crops. Paddy, soyabean, peal millet, and maize are Kharif season (fall) crops. Sugarcane is a year-round crop.
10 Average time duration of the phone survey is 16 minutes. Original number of households surveyed is 1868. Eighty-nine farmers have missing information in at least one of the indicators considered for the study and hence, we dropped those observations.
11 Our earlier surveys did not include the cost of cultivation data. Therefore, the data is taken from the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India.
Among states, paddy has highest coverage (in terms of area) in Uttar Pradesh. Pearl millet has highest coverage (in area) in Rajasthan. Soybean covers the highest area in Uttar Pradesh. For maize, we consider Rajasthan.

In PM-AVY, each member of the family is entitled to 5 kg of wheat/rice and 1 kg of pulse per household.

Asset index, a proxy for wealth, was constructed using principal component analysis of asset ownership such as bicycle, radio, television, DVD player, mobile phone (non-smart), two-wheeler, four-wheeler, refrigerator, cooler, fan, and computer (or laptop).

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**SUPPORTING INFORMATION**

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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