# Supplemental Appendix for *In-Kind Transfers as Insurance*

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# A1 Comparing the optimal and in-kind transfer

In this section, we show that in-kind transfers will not equal the optimal transfer except in special cases. As a result, the in-kind transfer will generally not provide the same welfare benefit as the optimal transfer. Intuitively, the in-kind transfer provides insurance in proportion to the in-kind transfer quantity, rather than the individual's preferences.

To highlight this intuition, we focus on the simple case where income is fixed and only the price of the in-kind good varies. Equation 1, restated here, tells us that the optimal transfer $x(p_j)$ equates the marginal value of income for all prices $p_j$, or all states of the world:

$$v_y(p, y + x(p_j)) = \mu$$

Taking the derivative with respect to $p_j$,

$$v_{yp} + v_{yy}x'(p_j) = 0$$

Rearranging and taking advantage of the fact that $\frac{v_{py}}{v_y} = \frac{\alpha_j}{p_j}[\gamma - \eta_j]$ and $\frac{v_{yy}}{v_y} = \frac{-\gamma}{y}$,[1] we have that

$$x'(p_j) = \frac{q_j[\gamma - \eta_j]}{\gamma} \tag{A1}$$

where $q_j$ is consumption of the in-kind good. In contrast, for the in-kind transfer $p_j z$, the marginal change in the transfer with respect to $p_j$ is $z$. The in-kind transfer therefore emulates the optimal transfer if and only if $z = \frac{q_j[\gamma - \eta_j]}{\gamma}$. Otherwise, it will provide either too much or too little insurance.

[1] These expressions follow from taking the derivative of Roy's identity with respect to $p_j$, and from the definition of the coefficient of relative risk aversion respectively.

# A2 Additional notes on data

## A2.1 Sample

Our data come from the Household Consumer Expenditure schedules of the 59$^{th}$ through 68$^{th}$ rounds of the Indian National Sample Survey, covering January 2003 through June 2012. The expenditure survey was not administered in rounds 65 and 67, so we have a gap from July 2008–June 2009 and July 2010–June 2011. We exclude Union Territories and Delhi from our analysis, which gives 28 distinct states. In total, our sample includes 524,911 households.

We considered including data from earlier rounds of the NSS. However, the 58$^{th}$ and earlier rounds are based on the 1991 Census, rather than the 2001 Census. This presents two difficulties. First, the weights change drastically, because of large population changes between the two years, which presents difficulties in interpretation. Second, many district definitions change between the 58$^{th}$ and 59$^{th}$ rounds, mostly as a result of district splits. Creating consistent district identifiers would therefore mean using the larger 58$^{th}$ round districts, limiting our geographic precision and reducing the number of unique districts by 17%. Table A1 provides a full list of the rounds included in our analysis, and periods they cover.

## A2.2 Detecting data errors in unit values

Before taking mean unit values to use as price measures, we remove some obvious data errors. The errors seem to be arising from errors in the unit measures. Most of the obvious outliers have quantities that are very small, which suggests that they may have been reported in different units. In some cases, the quantity appears to be 10x or 100x too small. We identify these using the following two methods;

We identify outliers for all our items using two methods:

- SD rule: We first trim the top and bottom 1% of UVs by item-round to create $UV_{trim}$. We then take the median and SD of $UV_{trim}$ by item-round. The idea here is to get a close to accurate measure of the SD for every item, since some SDs are more skewed than others, depending on how much of an issue outliers are for the item. Once we trim the the unit values, the SDs generally become very small, indicating that a few very big outliers are causing the SDs to be skewed. We then identify outliers as UVs outside $15 \times SD_{trim}$ above/below the median. Using 10 or anything smaller as the threshold seems to capture observations that could be valid data. 12 and 15 produce similar results, so we use the less restrictive threshold.

- Factor rule: To deal with quantities that seem to have been reported in different units,

we identify observations that are ... .08x-.12x, 8x-12x, 80x-120x ... greater than the item-round or area-period median.

We use this procedure when we calculate the rice prices in our main analysis, and for all prices when we construct the Laspeyres index in Section A2.3.

## A2.3 Real consumption

An alternative to using calories as an outcome would be to instead use real consumption. The main difficulty with this approach is measuring local prices for all consumption categories. While the NSS records expenditure in each category, for we can measure prices only for those categories that record quantities and are relatively homogenous.[2] We are able to construct unit-value prices for 73.7% of food expenditure, but only 16.7% of non-food expenditure (food and non-food are each about half of the budget). The vast majority of the non-food consumption for which we observe prices is fuel.

Using unit values for food and fuel, we construct a region-sector-quarter level Laspeyres price index. We also measure nominal expenditure, imputing the level of consumption for PDS goods at the level of the market price in line with our inframarginality assumption and including consumption from home production as valued by the NSS surveyors. Combining these, we construct a measure of real consumption.[3]

In Tables A3 and A11 we reproduce our main results using log real consumption as the dependent variable. Table A3 shows that real consumption is lower when market rice prices are high, indicating that higher prices are not fully offset by higher expenditures. Similarly as in our calorie results, we observe a stronger negative relationship between market rice prices and log real consumption for below-median SES households than for above-median SES households. Panel A of Table A11 shows the effect of the PDS on real consumption; a Rs. 100 increase in the value of the PDS increases consumption by 5.4 percent overall, and 6.5 percent for below-median SES households. Panel B regresses log real consumption on market prices, PDS value, and their interaction (with PDS value and the price interaction instrumented as discussed in Section 5). In line with our calorie results, higher prices are associated with lower consumption but this relationship is attenuated by higher PDS transfers.

[2]For example, "other tobacco products" measures quantities in grams, but could include different products in different times and places.

[3]We considered using only food and fuel nominal expenditure to match the price index, but this would overstate the extent to which real consumption drops when prices are high as households substitute away from food and fuel consumption.

# A3 PDS policy changes

## A3.1 Institutional and political context

The PDS has a long history, with antecedents in British times related to public food distribution to avoid famines. In the modern era, the Central Government, through the Food Corporation of India, procures foodgrains from farmers via a vast network of intermediary agencies. These grains are stored in FCI warehouses across the country. State governments obtain grain from these warehouses and distribute it locally via Fair Price Shops (FPSs, or "ration shops"), of which there are over half a million across the nation. Households are assigned to local FPSs, from whom they obtain grains at the last mile after paying the subsidized price (in some cases, like in the state of Tamil Nadu, there is no charge for obtaining PDS rice).

PDS policy is set at the national level by the Central Government, with state governments supplementing national benchmarks with their own policies. The Central Government sets what is called the "Central Issue Price," the highly subsidized rate at which state governments can procure grains from the central pool and distribute to citizens. In addition, the central government also determines quotas for the number of people who are eligible to receive PDS grains.

For the era that is relevant to our study, the main national policy reform was the introduction of the Targeted PDS (TPDS) in 1997, which was further revised in 2000-01. Under TPDS, households were categorized as Above Poverty Line (APL), Below Poverty Line (BPL), or Antyodaya (poorest of the poor). For the most part, APL households were effectively ineligible for the TPDS since the PDS price set for them was often higher than the market price for equivalent grains. Meanwhile, there were very few officially sanctioned Antyodaya households; for this reason, we mainly focus on BPL households and the PDS policies relevant for these households (as does most of the literature). In 2014, the National Food Security Act was passed, which completely overhauled the functioning of the PDS; we therefore study the period between 2003-12, which falls between the two major national policy changes and corresponds to available NSS data in that period.

As part of the introduction of the TPDS, the Central Government used poverty rates from 1993-94 to determine the number of BPL households (eligible for PDS subsidies) in each state. This was the number of households whose PDS entitlement—at Central Government-set PDS prices—the Central Government committed to pay for in each state.

However, state governments were free to use their own revenues to supplement Central Government subsidies, by either expanding the number of households eligible for the PDS, and/or reducing the rates charged. There are many such instances of state government

policies, which is what we exploit in our analysis. For example, Khera (2011) notes that "since 2003, many state governments have felt that the caps on BPL cards imposed by the central government are too stringent," going on to set their own eligibility numbers. The same article goes on to point out the "renewed political interest" in the PDS in the mid-aughts, resulting in both increased eligibility and reduced prices for PDS grains.

## A3.2 Reform determinants

The motivation for these state level policy changes was mainly political—indeed, in a democratic system, to some extent all policy reforms are politically motivated. State governments or opposition parties would often advertise these reforms before elections, making them part of their platforms. However, they are of course not always able to implement these promises, and moreover incumbent governments are restricted in implementing big policy changes right before elections by the election commission.

In Table A14 we consider whether states which reformed the PDS at some point during our period of study (either through an expansion or a statutory price change) had different characteristics at the start of the period. We find that households in these states were of similar SES status and faced similar market conditions (in particular no difference in the market price of rice) as states in which no reforms happened. The only difference we observe is that states which made their PDS system more generous over 2003-2012 already had slightly more generous PDS systems to start with: a higher share of the population purchased rice from the PDS, and when they did they paid a slightly lower price than in states which never had a reform. To reflect these slight differences across the control and treatment locations, in our main analysis we control throughout for district-sector fixed effects which capture time-invariant state characteristics such as baseline PDS characteristics that could affect outcomes.

We also consider whether observable state characteristics can explain the timing of the reforms, by looking at the evolution of these characteristics prior to the reform in reforming states in Table A15. Specifically, for the period prior to the reform we regress these characteristics on an indicator for the six months immediately before the reform, conditioning on state and period fixed effects. We include the non-reform states to help identify the period fixed effects.

Here again, we see no evidence that reforming states were on a different trajectory prior to implementing reforms. There are no large or statistically significant changes in market rice prices, PDS generosity, or measures of caloric intake. We view these results as consistent with the event study graphs in Figure 3, which find flat pre-trends in PDS value and meeting the MCR in the years before the reforms.

### A3.3 Other potential confounders

It is also possible that other concurrent factors, including other social welfare programs, may drive our results. First, we confirm that political cycles—which could perhaps coincide with price cycles—are not driving our results. We do so by including controls for electoral cycles, as shown in Table 8. As is clear from Column 2, including these cycles does not make any qualitative difference to our results.

Since the PDS is a large and expensive program, and local governments are restricted in their revenue raising capacities (Rao, 2019), these policy changes are unlikely to be linked to other programs or changes at the local level. However, during the course of our study period the National Rural Employment Guarantee Act (NREGA) was passed, setting up India's other large social protection program (see Sukhtankar (2017) for more details on NREGA). NREGA entitles rural households to 100 days of paid employment on demand, doing manual labor at minimum wages, and state programs were rolled out from 2005-07. Given that the rollout was at the district level, and the policy changes we exploit were at the state level, it is unlikely that the rollout affects our estimates. Nonetheless, given the size of the program and the targeting of the poor, we also check that the NREGA rollout is not driving our results, by including indicators for the rollout at the district level as controls. Again, Table 8 shows that our results are robust to the NREGA rollout.

# A4 Appendix Exhibits

Figure A1: Share purchasing PDS by per-capita expenditure

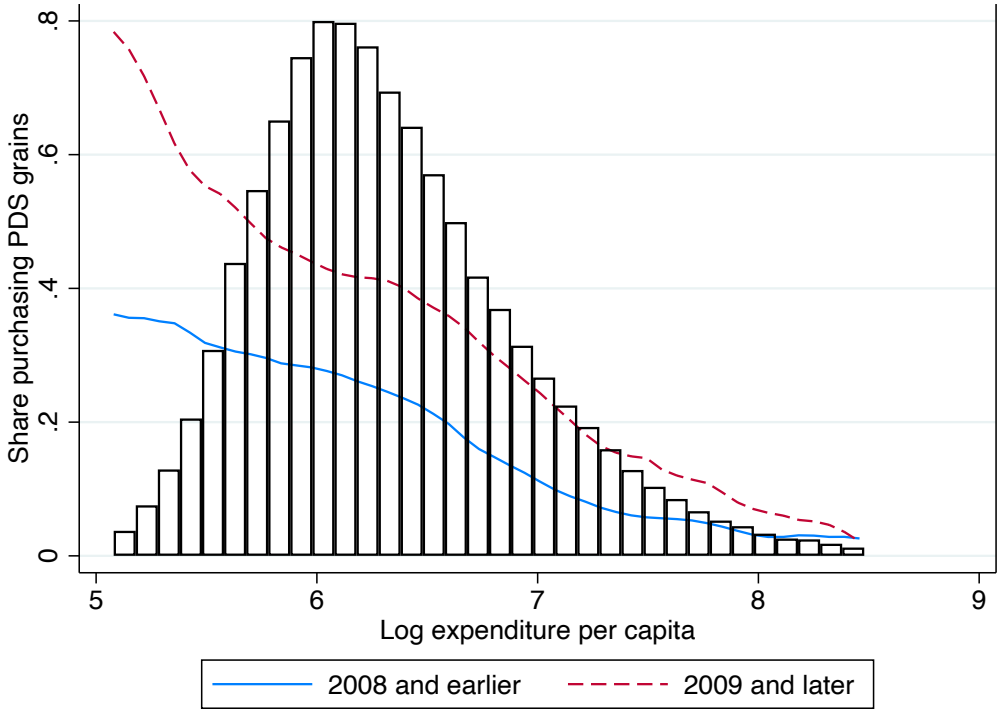
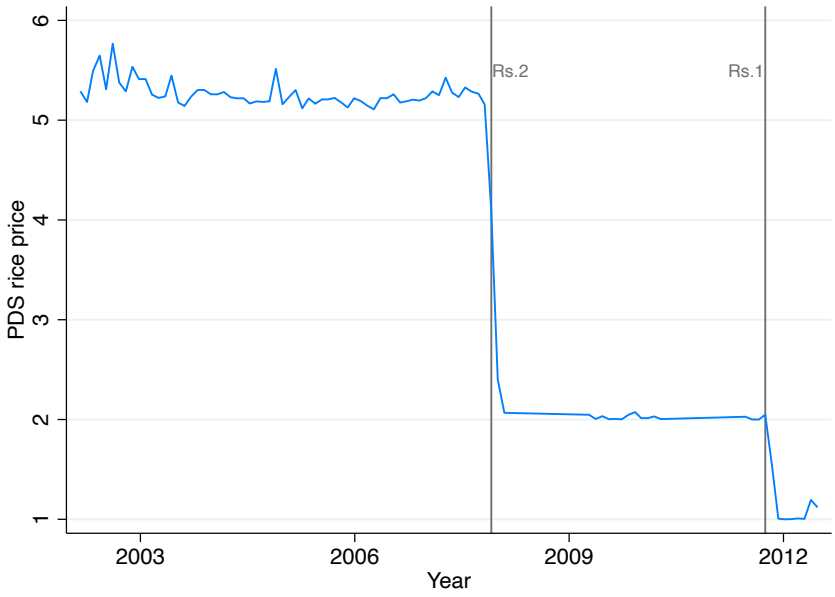


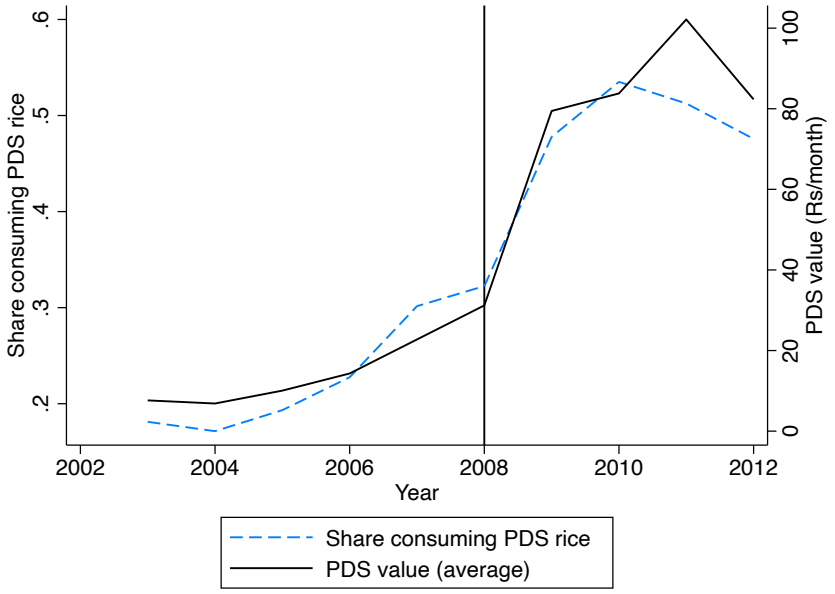

Figure shows share of households consuming PDS rice before and after 2008. The histogram shows the distribution of per-capita income, in 1999 rupees. The exchange rate was 43 rupees to one USD.

Figure A2: Example PDS policy changes

(a) Statutory PDS rice prices in Andhra Pradesh

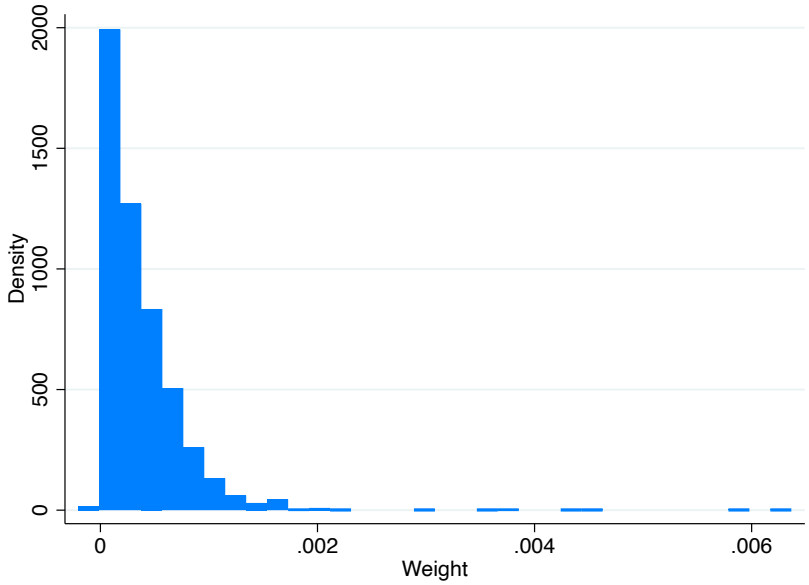



(b) Share of population consuming PDS in Odisha



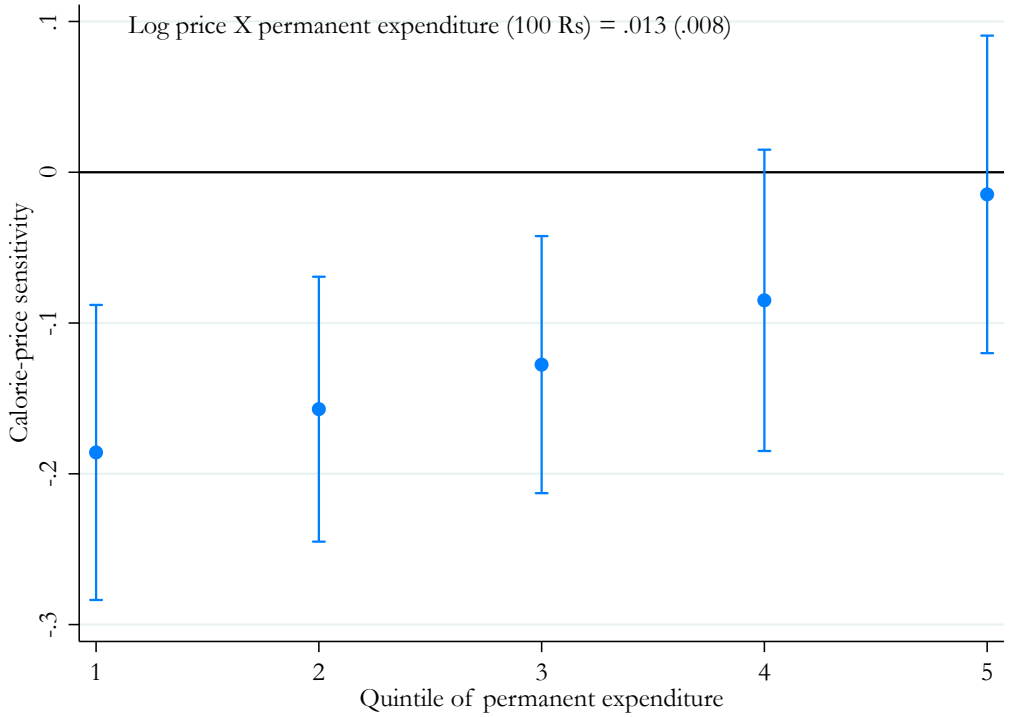

Panel A shows monthly average PDS rice prices in Andhra Pradesh, measured using NSS unit values. Vertical lines highlight two statutory price reductions.Panel B shows the share of households consuming PDS rice (left axis) and average PDS value (right axis) in Odisha in each year in our sample period, with the vertical line representing a reform that reduced prices and expanded the number of PDS-eligible households in 2008.

Figure A3: Distribution of weights on district-sector-time effects



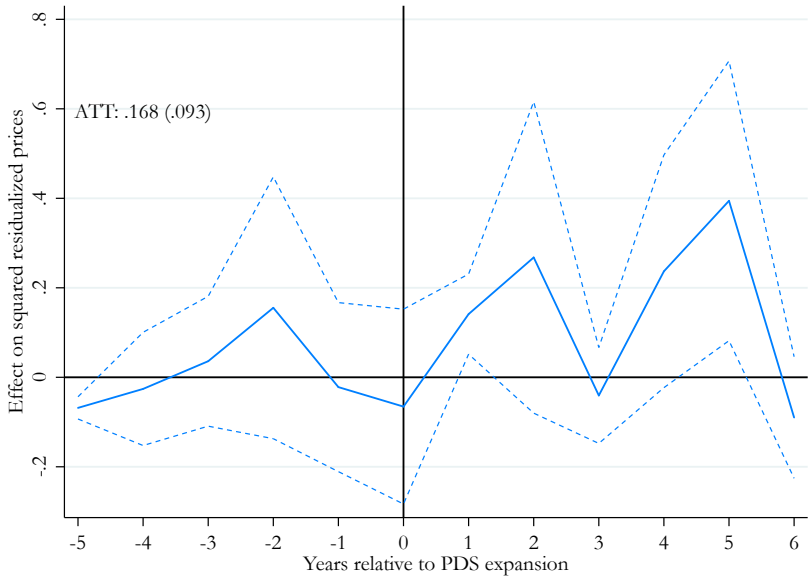

This figure shows the histogram of weights on the district-sector-period-specific treatment effects in a difference-in-differences estimate of the effect of the PDS eligibility expansions. 13 of 2,756 treated district-sector-periods have negative weights. Calculated using de Chaisemartin and D'Haultfœuille (2020).

Figure A4: Sensitivity of meeting the MCR on prices by SES quintile




This figure shows the coefficients from a regression of meeting the MCR on prices interacted with groups for each quintile of the within-state-year household SES distribution. SES is the predicted value from a regression of log expenditure per capita on permanent household characteristics, with district-sector-season and period fixed effects. Overlaid coefficient comes from the analogous regression of meeting the MCR on price and predicted SES interacted with price.

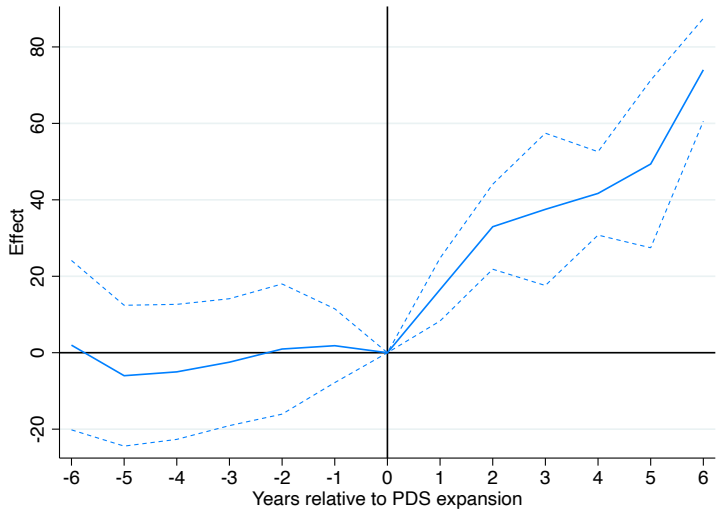
Figure A5: Effect of PDS eligibility expansions on market rice price variability



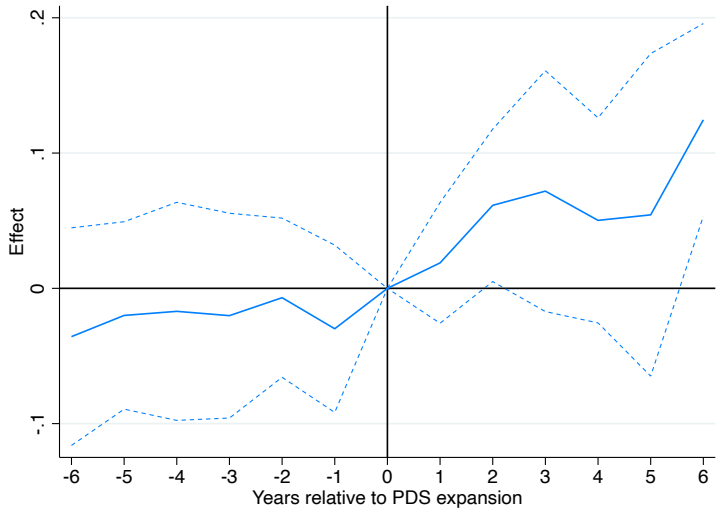

This figure shows event study coefficients from a regression of price variability on time relative to policy expansion: $y_{idt} = \sum_{\tau \neq 0} \beta_\tau \mathbb{1}_\tau + X_{idt}\alpha + \gamma_d + \varphi_t + \varepsilon_{iat}$, for household $i$ in district-sector-season $d$ and year $t$ at year relative to expansion $\tau$. Residualized market prices constructed from state-region-sector-specific regressions of prices on a quintic polynomial in quarter of surveying. Controls include PDS rice price, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Household-level SES is the predicted value from a regression of log expenditure per capita on permanent household characteristics, with district-sector-season, year-quarter, and NSS round fixed effects. Models are estimated using the imputation approach of Borusyak, Jaravel and Spiess (2021). Standard errors clustered at the state level.

Figure A6: Effect of PDS eligibility expansions on PDS transfer value and caloric intake (two-way fixed effects estimation)

(a) Effect on PDS transfer value




(b) Effect on meeting minimum calorie requirement




This figure shows event study coefficients from a regression of the outcome (PDS value in Panel (a) and an indicator for whether the household meets minimum calorie requirements in Panel (b)) on time relative to policy expansion: $y_{idt} = \sum_{\tau \neq 0} \beta_\tau \mathbb{1}_\tau + X_{idt}\alpha + \gamma_d + \varphi_t + \varepsilon_{iat}$, for household $i$ in district-sector-season $d$ and year-quarter $t$ at year relative to expansion $\tau$, where controls include PDS rice price, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Household-level SES is the predicted value from a regression of log expenditure per capita on permanent household characteristics, with district-sector-season, year-quarter, and NSS round fixed effects. Models are estimated using two-way fixed effects and contain year-quarter fixed effects, but are otherwise identical to Figure 3. Standard errors clustered at the state level.

Table A1: NSS data

| **NSS Rounds** | **Sample size** | **Time period** |
|---|---|---|
| 59 | 39,544 | Jan 2003 – Dec 2003 |
| 60 | 28,626 | Jan 2004 – Jun 2004 |
| 61* | 121,158 | Jul 2004 – Jun 2005 |
| 62 | 38,485 | Jul 2005 – Jun 2006 |
| 63 | 61,149 | Jul 2006 – Jun 2007 |
| 64 | 48,720 | Jul 2007 – Jun 2008 |
| 66* | 98,010 | Jul 2009 – Jun 2010 |
| 68* | 98,746 | Jul 2011 – Jun 2012 |

This table presents details on the National Sample Survey rounds used in our analysis. Asterisks indicate thick rounds which are representative at the district level. Thin rounds are only representative at the NSS region level.

Table A2: Summary statistics for number of observations defining rice unit values

| | Mean (SD) | Percentile | | | | |
|---|---|---|---|---|---|---|
| | | 1% | 5% | 10% | 25% | 50% |
| *Panel A: Region-quarter level* | | | | | | |
| Rice UV, unweighted | 112.29 (103.53) | 7 | 16 | 23 | 42 | 78 |
| PDS rice | 38.63 (56.19) | 1 | 1 | 2 | 5 | 16 |
| *Panel B: District-quarter level* | | | | | | |
| Rice UV, unweighted | 14.94 (15.81) | 1 | 3 | 4 | 6 | 10 |
| PDS rice | 7.82 (9.86) | 1 | 1 | 1 | 2 | 4 |

Table shows summary statistics and percentiles for number of observations defining unit values at region-sector-period level. Standard deviations in parentheses.

Table A3: Log real consumption and market prices by subsamples

| | All | By median SES | | By Census region | | Rural by landowning | |
|---|---|---|---|---|---|---|---|
| | | Below | Above | Rural | Urban | Landless | Landowning |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Log market rice price | -0.167*** | -0.198*** | -0.145*** | -0.175*** | -0.143*** | -0.088 | -0.203*** |
| | (0.041) | (0.057) | (0.042) | (0.055) | (0.051) | (0.072) | (0.055) |
| Equality of effect ($p$-value) | | | 0.36 | | 0.67 | | 0.07 |
| Observations | 519,573 | 210,163 | 309,410 | 313,031 | 206,542 | 62,848 | 250,183 |

Table displays regression of log calories per-capita on log market prices for rice. All specifications include district-sector-season and period fixed effects. Demographic controls are log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. All households owning 0.2 hectares of land or greater are classified as landowning. Household-level SES are the predicted values from a projection of log expenditure per capita on permanent household characteristics, with geographic unit and period fixed effects. Period fixed effects include calendar and NSS round fixed effects. Standard errors in parentheses and clustered at the region-sector level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Log RPS prices on log NSS unit value prices

| | All | By median SES | | By landowning | |
|---|---|---|---|---|---|
| | | Below | Above | Landless | Landowner |
| | (1) | (2) | (3) | (4) | (5) |
| Log market rice price | 0.576*** | 0.558*** | 0.654*** | 0.582*** | 0.573*** |
| | [0.063] | [0.065] | [0.068] | [0.075] | [0.062] |
| Observations | 175,065 | 117,814 | 57,251 | 36,655 | 138,410 |

This table shows regressions of log rice prices from the Rural Price Survey (RPS) on log market rice leaveout mean unit values from the National Sample Survey from 2003-2012. All specifications include district-sector-season and period (calendar quarter and NSS round) fixed effects. Controls include log market rice unit value, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Household-level SES is the predicted value from a regression of log expenditure per capita on permanent household characteristics, with district-sector-season, year-quarter, and NSS round fixed effects. All households owning 0.01 hectares of land or greater are classified as landowning. Standard errors in parentheses and clustered at the region-sector level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Log calories per adult equivalent and market prices by subsample

| | All | By median SES | | By Census region | | Rural by landowning | |
|---|---|---|---|---|---|---|---|
| | | Below | Above | Rural | Urban | Landless | Landowning |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Log market rice price | -0.078** | -0.144*** | -0.021 | -0.120*** | -0.001 | -0.154** | -0.119*** |
| | (0.030) | (0.039) | (0.030) | (0.041) | (0.032) | (0.074) | (0.034) |
| Equality of effect ($p$-value) | | | 0.00 | | 0.02 | | 0.60 |
| Observations | 524,911 | 211,796 | 313,115 | 316,234 | 208,677 | 63,614 | 252,620 |

Table displays regression of log calories per adult equivalent on log market prices for rice. All specifications include district-sector-season and period fixed effects. Demographic controls are log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. All households owning 0.2 hectares of land or greater are classified as landowning. Household-level SES are the predicted values from a projection of log expenditure per capita on permanent household characteristics, with geographic unit and period fixed effects. Period fixed effects include calendar and NSS round fixed effects. Standard errors in parentheses and clustered at the region-sector level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: PDS eligibility expansions

| State | Policy Change | Type |
|---|---|---|
| Tamil Nadu | December 31, 2004 | Expansion |
| Chhattisgarh | April 30, 2007 | Expansion |
| Karnataka | June 1, 2008 | Expansion |
| Odisha | August 1, 2008 | Expansion/price reduction |
| Kerala | April 16, 2011 | Expansion |

This table shows the major expansions in PDS eligibility used in our analysis, as noted in Section 5.1.

Table A7: First stage of PDS value (in 100 Rs.) on instruments

| | All | By median SES | | By Census region | | Rural by landowning | |
|---|---|---|---|---|---|---|---|
| | | Below | Above | Rural | Urban | Landless | Landowning |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| PDS price (Rs.) | -0.097*** | -0.126*** | -0.064** | -0.106** | -0.063** | -0.102*** | -0.107** |
| | (0.035) | (0.043) | (0.025) | (0.039) | (0.026) | (0.033) | (0.042) |
| Eligibility increase (=1) | 0.513*** | 0.542*** | 0.449*** | 0.525*** | 0.501*** | 0.481*** | 0.539*** |
| | (0.103) | (0.114) | (0.093) | (0.114) | (0.107) | (0.122) | (0.127) |
| Eligibility increase × PDS price | -0.116*** | -0.099* | -0.120*** | -0.108** | -0.148*** | -0.117** | -0.102** |
| | (0.038) | (0.049) | (0.025) | (0.045) | (0.030) | (0.045) | (0.049) |
| Effective F-stat | 19.07 | 17.03 | 16.37 | 17.30 | 16.47 | 15.19 | 15.57 |
| 10% bias crit. val. | 18.66 | 17.84 | 18.87 | 18.14 | 19.84 | 20.14 | 17.79 |
| Observations | 524,911 | 211,796 | 313,115 | 316,234 | 208,677 | 63,614 | 252,620 |

This table reports regressions of PDS transfer value on PDS statutory rice prices, PDS expansion indicator, and their interaction. PDS value is calculated as the difference between market and PDS rice prices multiplied by household-level PDS quantities (expressed in units of 100). Market and PDS prices are average unit values of market and PDS rice at region-sector-period level. Statutory rice prices are state-mandated prices per kilogram of PDS rice for households below the poverty line. Expansion indicates if a household is surveyed in an expansion state after the date of expansion of the PDS reported in Table A6. All prices are deflated to 1999 rupees. All specifications include district-sector-season and period (calendar quarter and NSS round) fixed effects. Household controls include log market rice leaveout unit value, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Household-level SES is the predicted value from a regression of log expenditure per capita on permanent household characteristics, with district-sector-season, year-quarter, and NSS round fixed effects. Standard errors in parentheses and clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Effect of PDS generosity on meeting minimum calorie requirement

| | All | By median SES | | By sector | | Rural by landowning | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| *Panel A: IV of meeting minimum calorie requirement on PDS value* | | | | | | | |
| PDS value (100 Rs.) | 0.107** | 0.136** | 0.079 | 0.120** | 0.081 | 0.176*** | 0.106** |
| | (0.052) | (0.063) | (0.048) | (0.054) | (0.055) | (0.060) | (0.048) |
| Effective F-stat | 19.07 | 17.01 | 16.34 | 17.30 | 16.47 | 15.19 | 15.57 |
| 10% bias crit. val. | 18.66 | 17.84 | 18.87 | 18.14 | 19.84 | 20.14 | 17.79 |
| *Panel B: IV of meeting minimum calorie requirement on PDS value* | | | | | | | |
| Log market rice price | -0.260*** | -0.466*** | -0.124*** | -0.351*** | -0.174*** | -0.491*** | -0.282*** |
| | (0.054) | (0.086) | (0.043) | (0.083) | (0.045) | (0.083) | (0.072) |
| Market price × PDS value | 0.177** | 0.209*** | 0.274** | 0.160** | 0.422** | 0.108 | 0.112 |
| | (0.066) | (0.075) | (0.105) | (0.073) | (0.170) | (0.085) | (0.093) |
| Pred. rice elasticity at mean PDS | -0.207*** | -0.382*** | -0.072* | -0.301*** | -0.070 | -0.450*** | -0.249*** |
| | (0.051) | (0.094) | (0.035) | (0.077) | (0.049) | (0.091) | (0.062) |
| Mean PDS value | 0.30 | 0.40 | 0.19 | 0.31 | 0.25 | 0.38 | 0.29 |
| SD PDS value | 0.606 | 0.670 | 0.513 | 0.593 | 0.636 | 0.634 | 0.575 |
| $1^{th}$ percentile PDS value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| $99^{th}$ percentile PDS value | 2.559 | 2.700 | 2.330 | 2.416 | 2.733 | 2.564 | 2.367 |
| Observations | 524,911 | 211,772 | 313,139 | 316,234 | 208,677 | 63,614 | 252,620 |

This table shows coefficients from regression of a dummy for meeting the minimum caloric requirement (MCR) on PDS value (in Panel A) and PDS value, market rice prices and their interaction (Panel B). In Panel A, PDS value is calculated as the difference between market and PDS rice prices multiplied by household-level PDS quantities (expressed in units of 100 Rs.), and instrumented for with state-level statutory PDS prices, a dummy for state-level PDS expansions, and their interaction. In Panel B, the same three instruments are included, as well as their interactions with market prices. Model (1) includes all PDS instruments, (2) includes all PDS instruments but excludes states supplying the majority of rice to the PDS, (3) includes all PDS instruments but controls for active NREGA program in district at the time of surveying as well as elections at the state-quarter level, (4) instruments for PDS value with statutory rice price instruments alone, and (5) instruments for PDS value with expansion instruments alone. For comparison, mean per-capita expenditure is 711 Rs. All specifications include district-sector-season and period (calendar quarter and NSS round) fixed effects. Controls include log market rice unit value, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Standard errors clustered at the state level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Effect of PDS generosity on caloric outcomes

| | Meets MCR | | | Log calories per capita | | |
|---|---|---|---|---|---|---|
| | All | Below median SES | Above median SES | All | Below median SES | Above median SES |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: IV of outcomes on PDS value* | | | | | | |
| PDS value (100 Rs) | 0.107** | 0.136** | 0.078 | 0.064 | 0.062 | 0.069 |
| | (0.052) | (0.063) | (0.048) | (0.040) | (0.039) | (0.041) |
| Equality of effects ($p$-value) | | | 0.049 | | | 0.690 |
| Effective F-stat | 19.07 | 17.03 | 16.36 | 19.07 | 17.03 | 16.36 |
| 10% bias crit. val. | 18.66 | 17.84 | 18.87 | 18.65 | 18.15 | 18.85 |
| Wild bootstrap $p$-value | 0.142 | 0.086 | 0.338 | 0.270 | 0.098 | 0.322 |
| *Panel B: IV of outcomes on PDS value* | | | | | | |
| Log market rice price | -0.260*** | -0.467*** | -0.123*** | -0.166*** | -0.260*** | -0.106*** |
| | (0.054) | (0.086) | (0.044) | (0.033) | (0.057) | (0.030) |
| Market rice price × PDS value | 0.177** | 0.208*** | 0.274** | 0.149*** | 0.143*** | 0.247*** |
| | (0.066) | (0.075) | (0.105) | (0.049) | (0.045) | (0.073) |
| Equality of effects ($p$-value) | | | | | | |
| Log market rice price | | | 0.000 | | | 0.011 |
| Market rice price × PDS value | | | 0.435 | | | 0.026 |
| Pred. rice elasticity at mean PDS | -0.207*** | -0.383*** | -0.071* | -0.122*** | -0.203*** | -0.059** |
| | (0.051) | (0.094) | (0.036) | (0.033) | (0.058) | (0.027) |
| Mean PDS value | 0.30 | 0.40 | 0.19 | 0.30 | 0.40 | 0.19 |
| SD PDS value | 0.604 | 0.668 | 0.512 | 0.604 | 0.668 | 0.512 |
| 1st percentile PDS value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 99th percentile PDS value | 2.556 | 2.685 | 2.325 | 2.556 | 2.685 | 2.325 |
| Wild bootstrap $p$-value, market price | 0.492 | 0.482 | 0.494 | 0.450 | 0.504 | 0.442 |
| Wild bootstrap $p$-value, market price × PDS | 0.016 | 0.004 | 0.002 | 0.000 | 0.004 | 0.000 |
| Observations | 524,911 | 211,679 | 313,232 | 524,911 | 211,795 | 313,232 |

See notes to Table 7. This table includes wild bootstrap $p$-values, in addition to asymptotic standard errors but is otherwise the same as Table 7. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Effect of PDS generosity on logged rice prices

| | All | By median SES | | By Census region | | Rural by landowning | |
|---|---|---|---|---|---|---|---|
| | | Below | Above | Rural | Urban | Landless | Landowning |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| *Panel A: PDS rice price instrument* | | | | | | | |
| PDS value (100 Rs) | -0.026 | -0.010 | -0.057 | -0.015 | -0.065 | -0.051 | -0.004 |
| | (0.057) | (0.044) | (0.085) | (0.054) | (0.084) | (0.086) | (0.048) |
| Effective F-stat | 8.11 | 8.31 | 7.63 | 7.79 | 7.34 | 9.88 | 7.07 |
| 10% bias crit. val. | 23.11 | 23.11 | 23.11 | 23.11 | 23.11 | 23.11 | 23.11 |
| *Panel B: PDS expansion instrument* | | | | | | | |
| PDS value (100 Rs) | -0.008 | -0.006 | -0.012 | -0.002 | -0.022 | -0.039 | 0.009 |
| | (0.044) | (0.040) | (0.053) | (0.043) | (0.039) | (0.058) | (0.040) |
| Effective F-stat | 17.76 | 15.57 | 12.74 | 19.99 | 10.74 | 13.88 | 19.61 |
| 10% bias crit. val. | 23.11 | 23.11 | 23.11 | 23.11 | 23.11 | 23.11 | 23.11 |
| *Panel C: PDS rice price, expansion, and interaction instruments* | | | | | | | |
| PDS value (100 Rs) | -0.006 | -0.000 | -0.016 | 0.002 | -0.030 | -0.020 | 0.010 |
| | (0.030) | (0.029) | (0.033) | (0.032) | (0.019) | (0.036) | (0.033) |
| Effective F-stat | 17.21 | 14.51 | 16.34 | 15.56 | 15.77 | 12.61 | 14.78 |
| 10% bias crit. val. | 17.99 | 16.77 | 19.01 | 16.81 | 19.99 | 20.57 | 16.88 |
| Observations | 524,911 | 211,796 | 313,115 | 316,234 | 208,677 | 63,614 | 252,620 |

Panel A displays results of instrumental variables regression of log rice unit values on PDS value, instrumented by PDS rice price. Panel B displays results of instrumental variables regression of log rice unit values on PDS value, instrumented by PDS expansion. Panel C displays results of instrumental variables regression of log rice unit values on PDS value, instrumented by PDS rice price, PDS expansion, and their interaction. Weak IV F-stats are the effective F-stat of Montiel Olea-Pflueger (2013) in all panels. Controls include log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Standard errors clustered at the state level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A11: Effect of PDS generosity on log real expenditure

| | All | Below median SES | Above median SES |
|---|---|---|---|
| | (1) | (2) | (3) |
| *Panel A: IV of log real expenditure on PDS value* | | | |
| PDS value (100 Rs) | 0.054* | 0.065* | 0.040 |
| | (0.031) | (0.032) | (0.035) |
| Effective F-stat | 19.02 | 16.85 | 16.80 |
| 10% bias crit. val. | 18.74 | 17.50 | 19.05 |
| *Panel B: IV of log real expenditure on PDS value* | | | |
| Log market rice price | -0.258*** | -0.325*** | -0.222*** |
| | (0.047) | (0.065) | (0.051) |
| Market rice price × PDS value | 0.159** | 0.128*** | 0.288*** |
| | (0.060) | (0.039) | (0.102) |
| Pred. rice elasticity at mean PDS value | -0.210*** | -0.273*** | -0.166*** |
| | (0.039) | (0.061) | (0.046) |
| Mean PDS value | 0.30 | 0.41 | 0.19 |
| SD PDS value | 0.609 | 0.672 | 0.518 |
| 1st percentile PDS value | 0.000 | 0.000 | 0.000 |
| 99th percentile PDS value | 2.564 | 2.704 | 2.337 |
| Observations | 519,573 | 210,163 | 309,410 |

This table shows coefficients from regression of log real expenditure on PDS value (in Panel A) and PDS value, market rice prices and their interaction (Panel B). In Panel A, PDS value is calculated as the difference between market and PDS rice prices multiplied by household-level PDS quantities (expressed in units of 100 Rs.), and instrumented for with state-level statutory PDS prices, a dummy for state-level PDS expansions, and their interaction. In Panel B, the same three instruments are included, as well as their interactions with market prices. For comparison, mean per-capita expenditure is 708 Rs. All specifications include district-sector-season and period (calendar quarter and NSS round) fixed effects. Controls include log market rice unit value, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Standard errors clustered at the state level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Effect of market rice prices on caloric outcomes, by predicted caloric intake

| | Meets MCR | | | Log calories per capita | | |
|---|---|---|---|---|---|---|
| | All | Below median SES | Above median SES | All | Below median SES | Above median SES |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log market rice price | -0.136*** | -0.214*** | -0.073** | -0.075** | -0.115** | -0.023 |
| | (0.040) | (0.064) | (0.035) | (0.029) | (0.053) | (0.029) |
| Market rice price × pred. calories | 0.512** | 0.331 | 0.518** | 0.283* | 0.277 | 0.043 |
| | (0.234) | (0.234) | (0.248) | (0.150) | (0.233) | (0.184) |
| Implied price × PDS effect | .033 | .021 | .037 | .018 | .017 | .003 |
| Observations | 524,911 | 211,796 | 313,115 | 524,911 | 211,796 | 313,115 |

This table shows coefficients from regression of meeting the MCR and log calories per capita on log market rice prices and their interaction with predicted caloric intake. Predicted caloric intake comes from a regression of caloric intake on the SES predictors. The implied price × PDS effect comes from multiplying the log market rice prices × predicted calorie coefficient by the effect of the an extra 100 Rs of PDS value (from Panel A of Table 7). All specifications include district-sector-season and period (calendar quarter and NSS round) fixed effects. Controls include log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Standard errors clustered at the state level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Effect of PDS generosity on caloric outcomes

| | Meets MCR | | | Calories per adult equiv. | | |
|---|---|---|---|---|---|---|
| | All | Below median SES | Above median SES | All | Below median SES | Above median SES |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: IV of outcomes on PDS value* | | | | | | |
| PDS value (100 Rs) | 0.107** | 0.136** | 0.078 | 0.082* | 0.077* | 0.094** |
| | (0.052) | (0.063) | (0.048) | (0.041) | (0.039) | (0.043) |
| Equality of effects ($p$-value) | | | 0.049 | | | 0.290 |
| Effective F-stat | 19.07 | 17.03 | 16.37 | 19.07 | 17.03 | 16.37 |
| 10% bias crit. val. | 18.66 | 17.84 | 18.87 | 18.67 | 17.96 | 18.84 |
| *Panel B: IV of outcomes on PDS value* | | | | | | |
| Log market rice price | -0.260*** | -0.468*** | -0.123*** | -0.189*** | -0.292*** | -0.109*** |
| | (0.054) | (0.086) | (0.044) | (0.037) | (0.054) | (0.039) |
| Market rice price × PDS value | 0.177** | 0.209*** | 0.274** | 0.167*** | 0.151*** | 0.245*** |
| | (0.066) | (0.075) | (0.105) | (0.054) | (0.046) | (0.074) |
| Equality of effects ($p$-value) | | | | | | |
| Log market rice price | | | 0.000 | | | 0.003 |
| Market rice price × PDS value | | | 0.438 | | | 0.040 |
| Pred. rice elasticity at mean PDS | -0.207*** | -0.384*** | -0.071* | -0.139*** | -0.232*** | -0.062* |
| | (0.051) | (0.094) | (0.036) | (0.039) | (0.059) | (0.035) |
| Mean PDS value | 0.30 | 0.40 | 0.19 | 0.30 | 0.40 | 0.19 |
| SD PDS value | 0.604 | 0.668 | 0.512 | 0.604 | 0.668 | 0.512 |
| 1st percentile PDS value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 99th percentile PDS value | 2.556 | 2.685 | 2.325 | 2.556 | 2.685 | 2.325 |
| Observations | 524,911 | 211,796 | 313,115 | 524,911 | 211,796 | 313,115 |

This table shows coefficients from regressions of an indicator for meeting the minimum calorie requirement (MCR, columns 1 and 2) or log calories per capita (columns 3 and 4) on PDS value (in Panel A) and PDS value, market rice prices and their interaction (Panel B). In Panel A, PDS value is calculated as the difference between market and PDS rice prices multiplied by household-level PDS quantities (expressed in units of 100 Rs.), and instrumented for with state-level statutory PDS prices, a dummy for state-level PDS expansions, and their interaction. In Panel B, the same three instruments are included, as well as their interactions with market prices. For comparison, mean per-capita expenditure is 711 Rs. Pred. rice elasticity is taken at mean PDS value. All specifications include district-sector-season and period (calendar quarter and NSS round) fixed effects. Controls include log market rice unit value, log household size, SC/ST, land ownership, religion, cooking fuel, and SES index. Effective F-stat calculated using Montiel Olea-Pflueger (2013). Standard errors clustered at the state level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A14: Difference in baseline characteristics, by whether ever reformed PDS

| | Ever expanded eligibility | | | Ever lowered PDS prices | | |
|---|---|---|---|---|---|---|
| | Reform (1) | No reform (2) | Difference (3) | Reform (4) | No reform (5) | Difference (6) |
| Caloric intake (per capita) | 2000.0 | 2109.1 | -109.2 | 2033.2 | 2147.0 | -113.8** |
| | [653.2] | [650.0] | (50.5) | [638.7] | [663.6] | (45.5) |
| Meets MCR | 0.50 | 0.64 | -0.13 | 0.55 | 0.68 | -0.12*** |
| | [0.50] | [0.48] | (0.049) | [0.50] | [0.47] | (0.044) |
| PDS value (100 Rs.) | 0.44 | 0.070 | 0.37 | 0.26 | 0.030 | 0.23** |
| | [0.63] | [0.23] | (0.17) | [0.50] | [0.14] | (0.10) |
| PDS value $> 0$ | 0.40 | 0.12 | 0.28 | 0.29 | 0.063 | 0.22*** |
| | [0.49] | [0.33] | (0.11) | [0.45] | [0.24] | (0.077) |
| Market rice price | 10.0 | 9.79 | 0.26 | 9.83 | 9.87 | -0.037 |
| | [2.19] | [2.17] | (0.94) | [2.02] | [2.35] | (0.87) |
| PDS rice price | 4.97 | 5.55 | -0.58 | 5.19 | 5.70 | -0.51 |
| | [1.42] | [2.90] | (0.61) | [1.81] | [3.38] | (0.43) |
| Statutory PDS rice price | 4.39 | 5.08 | -0.69 | 4.56 | 5.37 | -0.82** |
| | [0.88] | [0.75] | (0.39) | [0.95] | [0.26] | (0.31) |
| Monthly expenditure (per capita, deflated) | 677.2 | 635.9 | 41.3 | 654.4 | 634.2 | 20.2 |
| | [678.9] | [630.8] | (85.6) | [685.1] | [585.1] | (74.4) |
| SES index | -0.10 | -0.17 | 0.070 | -0.16 | -0.16 | 0.0020 |
| | [1.01] | [0.92] | (0.25) | [0.94] | [0.94] | (0.21) |
| Urban (=1) | 0.27 | 0.26 | 0.0099 | 0.27 | 0.26 | 0.011 |
| | [0.44] | [0.44] | (0.047) | [0.44] | [0.44] | (0.053) |
| Landless (rural only) | 0.00079 | 0.0067 | -0.0059 | 0.0036 | 0.0076 | -0.0040 |
| | [0.028] | [0.082] | (0.0025) | [0.060] | [0.087] | (0.0040) |
| Observations | 8,678 | 30,150 | | 19,057 | 19,771 | |

Columns (1) and (3) show the weighted mean and standard deviations in [] of the characteristic for reform states; columns (2) and (5) the mean for non-reform states. Columns (3) and (6) show the difference with standard errors in () clustered by state. Means calculated for the first round each state appears in the NSS. Reform defined as having either reduced PDS prices by at least 1 Rs.. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A15: Within-state differences in household characteristics, by time relative to reform

| | Expanded eligibility | | | Lowered PDS prices | | |
|---|---|---|---|---|---|---|
| | Two qrtrs. before (1) | Earlier (2) | Difference (3) | Two qrtrs. before (4) | Earlier (5) | Difference (6) |
| Caloric intake (per capita) | 2031.3 | 2102.0 | 41.3 | 2052.4 | 2111.8 | 23.7 |
| | [640.5] | [633.9] | (24.7) | [620.7] | [639.1] | (18.8) |
| Meets MCR | 0.53 | 0.61 | 0.043 | 0.55 | 0.63 | 0.0047 |
| | [0.50] | [0.49] | (0.024) | [0.50] | [0.48] | (0.013) |
| PDS value (100 Rs.) | 0.60 | 0.19 | 0.0043 | 0.34 | 0.13 | 0.033 |
| | [0.71] | [0.44] | (0.038) | [0.53] | [0.33] | (0.019) |
| PDS value $> 0$ | 0.48 | 0.22 | -0.013 | 0.38 | 0.18 | 0.018 |
| | [0.50] | [0.42] | (0.023) | [0.48] | [0.38] | (0.014) |
| Market rice price | 9.92 | 9.78 | -0.25 | 10.0 | 9.66 | -0.14 |
| | [1.68] | [2.09] | (0.12) | [1.78] | [2.16] | (0.098) |
| PDS rice price | 2.97 | 3.76 | -0.13 | 3.87 | 4.02 | 0.11 |
| | [0.50] | [2.11] | (0.22) | [1.18] | [2.14] | (0.12) |
| Statutory PDS rice price | 2.70 | 3.94 | -0.26 | 3.84 | 4.32 | 0.19 |
| | [0.95] | [1.27] | (0.15) | [0.67] | [0.89] | (0.10) |
| Monthly expenditure (per capita, deflated) | 847.1 | 697.3 | 115.9 | 726.7 | 677.3 | 27.3 |
| | [1095.7] | [719.7] | (64.6) | [839.2] | [697.1] | (37.4) |
| SES index | 0.088 | -0.031 | 0.054 | -0.023 | -0.083 | -0.0067 |
| | [1.13] | [0.99] | (0.045) | [1.03] | [0.99] | (0.028) |
| Year preceding an election | 0.21 | 0.19 | 0.16 | 0.23 | 0.21 | 0.055 |
| | [0.41] | [0.39] | (0.12) | [0.42] | [0.41] | (0.073) |
| Year following an election | 0 | 0.18 | -0.25 | 0.16 | 0.19 | -0.078 |
| | [0] | [0.38] | (0.065) | [0.36] | [0.40] | (0.098) |
| Observations | 8,019 | 459,811 | | 14,492 | 385,232 | |

Columns (1) and (3) show the weighted mean and standard deviations in [] of the characteristic for the two quarters before the reform; columns (2) and (5) the mean prior to that. Columns (3) and (6) show the difference with standard errors in () clustered by state-year-quarter. Columns (3) and (6) adjust for state and quarter fixed effects, and includes non-reform states to help estimate the quarter effects. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.