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**It's All in the Timing: Household  
Expenditure and Labor Supply  
Responses to Unconditional Cash  
Transfers.**

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WORKING PAPER

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# ABSTRACT

## It's All in the Timing: Household Expenditure and Labor Supply Responses to Unconditional Cash Transfers

Samuel Bazzi<sup>\*</sup>, Sudarno Sumarto<sup>\*\*</sup>, Asep Suryahadi<sup>\*\*\*</sup>

Targeted cash transfer programs have been an important policy tool in developing countries. This paper considers (i) how the timing of transfers affects household expenditure and labor supply responses, and (ii) how household expectations shape our interpretation of those responses. We study these issues in the context of a short-term program that provided quarterly unconditional transfers of US\$30 to over 19 million households in Indonesia. Our empirical strategy relies on nationally representative panel data, difference-in-difference re-weighting estimators, and the staggered rollout of the second quarterly transfer. On average, beneficiary households that received the two full transfers by early 2006 did not differ from comparable nonbeneficiaries in terms of per capita expenditure growth and changes in labor supply per adult. However, beneficiaries still awaiting their second transfer reported a 7 percentage point lower expenditure growth and a reduction in labor supply by an additional 1.5 hours per adult per week. The expenditure differences dissipated by early 2007, several months after the final transfer were received by all beneficiaries. We also exploit variation in transfers per capita to identify a small marginal propensity to consume out of transfer income (around 0.10). We reconcile the empirical results with the predictions of a simple permanent income model, consider rival (missing) data-driven explanations, and document similar household responses to other transitory changes in income.

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# I. INTRODUCTION

Targeted cash transfer (CT) programs have been an important policy tool in developing countries over the last decade. Such programs have been shown in numerous settings to improve education, health, and other welfare outcomes among poor households.<sup>1</sup> Recent studies have explored optimal program design along several dimensions (e.g., Baird et al., 2011; Barrera-Osorio et al., 2011; Carrillo and Ponce Jarrín, 2009; De Janvry and Sadoulet, 2006; Filmer and Schady, 2011). However, despite a rich and growing evaluation of the literature, we have limited evidence on (i) how the timing of these changes in nonlabor income may affect household expenditure and labor supply responses, and moreover (ii) how household expectations shape our interpretation of those responses.

In this paper, we investigate these issues in the context of a large-scale, short-term unconditional cash transfer (UCT) program in Indonesia. After slashing regressive fuel subsidies, the government of Indonesia provided nearly 19 million households with quarterly transfers of around US\$30—roughly one-eighth of average quarterly household expenditures at baseline—between October 2005 and September 2006. We use well-timed, nationally representative household-level panel data from the National Socioeconomic Survey (Susenas) to identify the household expenditure and labor supply responses over two time horizons: (i) a short-term period after which beneficiary households had received one or two quarterly transfers and (ii) a medium-term period by which time the program had ceased.

Our identification strategy relies on multiple sources of variation in transfer income.<sup>2</sup> First, we use a difference-in-difference (DID) procedure, re-weighting all households by their predicted probability of treatment (see Heckman et al., 1998; Abadie, 2005). Although beneficiaries were identified through a quasi-means testing process, we show that it is not possible to reconstruct the proxy means scores in a reliable enough manner to justify a fuzzy regression-discontinuity design. Nevertheless, our augmented model for predicting program receipt captures substantial variation in treatment status across households, and re-weighting effectively rebalances UCT recipient and nonrecipient households along baseline characteristics.

Second, we exploit the staggered rollout of the second transfer payment. This staggering arose as a result of delays in the local disbursement schedule across *kecamatan* (subdistricts).<sup>3</sup> Due to the timing of the midline follow-up survey varying in respect to the disbursement schedule, we are able to identify variation in the timing (and hence cumulative magnitude) of transfers received across beneficiary households: one-fourth of all recipients were still awaiting their second transfers at the time of enumeration in early 2006. As we show, the staggering occurred primarily across large regions rather than across households within regions. Moreover, we document that the staggering process was as good as random inasmuch as the timing of transfers and surveys cannot be explained by observable differences across regions in terms of remoteness, weather shocks, or level of development.

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<sup>1</sup>See Hanlon et al. (2010) for a comprehensive review of the literature.

<sup>2</sup>Not unlike similar programs in other countries, Indonesia's UCT was implemented under politicized time constraints that precluded building evaluation mechanisms into the program *ex ante*.

<sup>3</sup>Indonesia's administrative divisions proceed from province to *kabupaten* (district) to *kecamatan* (subdistrict) to village. Local post offices at the *kecamatan* level were responsible for disbursing quarterly cash transfers to all villages within their jurisdiction.

Lastly, because the size of the transfer (per disbursement) was fixed regardless of household size, the scale of the benefit varied considerably across recipient households. We take several steps to show that the variation in transfers per capita is plausibly exogenous and hence can be used to identify an intensive margin treatment effect.<sup>4</sup> De Janvry and Sadoulet (2006) make use of similar variation in treatment intensity imposed by the cap on total transfers in the Progresa program in Mexico, and Kaboski and Townsend (2005, 2011) analogously exploit variations in fixed financial transfers across Thai villages that vary in population size.

Our first key empirical results suggest that the timing of transfer disbursements sharply affect the expenditure and labor supply responses. We find no mean differences in household per capita expenditure growth between control households (i.e., comparable nonbeneficiaries) and UCT beneficiaries that had received the two full transfers as expected by the time of follow-up enumeration in early 2006. However, the one-quarter of UCT recipients were still awaiting their second transfer at the time of follow-up enumeration, reporting expenditure growth rates that are roughly 0.075 log points lower on average than both control households and UCT recipients that had already received the second transfer. The largest difference across groups is found in food rather than nonfood expenditures. This relatively large differential treatment effect dissipates by early 2007, several months after the final quarterly transfer was received by all beneficiaries. Despite the null treatment effects on expenditures, we do find that UCT benefits are associated with some differential movement out of—albeit also into—poverty over both the short- and medium-term horizons.

We also find similar differential treatment effects in terms of labor supply. Timely receipt of the second transfer by early 2006 had a null effect on the labor supply per adult,<sup>5</sup> but a delayed receipt of the second transfer was associated with a decline of 1.5 hours per adult per week on average. Unlike the expenditure response, however, some of this difference across the two groups of beneficiaries persisted through early 2007, suggesting potential adverse medium-run labor market effects.

These baseline estimates hold up to a battery of robustness checks as well as alternative double-robust and control function estimators (see Busso et al., forthcoming; Imbens and Wooldridge, 2009). However, pooling the two treatment groups (i.e., ignoring the delayed receipt of the second transfer) and estimating a conventional binary treatment effect would have understated both the labor and expenditure response to the program. Although the sharp differences in outcomes across treatment groups are relatively well-identified by the exogenous staggering, the comparisons with the pure control group require stronger assumptions. Identification hinges on the probability of receiving any transfers being orthogonal to time-varying unobservable determinants of expenditures (or labor supply). In other words, targeting agents must not have allocated eligibility on the basis of idiosyncratic shocks occurring between enumeration at baseline and follow-up, but this was not captured in the latter survey.

Exploiting an identification strategy which does not hinge on these same assumptions, we find that the scale of the transfers also matters. Conditional on the observed differences across midline treatment levels, expenditure growth is increasing in transfers per capita. We have estimated a marginal propensity to consume (MPC) out of UCT income of around 0.10.

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<sup>4</sup>Baseline household sizes do not vary systematically across treatment (and control) groups. Nor does the UCT program have any effect on the change in household size between periods. Also, although 7% of recipients report obtaining less than the full 30 USD per disbursement, this added variation is uncorrelated with all observable household and village characteristics.

<sup>5</sup>Adults are defined as individuals 14 years of age and older. We find no response of child labor to the program.

Although this may appear small, the estimated MPC is economically meaningful. An increase in household transfers per capita by US\$10 per quarter implies a rough increase of 5% in monthly household expenditures per capita. This within-treatment group comparison suggests an important intensive margin treatment effect, not unlike what has been found in other studies (e.g., Filmer and Schady, 2011).

We attempt to rationalize the observed treatment effects of the UCT using a simple conceptual framework based on the permanent income hypothesis (PIH). In a canonical PIH model, household expenditures should exhibit a very small response to unanticipated transitory income shocks. The MPC out of UCT income should be equivalent to  $r/(1+r)$ , where  $r$  is the real interest rate. Inasmuch as the UCT program was not yet conceived at the time of the baseline Susenas enumeration in early 2005, households observed at that time could not have anticipated their receipt (or nonreceipt) of benefits beginning in late 2005. Thus, at midline in early 2006, households that received two transfers should have had an expenditure growth that is  $[r/(1+r)] \times T$  larger on average than comparable nonrecipients and  $[r/(1+r)] \times T/2$  larger than households that received one transfer (where  $T$  is some proportional measure of transfers received).<sup>6</sup> Given the real interest rates  $r \approx 0$  around this period,<sup>7</sup> it seems plausible that we could find a null midline average effect of the UCT program when comparing recipient expenditure growth with counterfactual nonrecipients. Even with  $r > 0$ , any measurement error in expenditure or hours worked could make it difficult to obtain precise estimates of small treatment effects. These explanations could also generate the null effects observed at endline in early 2007.

However, the large reduction in expenditures among recipients who had only received one transfer by midline enumeration merits an alternative explanation—albeit one that is still grounded in the PIH. Suppose that (i) at the time of forecasting their short-term future income for roughly the six months prior to midline enumeration, all UCT beneficiaries fully anticipated their receipt of transfers by early 2006, and (ii)  $r$  is sufficiently greater than zero to generate mean observable differences across treatment levels. Condition (i) implies identical expenditure growth among control households and recipients that had obtained the full two transfers as expected by midline. This setup also implies relatively lower expenditure growth among UCT beneficiaries unexpectedly still awaiting their second quarterly transfer at follow-up. This gap can be interpreted as the effect of income falling short of forecasted expectations. In other words, savings were withdrawn too early ahead of the anticipated (but delayed) transfer. While neither expectations/timing convention are entirely dispositive, both highlight the value of the PIH in characterizing household responses to the UCT.<sup>8</sup>

We go on to show that Indonesian households exhibit similar expenditure responses to other transitory covariate income shocks. In particular, we find that household expenditures per capita in rural areas increase in response to unanticipated positive rainfall shocks. However, the excess sensitivity is only found among households engaged in agriculture, whereas the treatment effects did not differ along this dimension of heterogeneity.

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<sup>6</sup>Note that these all-else-equal comparisons hinge on (i) the re-weighting estimator balancing treatment and control households on baseline observable characteristics, and (ii) zero mean differences in unobservables across treatment and control households.

<sup>7</sup>Despite relatively high nominal interest rates, consumer prices of many goods were soaring around this time as a result of the fuel subsidy cutbacks and the initial impact of the ban on rice imports (see Bazzi, 2012).

<sup>8</sup>Of course, it is still possible that the differential treatment effects are entirely due to the difference in the amount of transfers received irrespective of timing. While we cannot rule this out entirely, the PIH could still explain the differential as being due to liquidity constraints that prevented transfer recipients from borrowing to smooth consumption between fully anticipated transfer dates.

Nevertheless, the null treatment effects of the UCT program seem to contradict results from numerous other settings. Why did unconditional cash transfers to relatively poor and (presumably) liquidity-constrained Indonesian households not yield the large expenditure gains typically found in the literature? One possibility raised in auxiliary fieldwork conducted by the authors (see Hastuti et al., 2006) is that UCT beneficiaries spent the transfer funds immediately within weeks, if not days, after receipt. If this expenditure took place sufficiently prior to enumeration, then the survey instrument might miss them. To the extent that these funds were used on durables, this does not seem to be the case since the results were unchanged when using a pro-rated measure of durable expenditures over the past year (roughly, March 2005–March 2006) rather than the past month, as in our baseline approach. Moreover, the results are robust to controlling for the date of midline enumeration in early 2006 (though we do not observe the date of transfer receipt). Yet, we cannot rule out that the funds were allocated entirely towards immediate food expenditures as these are only recorded in the week prior to the survey enumeration. Ultimately, available survey data does not allow us to assess the actual amount of savings out of the transfer beyond that implied by our estimated MPC.<sup>9</sup>

Another possibility is that targeting agents effectively identified *ex ante* are precisely those households that would likely experience the greatest adverse shock as a result of the generalized inflation caused by the fuel subsidy cutbacks. Although we account for a range of observable determinants of program participation, local program enumerators in mid-2005 surely relied upon a much larger set of information than was available to researchers in the baseline survey from early 2005. If such targeting based on expected negative welfare shocks took place systematically across Indonesia, then our estimates might simply reflect the differential forecasting ability of targeting agents.

Yet another possibility is that recipient households strategically under-reported their expenditure so as to remain on the beneficiary lists that were under public scrutiny at the time.<sup>10</sup> This source of nonclassical measurement error could bias the treatment effects downward if recipients perceived their ongoing participation as being contingent on reported welfare levels. We attempted to test for this source of bias by controlling whether the household was assigned to the initial list by the village head (potentially more prone to patronage) or by a regional government official outside the village (less prone to patronage). In doing so, we find little evidence of any differential treatment effects along this dimension of the program.

This paper offers new evidence on the importance of timing and expectations in understanding the effects of cash transfers on household behavior in low-income settings. There is a large amount of literature examining household responses to transitory changes in nonlabor income in the United States (e.g., Hsieh, 2003; Sahm et al., 2012; Shapiro and Slemrod, 1995, 2009; Souleles, 1999). These studies draw similarly rich insights using the PIH to understand why, for example, consumers do not respond to anticipated changes in after-tax income. At the same time, the analogous connection with the PIH has not yet permeated the large amount of literature on cash transfers in developing countries.

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<sup>9</sup>A related concern is that certain asset purchases go unreported. In the baseline results, we employ data from the short-form expenditure questionnaire, which includes broad categories of durable goods and asset purchases. However, we find identical results in robustness checks using the long-form expenditure questionnaire, which contains much more detailed expenditure sub-categories and has been shown to yield higher total reported expenditures (see Pradhan, 2009).

<sup>10</sup>The first few months of the UCT program in 2005 generated a great deal of public controversy surrounding the allocation of benefits and widespread perception of mistargeting (see Cameron and Shah, 2012).

There are, however, a few important exceptions closely related to the present study. Bianchi and Bobba (forthcoming) show that conditional cash transfers (CCT) delivered through Progresa in Mexico increase entrepreneurial activity among beneficiaries in advance of their actual receipt of the transfers. By exploiting the differential timing of the transfers across households, they are able to argue that the CCT increased entrepreneurship not only by relaxing liquidity constraints but also by encouraging risk-taking. Edmonds (2006) makes use of an analogous eligibility rule in the Child Support Grant program in South Africa, which gives rise to differences across beneficiary households in the timing of the receipt of transfers but not the eventual total amount received. Contrary to the predictions of a canonical PIH model, he finds that households reduce child labor and increase schooling in anticipation of future transfer income, attributing the result to binding liquidity constraints. Beyond these two reduced-form studies, a recent structural evaluation of Progresa makes it possible to assess the effect of control households' expectations over future transfers on the observed treatment effects (Attanasio et al., 2012). Failing to account for such expectations can lead researchers to understate the magnitude of actual treatment effects. Although this bias did not arise in the case of Progresa, the insights raised by Attanasio et al. resonate with our findings, which suggest that failing to account for unmet expectations over the timing of transfers would have led to substantially understated (and even negative) treatment effects on expenditure and labor supply outcomes.

The remainder of the paper proceeds as follows. Section 2 provides background on the program and the dataset employed in the analysis; Section 3 motivates the evaluation model and details the identification strategy; Section 4 presents the primary empirical results; Section 5 reconciles the main empirical findings with insights from a simple permanent income model; and Section 6 concludes.

## **II. BACKGROUND: CUTBACKS AND CASH**

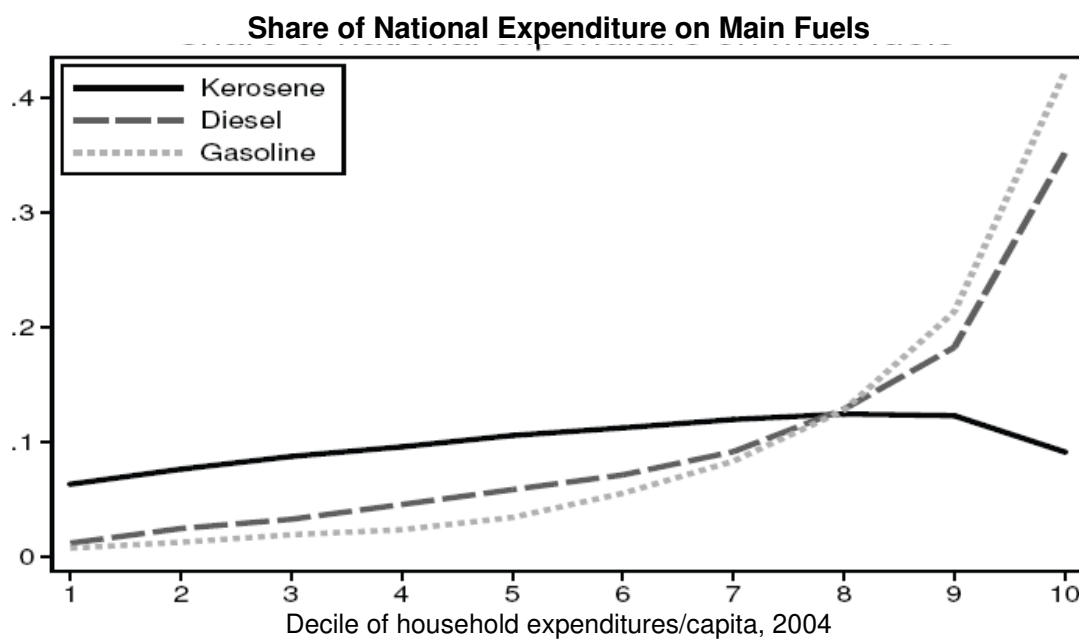
In the midst of escalating global oil and gas prices in 2005, the Government of Indonesia (GoI) significantly reduced fuel subsidies, raising regulated prices by a weighted average of 29% in February and then again by 114% in September of that year. These cost cutting measures yielded over US\$10 billion in annualized budgetary savings, a portion of which the GoI put towards the country's first large-scale unconditional cash transfer (UCT) program. This section details various features of the program relevant to understanding the household expenditure and labor supply responses to the transfer income.

### **2.1 Fuel Subsidy Removal and Price Shocks**

The subsidy reform proceeded in two stages. In March 2005, the government raised gasoline and automotive diesel prices by 33 and 27% respectively. After several months and some publicity, the GoI dramatically reduced subsidies on October 1st, effectively raising the price of the three fuel products by a weighted average of 114%. Previously immune to policy change, kerosene prices nearly tripled increasing by 186%, while gasoline and diesel prices grew another 88 and 105% respectively.

The direct effect of these price shocks on household welfare would depend first and foremost on the incidence of fuel consumption. Based on data from a nationally representative household survey (Susenas) from February 2004, prior to the first round of subsidy

downgrades, over 95% of Indonesian households consumed at least one of the three main fuel products, and over 90% consumed kerosene. Figure 1 examines the distribution of national fuel expenditure across deciles of household expenditure per capita in 2004. Automotive diesel and gasoline subsidies are most regressive while the overall incidence of kerosene consumption tends to be relatively flat across the distribution of income. The slight dip in kerosene consumption among wealthier households suggests a modest progressive element to kerosene subsidies.



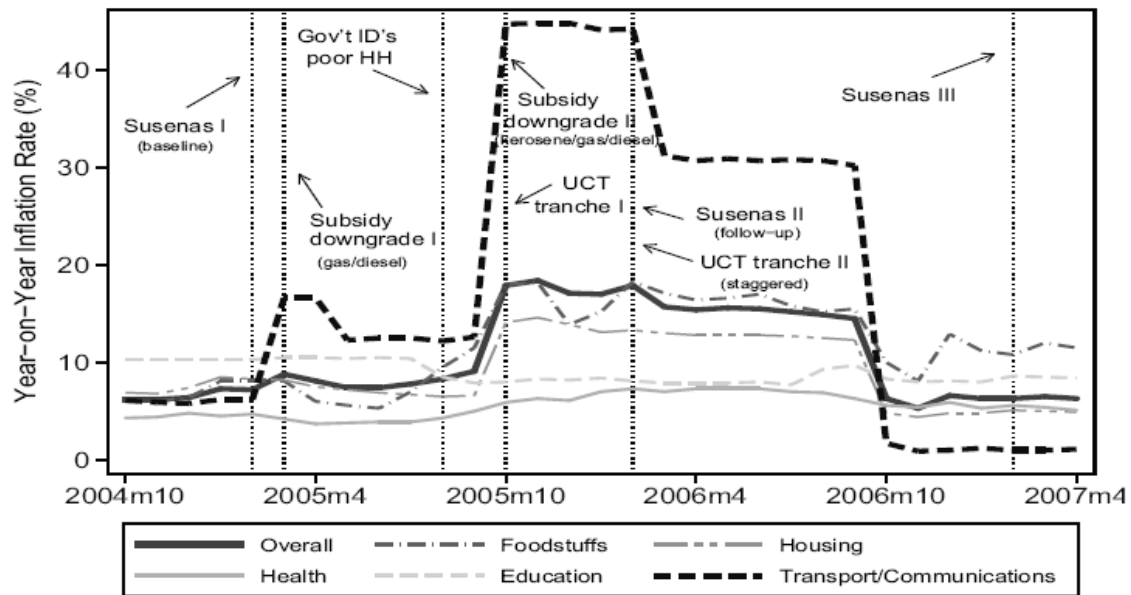
**Figure 1. Benefit incidence of fuel subsidies, 2004**

Note: Calculated from Susenas 2004. Each point on the line represents that decile x location share of overall national expenditure on the given fuel product.

Nevertheless, fuel products only comprise a small share of overall household expenditures among both rich and poor. On average, the poorest decile of households allocate 3.7% of their total monthly expenditure to kerosene while households in the richest decile spend only 1.9%. Nearly 93% of the poorest households and 80% of the richest households purchased kerosene in the month preceding enumeration in February 2004. Meanwhile, only 6% of the poorest households directly purchased gasoline compared to 46% of the richest households. The corresponding average budget allocation for gasoline was 0.1% for the poorest households and 2.3% for the richest households. Therefore, although a large swathe of the population stood to be adversely affected by the kerosene and gasoline subsidy removals, these small budget allocations suggest that the pass-through to purchasing power would have to occur through more indirect channels.

The regulated increase in fuel prices led to substantial consumer price inflation as a result of the rising costs of transportation and production of goods with substantial fuel-based inputs. Over the period from February 2005 to February 2006, the CPI increased by 17.9%. Figure 2 shows the timing of the subsidy removals and the subsequent pass-through to other consumer goods and services. The year-on-year inflation rate provides a convenient benchmark as the nationally representative household surveys used in this study are conducted on an annual basis. The figure shows that the economy-wide effects from the limited downgrade of gasoline and diesel subsidies in early 2005 were relatively small compared to the large inflationary

upswing brought on by the second round of cutbacks in late 2005. Also, the path of food prices appears to follow a similar trajectory as fuel prices, albeit for largely orthogonal reasons related to trade policy.<sup>11</sup>



**Figure 2. Subsidies, transfers, and surveys: A timeline of events**

Note: Monthly price indices are obtained from Bank Indonesia's online data system, November 2009

## 2.2 UCT Program Implementation

With the fiscal savings generated by the subsidy cutbacks, the government implemented a targeted unconditional cash transfer (UCT) program beginning in October 2005 and culminating in September 2006. The stated goal of the program was to provide four quarterly disbursements of 300,000 Rupiah (Rp) (around US\$30) to the poorest 30% of households beginning on October 1st. Political exigency would ultimately dictate targeting and implementation.

The targeting of beneficiaries proceeded in three stages. Firstly, local government officials devised a large list of potential recipient households in August 2005 using a combination of own-discretion and community-based records from prior government programs. Secondly, using a minimalist survey instrument (known as PSE05.RT), the local statistics agency enumerated households found on this initial list as well as on others from additional government sources. The survey questions concerned: (i) floor type, (ii) wall and roof type, (iii) toilet facility, (iv) electrical source, (v) cooking fuel source, (vi) drinking water source, (vii) frequency of meat consumption, (viii) frequency of meal consumption, (ix) frequency of purchase of new clothes, (x) access to public health facilities, (xi) primary source of income, (xii) educational attainment of household heads, (xiii) amount of savings and type of assets,

<sup>11</sup>Around late 2005, the price of domestically-produced rice—the main staple among the majority of Indonesian households—began a steep upward ascent due in small part to rising transport costs but mostly due to the government decision to ban rice imports in January 2004. While a boon to rice producers, the spike in rice prices had arguably more severe consequences for poor households than did the downsizing of fuel subsidies (see Simatupang and Timmer, 2008; McCulloch, 2008).

and (ixv) floor width.<sup>12</sup> Lastly, the Statistics Indonesia (BPS) used the survey data to implement a proxy-means test to generate the final list of eligible households by the end of September. Although the PSE05.RT data and PMT scores are not available, the baseline Susenas data, which we describe next, include close proxies for all questions except those concerning savings, assets, and frequency of consumption.

### III. EMPIRICAL STRATEGY

We employ several quasi-experimental identification strategies in order to evaluate the effect of the UCT on expenditure and labor supply outcomes. Firstly, due to a rushed implementation schedule and weak pre-existing targeting infrastructure, many nonpoor received benefits while many genuinely poor households did not. These targeting errors prove useful for the purpose of constructing counterfactual nonrecipient households through reweighting procedures. Secondly, for exogenous administrative reasons, the second quarterly transfer was staggered across regions with respect to the timing of the midline survey. We exploit this variation after showing that the staggering process is orthogonal to observable household and regional characteristics. Thirdly, because all households received the same transfer amount per disbursement, we observe considerable variation in transfers per capita. This allows us to identify—under certain testable assumptions—an intensive margin treatment effect as well as the (quasi-) marginal propensity to consume (MPC) out of the transfer income. In the remainder of this section, we first describe the Susenas panel data and then detail the empirical strategies for exploiting the multiple sources of treatment variation.

#### 3.1 Data

We use three waves of nationally representative panel data from the National Socioeconomic Survey (known as Susenas) collected in February–April 2005, 2006, and 2007. After matching households across the 2005 and 2006 rounds, we obtain a balanced panel of 9,048 households. We also observe a subset of households ( $N=7,016$ ) again in February–April 2007.<sup>13</sup> Susenas 2005 provides a good baseline as it was implemented prior to the announcement of the UCT program and the large-scale subsidy cutbacks in October (see Figure 2).

Taking advantage of the spatial mismatch in the timing of the midline survey and the rollout of UCT disbursements, we observe three levels of treatment denoted by the number of disbursements  $D \in \{0,1,2\}$  received by the time of Susenas enumeration in February–April 2006. We observe 2,444 households in the treatment group ( $D > 0$ ), but 639 of these households had only received a single disbursement at the time of enumeration while the remaining 1,805 households had received two disbursements.<sup>14</sup>

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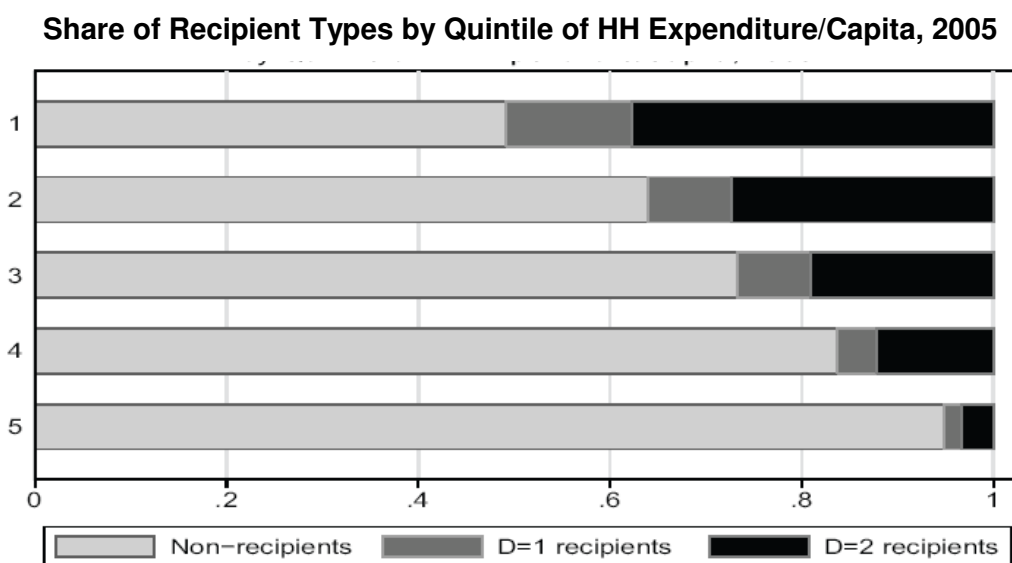
<sup>12</sup>In practice, only 35% of households report ever being visited by enumerators, and 8% did not know whether or not their household was visited (according to Susenas 2006). The majority of those enumerated were visited not by BPS officials but by local government officials.

<sup>13</sup>The baseline survey contains 10,574 households, while the follow-up in February 2006 contains 9,892 households. The February 2007 survey meanwhile contains more than 55,000 households, a subset of which were interviewed in the two preceding years. See the notes to Tables 1 for details on panel construction.

<sup>14</sup>Unfortunately, we did not observe the date on which households in the panel data received each of the disbursements.



The UCT program was intended to reach all poor and near-poor households (below 1.2 times the official region-specific poverty line). Recipient households were indeed poorer on average than nonrecipients in early 2005 prior to the UCT program (see Table 1). Yet, there was still evidence of potential (i) *leakage* of benefits, as 37% of UCT recipients were in the top three national per-capita expenditure quintiles, and (ii) *undercoverage*, as half of the lowest quintile did not receive any benefits. Figure 3 bears out these targeting results. Whether benefits were actually mis-targeted based on proxy means scores is unanswerable with existing data, for the reasons discussed below. Regardless of this, only 50 (39)% of poor (near-poor) households received any transfers. In theory, the distributional overlap across groups, which is correlated with observable covariates  $X_h$ , should make it easier to identify credible counterfactual nonrecipients.



**Figure 3. Treatment level by baseline expenditure decile**

Note: D – d recipients obtained d UCT disbursements by enumeration in early 2006 as reported in a module attached to Susenas 2006. The quintile of household expenditures per capita is based on data reported in Susenas 2005.

Despite the convenient panel setup, the *Susenas* data has an important limitation in that households only report a subset of the eligibility questions from the PSE.05 survey. We directly observe eight of the fourteen eligibility indicators in the February 2005 baseline survey.<sup>15</sup> Among the most important questions unavailable in the *Susenas* survey are those concerning frequency of meal consumption, assets, and savings proxies. While it is not possible to obtain the actual household proxy mean scores that would allow us to implement a regression discontinuity design, we can use the available questions in *Susenas* coupled with the *kabupaten*-specific coefficients for each qualifying criteria to construct a quasi-PMT score.<sup>16</sup>

<sup>15</sup>A second limitation is that the data structure poses a somewhat nonstandard attrition problem. Although attritors appear much more similar to nonrecipients than recipients (see Table 1), we do not know which attritors between 2005 and 2006 actually received the UCT. We observe recipient status among the 2,034 attritors between 2006 and 2007, and somewhat reassuringly the ratio of recipients to nonrecipients remains essentially unchanged across years. The attrition is largely attributable to the panel survey design, which drops and replaces around 20% of the original households at each new wave. Although inter-survey attrition is potentially a nonnegligible problem, we ignore its consequences in the econometric results presented below. Nevertheless, all results are robust to reweighting the sample so as to account for the probability of attrition as a function of all observable characteristics used to predict treatment.

<sup>16</sup>We are grateful to Lisa Cameron and Hamonangan Ritonga for providing the PMT coefficients.

However, as we show in Appendix A, these reconstructed scores (i) fail to produce any (even remotely fuzzy) discontinuities around the stipulated thresholds, and (ii) underperform our estimated propensity scores (see below) based on a richer set of household characteristics plausibly available to local enumerators and village officials.

**Table 1. Expenditure Statistics, 2005 and 2006**

|  | 2005 |      |     |        |      | 2006 |      |     |        |      |
|--|------|------|-----|--------|------|------|------|-----|--------|------|
|  | Mean | SD   | Min | Median | Max  | Mean | SD   | Min | Median | Max  |
| <b>Nonrecipients (N=6606)</b>                |      |      |     |        |      |      |      |     |        |      |
| Expenditure/capita (000s Rp)                 | 315  | 292  | 52  | 243    | 7702 | 356  | 300  | 31  | 272    | 4891 |
| Food expenditure/capita (000s Rp)            | 162  | 93   | 30  | 138    | 2790 | 182  | 104  | 20  | 155    | 1141 |
| Nonfood expenditure/capita (000s Rp)         | 153  | 234  | 8   | 94     | 7071 | 174  | 228  | 0   | 108    | 4236 |
| Education expenditure/capita (000s Rp)       | 11   | 60   | 0   | 2      | 2269 | 8    | 41   | 0   | 0      | 1660 |
| Health expenditure/capita (000s Rp)          | 11   | 67   | 0   | 2      | 2607 | 10   | 62   | 0   | 2      | 3137 |
| Below poverty line                           | 0.10 | 0.30 | 0   | 0      | 1    | 0.11 | 0.31 | 0   | 0      | 1    |
| Quintile (nat'l) expenditure/capita          | 3.23 | 1.38 | 1   | 3      | 5    | 3.28 | 1.37 | 1   | 3      | 5    |
| Quintile (intra-province) expenditure/capita | 3.21 | 1.39 | 1   | 3      | 5    | 3.26 | 1.38 | 1   | 3      | 5    |
| <b>D=1 Recipients (N=639)</b>                |      |      |     |        |      |      |      |     |        |      |
| Expenditure/capita (000s Rp)                 | 185  | 93   | 49  | 165    | 843  | 195  | 118  | 41  | 170    | 1817 |
| Food expenditure/capita (000s Rp)            | 121  | 60   | 32  | 110    | 761  | 123  | 62   | 30  | 110    | 422  |
| Nonfood expenditure/capita (000s Rp)         | 65   | 49   | 9   | 52     | 423  | 72   | 80   | 9   | 56     | 1581 |
| Education expenditure/capita (000s Rp)       | 2    | 6    | 0   | 0      | 220  | 2    | 4    | 0   | 0      | 48   |
| Health expenditure/capita (000s Rp)          | 10   | 83   | 0   | 1      | 1832 | 4    | 11   | 0   | 1      | 150  |
| Below poverty line                           | 0.25 | 0.43 | 0   | 0      | 1    | 0.34 | 0.47 | 0   | 0      | 1    |
| Quintile (nat'l) expenditure/capita          | 2.25 | 1.21 | 1   | 2      | 5    | 2.14 | 1.18 | 1   | 2      | 5    |
| Quintile (intra-province) expenditure/capita | 2.36 | 1.27 | 1   | 2      | 5    | 2.27 | 1.25 | 1   | 2      | 5    |
| <b>D=2 Recipients (N=1805)</b>               |      |      |     |        |      |      |      |     |        |      |
| Expenditure/capita (000s Rp)                 | 178  | 90   | 31  | 159    | 945  | 192  | 92   | 37  | 172    | 908  |
| Food expenditure/capita (000s Rp)            | 115  | 54   | 17  | 104    | 645  | 124  | 57   | 23  | 112    | 484  |
| Nonfood expenditure/capita (000s Rp)         | 63   | 50   | 9   | 50     | 576  | 68   | 51   | 0   | 55     | 682  |
| Education expenditure/capita (000s Rp)       | 3    | 8    | 0   | 0.4    | 220  | 2    | 5    | 0   | 0      | 68   |
| Health expenditure/capita (000s Rp)          | 5    | 11   | 0   | 2      | 178  | 5    | 22   | 0   | 1      | 751  |
| Below poverty line                           | 0.28 | 0.45 | 0   | 0      | 1    | 0.31 | 0.46 | 0   | 0      | 1    |
| Quintile (nat'l) expenditure/capita          | 2.12 | 1.16 | 1   | 2      | 5    | 2.11 | 1.12 | 1   | 2      | 5    |
| Quintile (intra-province) expenditure/capita | 2.28 | 1.25 | 1   | 2      | 5    | 2.27 | 1.22 | 1   | 2      | 5    |
| <b>Attritors (N=771)</b>                     |      |      |     |        |      |      |      |     |        |      |
| Expenditure/capita (000s Rp)                 | 323  | 272  | 54  | 252    | 2927 |      |      |     |        |      |
| Food expenditure/capita (000s Rp)            | 180  | 119  | 38  | 150    | 1073 |      |      |     |        |      |
| Nonfood expenditure/capita (000s Rp)         | 142  | 197  | 10  | 86     | 2497 |      |      |     |        |      |
| Education expenditure/capita (000s Rp)       | 7    | 27   | 0   | 0.4    | 563  |      |      |     |        |      |
| Health expenditure/capita (000s Rp)          | 13   | 55   | 0   | 2      | 750  |      |      |     |        |      |
| Below poverty line                           | 0.14 | 0.35 | 0   | 0      | 1    |      |      |     |        |      |
| Quintile (nat'l) expenditure/capita          | 3.23 | 1.41 | 1   | 3      | 5    |      |      |     |        |      |
| Quintile (intra-province) expenditure/capita | 3.24 | 1.42 | 1   | 3      | 5    |      |      |     |        |      |

Note: A balanced two-year panel is constructed by matching along (i) province-*kabupaten-kecamatan-village*-sampling ID-household ID and (ii) household head names in the 2005 and 2006 *Susen* panels. While a traditional merge along strict geographic identifiers provides a balanced panel of 9,797 households, significant discrepancies in household characteristics (including first names of household members) across waves indicate that survey administrators did not ensure the time-consistency of household presence in the physical location of prior enumeration. A name-matching algorithm provided by

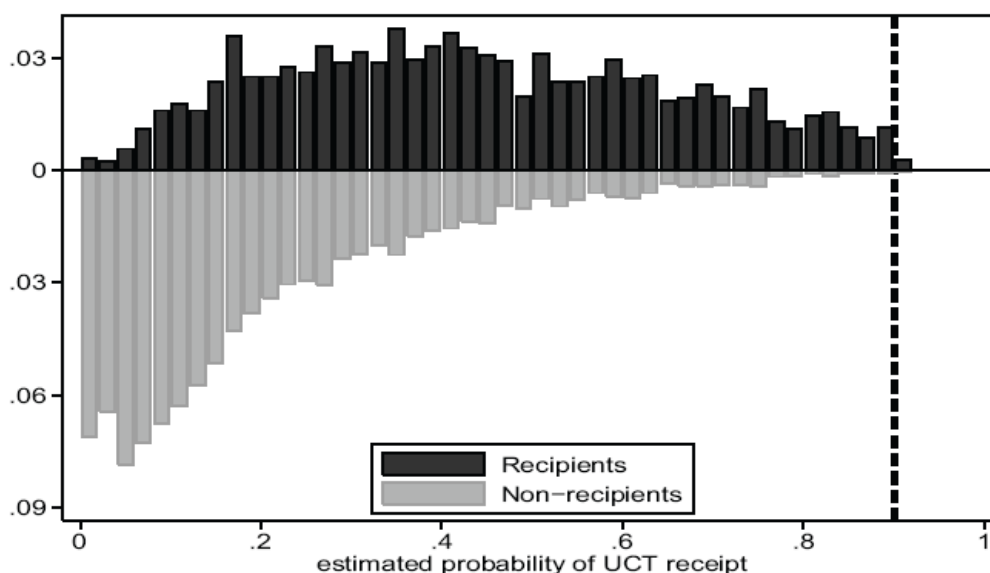
Robert Sparrow generated an initial balanced panel of almost 8500 households, and through further manual inspection, an additional 550 households were added. D=d recipients obtained d UCT disbursements by enumeration in early 2006. Attritors are those households which could be identified in the 2005 baseline survey but not in the subsequent rounds. Variable description: Rp stands for Rupiah. The exchange fluctuated between Rp9,500 and Rp10,500 to the dollar between October 2005 and September 2006. All expenditure variables are household per capita expressed in Rupiah per month. The underlying food expenditure items are recorded for the week prior to enumeration and scaled up to the monthly level by the factor 30/7. The underlying nonfood expenditure items are recorded for the year prior to enumeration and scaled down to the monthly level by the factor 1/12. Below poverty line is an indicator for whether or not the household's total expenditures per capita fell below the provincial rural or urban poverty line in the given year. Per capita expenditure quintiles are computed separately within the full national sample and within the 31 provinces in which sample households reside. The 2005 quintiles are calculated including attritors. The expenditure figures are not adjusted for inflation between 2005 and 2006. Since we are estimating an outcome expressed as the (log) difference between 2006 and 2005, the inflation rate is subsumed in the constant in all pure OLS estimates.

### 3.2 Identification

In general, we are interested in the average treatment effect on the treated (ATT) of receiving  $d$  relative to  $s$  disbursements. Denoting this estimator by  $\tau_{ds} \equiv \mathbb{E}[Y(d) - Y(s) | D=d]$  for some outcome  $Y$ , we aim to identify three parameters of interest  $\tau = (\tau_{10}, \tau_{20}, \tau_{21})$  using the following difference-in-difference specification for the change in log consumption (or some measure of hours worked),

$$\Delta \ln C_{ht} = \kappa + \tau_{10} 1\{D_h > 0\} + \tau_{21} 1\{D_h = 2\} + \Delta \varepsilon_{ht}, \quad (1)$$

where  $\tau_{20} \equiv \tau_{21} + \tau_{10}$  and the constant  $\kappa$  is simply average growth in nonrecipient households. By taking differences, we remove all variation in the time-invariant determinants of expenditures across households. Given data and policy constraints, our goal is to ensure that the comparison of outcomes across groups is as close as possible to what one would observe if treatment status  $D$  had been assigned randomly.



**Figure 4. Overlap in estimated propensity scores (P)**

Note: Propensity scores obtained from flexible logit regressions (see Table 2. Observations to the left of the dashed vertical line fall within the Crump et al. (2009) optimal overlap region.

We pursue a re-weighting approach in which the contribution of nonrecipient households to the counterfactual is directly proportional to their estimated odds of treatment,  $\omega = \hat{p} / (1 - \hat{p})$ , where  $\hat{p}$  is the household's predicted probability of receiving any UCT benefits. We estimate this propensity score as a saturated function of (i) all underlying components of the proxy means scores (available to us in Susenas), and (ii) additional household characteristics that would have been known to local (informal) targeting agents at the time of eligibility designation. Figure 4 demonstrates the substantial overlap in propensity scores for treatment ( $D > 0$ ) and control ( $D = 0$ ) households. The full set of underlying parameter estimates are reported in Table 2.<sup>17</sup> Given the considerable overlap, we then use the  $\omega$  terms as inverse probability weights in order to rebalance recipient ( $D > 0$ ) and nonrecipient ( $D = 0$ ) households along observable dimensions. Empirically, less than 5% of the covariates in Table 2 exhibit statistically significant mean differences (in  $t$ -tests) across recipients and nonrecipients after re-weighting by  $\omega$ . Under the assumption that there are no time-varying unobservable determinants of consumption growth correlated with UCT receipt, we can then interpret the conventional binary treatment effect causally (see Abadie, 2005).

**Table 2. Propensity Score Model,  $P(D_h > 0 \mid X_h)$**

| Regressor  | Coefficient | (Std. error)         |
|--|-------------|----------------------|
| Urban Area   | -0.177      | (0.114)              |
| HH Head Female   | 0.617***    | (0.114)              |
| Land owned (hectares)  | -0.099***   | (0.031)              |
| Land owned <sup>2</sup> (hectares)                           | 0.001***    | (0.000)              |
| HH ever participate in Rice for the Poor                     | 0.961***    | (0.085)              |
| # children in school   | -0.102      | (0.075)              |
| # children in school <sup>2</sup>                            | 0.023       | (0.020)              |
| Indicators for HH size $\in \{2, \dots, 12\}$                |             | [0.065] <sup>†</sup> |
| Floor area   | -0.005***   | (0.002)              |
| Household composition (reference=Share Adult Males, 10+ yrs) |             |                      |
| Share Female Children, 0-9 yrs                               | 0.619**     | (0.265)              |
| Share Male Children, 0-9 yrs                                 | 0.421*      | (0.234)              |
| Share Adult Females, 10+ yrs                                 | -0.025      | (0.186)              |
| Primary HH income source (reference=other)                   |             |                      |
| Trade/Retail   | -0.179      | (0.117)              |
| Financial/Real Estate  | -0.782      | (0.428)              |
| Agriculture  | 0.060       | (0.126)              |
| Mining   | -0.235      | (0.156)              |
| Manufacturing  | 0.158       | (0.125)              |
| Electricity/Gas/Water  | 0.269       | (0.882)              |
| Construction   | 0.260*      | (0.141)              |
| HH head education level (reference=no education)             |             |                      |
| Primary  | -0.283**    | (0.114)              |
| Junior high  | -0.571***   | (0.142)              |
| Senior high  | -1.091***   | (0.147)              |
| Higher   | -2.384***   | (0.347)              |

<sup>17</sup>Further details on the underlying variables and estimating equation can be found in the appendix.

...(continued)

| Regressor                                  | Coefficient | (Std. error) |
|--|-------------|--------------|
| Housing status (reference=other)           |             |              |
| Own house                                  | -0.085      | (0.127)      |
| Lease house                                | -0.132      | (0.238)      |
| Rent house                                 | -0.386      | (0.258)      |
| Free house                                 | 0.015       | (0.227)      |
| Official house                             | -0.719      | (0.528)      |
| Roof type (reference=other)                |             |              |
| Concrete roof                              | -0.849      | (0.451)      |
| Tile roof                                  | -0.418      | (0.328)      |
| Shingle roof                               | -0.490      | (0.437)      |
| Iron roof                                  | -0.410      | (0.320)      |
| Asbestos roof                              | -0.425      | (0.422)      |
| Fiber/Thatch roof                          | -0.400      | (0.378)      |
| Wall type (reference=other)                |             |              |
| Brick wall                                 | -0.337      | (0.304)      |
| Wood wall                                  | 0.023       | (0.292)      |
| Bamboo wall                                | 0.477       | (0.307)      |
| Floor type (reference=other)               |             |              |
| Cement/Tile/Plaster floor                  | 0.133       | (0.538)      |
| Wood/Reed/Bamboo floor                     | 0.290       | (0.544)      |
| Earthen floor                              | 0.797       | (0.549)      |
| Source of drinking water (reference=other) |             |              |
| Bottled water                              | -0.978**    | (0.394)      |
| Pump water                                 | -1.039***   | (0.289)      |
| Tap water                                  | -0.427      | (0.335)      |
| Protected well water                       | -0.678**    | (0.272)      |
| Unprotected well water                     | -0.918***   | (0.288)      |
| Protected spring water                     | -0.985***   | (0.306)      |
| Unprotected spring water                   | -0.883***   | (0.322)      |
| River water                                | -0.929***   | (0.322)      |
| Rain water                                 | -0.562      | (0.379)      |
| Buy drinking water                         | -0.166      | (0.153)      |
| Toilet facilities (reference=other)        |             |              |
| Own toilet                                 | -0.218*     | (0.128)      |
| Shared toilet                              | -0.016      | (0.132)      |
| Public toilet                              | 0.011       | (0.220)      |
| Source of light (reference=other)          |             |              |
| PLN <sup>a</sup> electricity               | 0.061       | (0.597)      |
| Non-PLN electricity                        | -0.082      | (0.690)      |
| Pump lantern                               | 0.899       | (0.631)      |
| Oil lamp                                   | 0.648       | (0.595)      |
| Toilet disposal location (reference=other) |             |              |
| Septic tank                                | -0.269      | (0.175)      |
| Pond/Rice field                            | -0.044      | (0.206)      |
| Lake, river, sea                           | -0.027      | (0.150)      |
| Beach                                      | -0.034      | (0.167)      |
| Constant                                   | 0.382       | (0.938)      |
| Pseudo- $R^2$                              |             | 0.22         |

Note: Estimated using a balanced panel containing 9050 households from Susenas 2005 and 2006 Panel. Standard errors are clustered by village. All variables are as reported in February-April 2005. The regression also controls for province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

<sup>a</sup>PLN is the state-run electricity company.

However, in order to identify the multivalued treatment effects in equation (1), we must (minimally) verify the exogeneity of the staggered rollout of the second quarterly disbursement. In Table 3, we show that the probability of receiving disbursement two conditional on receiving disbursement one,  $P(D = 2 | D > 0)$ , is explained almost entirely by geographic fixed effects. Whereas household-level characteristics explain considerable variation in the probability of receiving any disbursements,  $P(D > 0)$ , even with >600 *kecamatan* fixed effects, household-level characteristics explain little variation in  $P(D = 2 | D > 0)$  after controlling for *kabupaten* or *kecamatan* fixed effects. The R-squared and F tests in columns 7–12 suggest that the staggering occurs largely across *kecamatan/kabupaten* and is plausibly exogenous with respect to baseline household characteristics. This is reassuring given that the *kecamatan* each have a respective post office branch, which was responsible for disbursing the quarterly cash transfers.

**Table 3. Idiosyncratic vs. Spatial Variation in Staggering**

| Fixed Effects<br>$X_{h,t-1}$ controls                    | Province<br>No | <i>Kabupaten</i><br>No | <i>Kecamatan</i><br>No | Province<br>Yes | <i>Kabupaten</i><br>Yes | <i>Kecamatan</i><br>Yes |
|--|----------------|------------------------|------------------------|-----------------|-------------------------|-------------------------|
| <i>specification: <math>P_i(D &gt; 0)</math></i>         |                |                        |                        |                 |                         |                         |
|  | (1)            | (2)                    | (3)                    | (4)             | (5)                     | (6)                     |
| $H_0 : \beta_x = 0$                                      | —              | —                      | —                      | 30.72           | 28.67                   | 28.38                   |
| <i>F</i> statistic                                       |                |                        |                        |                 |                         |                         |
| [ <i>p</i> -value]                                       | —              | —                      | —                      | <0.001]         | <0.001]                 | <0.001]                 |
| $R^2$  | 0.049          | 0.167                  | 0.237                  | 0.236           | 0.326                   | 0.385                   |
| <i>specification: <math>P_i(D = 2   D &gt; 0)</math></i> |                |                        |                        |                 |                         |                         |
|  | (7)            | (8)                    | (9)                    | (10)            | (11)                    | (12)                    |
| $H_0 : \beta_x = 0$                                      | —              | —                      | —                      | 2.93            | 1.66                    | 0.90                    |
| <i>F</i> statistic                                       |                |                        |                        |                 |                         |                         |
| [ <i>p</i> -value]                                       | —              | —                      | —                      | <0.001]         | <0.001]                 | [0.705]                 |
| $R^2$  | 0.264          | 0.811                  | 0.893                  | 0.325           | 0.821                   | 0.896                   |

*Note:*  $D$  denotes the number of disbursements received by Susenas enumeration in early 2006. Linear probability regressions for  $P_i(D = 2 | \cdot)$  and  $P_i(D > 0 | \cdot)$  are based on the sample of recipient and all households, respectively. There are 30 provinces, 339 *kabupaten*, and 619 *kecamatan*.

Moreover, in Table 4, we show that geographic characteristics—both fixed (e.g., distance to urban centers) and time-varying (e.g., rainfall shocks)—cannot explain the spatial variation in staggering. There is little evidence that relatively poorer remote regions received the second disbursement any later than relatively wealthier, more central regions. Lastly, in results available upon request, we find that the date of survey enumeration in early 2006 is orthogonal to the level of treatment. In other words, households waiting for their second disbursement at the time of enumeration were not simply residing in regions enumerated at later dates. Thus, we are confident that the staggering process occurred for largely exogenous administrative reasons and hence can be used to identify multiple levels of treatment in the midline survey enumerated in early 2006.<sup>18</sup>

<sup>18</sup>We do not consider other approaches to identifying multivalued treatment effects (see Imbens, 2000; Cattaneo, 2010) since the multivalued treatment in our case is plausibly exogenous with respect to household and geographic characteristics. Due to the covariates determining binary treatment status having very little predictive power in distinguishing between individuals with one or two disbursements (see Table 3), the approaches for identifying multivalued treatment effects using the generalized propensity score (i.e., predicting multiple treatment levels) offer little advantage and introduce additional noise.

**Table 4. Staggering is Orthogonal to Interregional Differences**

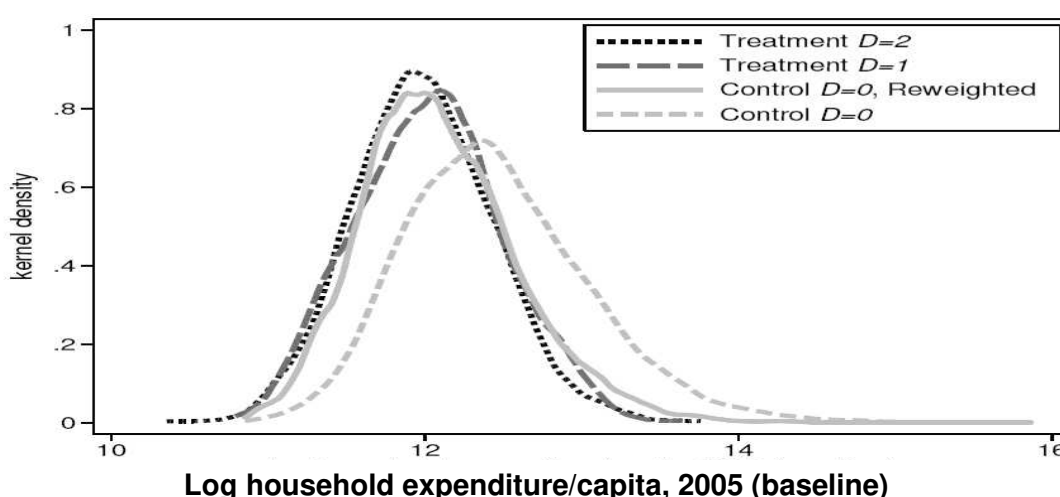
|   | (1)                | (2)               | (3)               | (4)                | (5)                | (6)                |
|---|--------------------|-------------------|-------------------|--------------------|--------------------|--------------------|
| log distance to <i>kecamatan</i> capital                  | 0.042<br>(0.037)   | 0.027<br>(0.039)  | 0.032<br>(0.039)  | 0.039<br>(0.039)   | 0.039<br>(0.039)   | 0.042<br>(0.039)   |
| log distance to <i>kabupaten</i> capital                  | -0.057<br>(0.032)* | -0.053<br>(0.033) | -0.040<br>(0.036) | -0.033<br>(0.036)  | -0.034<br>(0.036)  | -0.033<br>(0.036)  |
| log distance to Jakarta                                   | 0.005<br>(0.032)   | -0.034<br>(0.041) | -0.033<br>(0.041) | -0.030<br>(0.041)  | -0.031<br>(0.040)  | -0.022<br>(0.043)  |
| log <i>kabupaten</i> population, 2005                     |                    | -0.072<br>(0.046) | -0.075<br>(0.046) | -0.076<br>(0.045)* | -0.076<br>(0.045)* | -0.082<br>(0.046)* |
| urban village   |                    |                   | 0.064<br>(0.050)  | 0.067<br>(0.049)   | 0.069<br>(0.051)   | 0.074<br>(0.051)   |
| village road paved  |                    |                   |                   | 0.024<br>(0.054)   | 0.025<br>(0.054)   | 0.026<br>(0.054)   |
| village accessible only by water                          |                    |                   |                   | -0.100<br>(0.081)  | -0.100<br>(0.081)  | -0.107<br>(0.082)  |
| log mean household exp./capita in <i>kabupaten</i> , 2005 |                    |                   |                   |                    | -0.008<br>(0.093)  | -0.017<br>(0.094)  |
| rainfall shock, 2005                                      |                    |                   |                   |                    |                    | 0.120<br>(0.169)   |
| Number of households                                      | 2,383              | 2,383             | 2,383             | 2,383              | 2,383              | 2,383              |
| $R^2$   | 0.010              | 0.022             | 0.025             | 0.031              | 0.031              | 0.031              |

Note: Linear probability regressions based on the sample of recipient households using the following specification:  $P(D_{nv}=2 | D_{nv}>0)=\gamma Z_v + u_{nv}$ , where  $Z_v$  comprises a vector of characteristics associated with the village or region within which household  $v$  resides. Distance to *kecamatan/kabupaten* capital is based on travel distance; distance to Jakarta is calculated by the great-circle distance. Standard errors are clustered at the *kabupaten* level in all specifications. The sample decline is due to a loss of villages in Papua for which I could obtain reliable matches. All other results are robust to dropping these households.

\*Significant at 10%.

\*\*Significant at 5%.

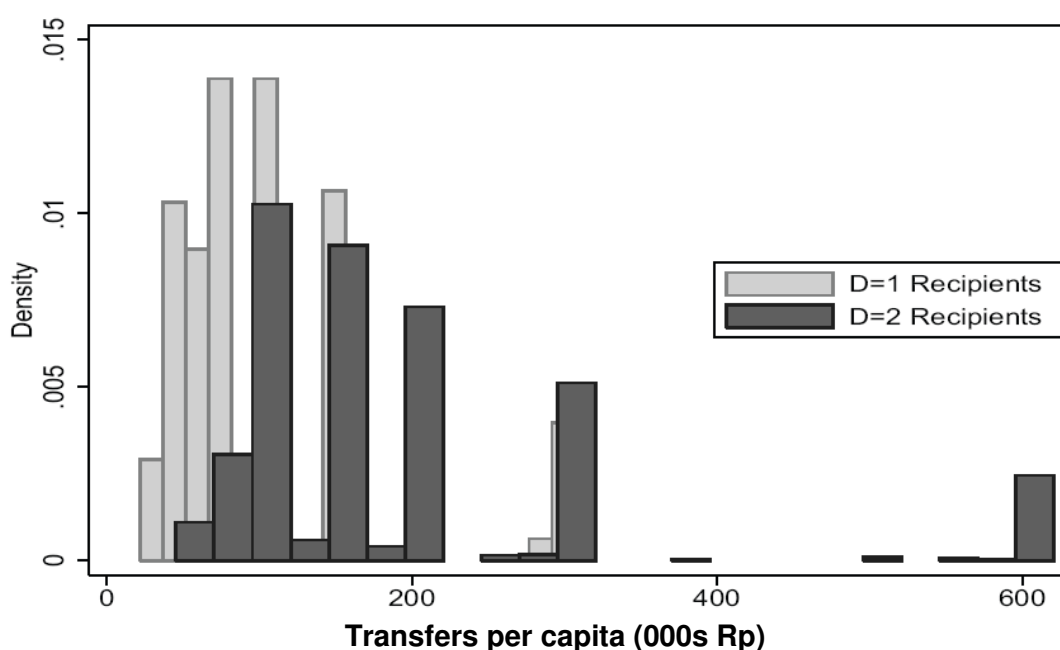
\*\*\*Significant at 1%.



**Figure 5. Baseline expenditure distributions by treatment status**

Note: All distributions estimated using Epanochnikov kernel and a rule-of-thumb bandwidth. The “Control (Reweighted)” observations are adjusted using inverse probability weights (IPW) based on normalized estimated odds of treatment  $\omega = \hat{P} / (1 - \hat{P})$ .

In Figure 5, we compare the distribution of log baseline household expenditures per capita across treatment levels. Given the exogeneity of the staggering process, it is not surprising to find that the distributions for treatment groups  $D=1$  and  $D=2$  are nearly identical and, in fact, statistically indistinguishable. Although mistargeting was rife, the control group is still substantially richer at baseline than the treatment groups. However, once we re-weight control households using  $\omega$ , the control group distribution shifts leftward and overlaps with the treatment group distributions quite strongly. The slight disproportion of control households in the right tail of the distribution leads to a small, albeit statistically significant, difference in mean across the treatment and control groups (at the 10% level). This slight imbalance in the baseline outcome in levels poses a potential source of bias but only inasmuch as that imbalance cannot be explained by observable time-invariant determinants of consumption. Otherwise the first differences will remove any bias. Other baseline covariates are effectively balanced after reweighting by  $\omega$  (results available upon request).



**Figure 6. Distribution of transfers per capita through February 2006**

Note: The transfer amount reported by households is obtained from a module attached to Susenas 2006.

In addition to variation in the timing of the second quarterly transfer, we also utilize the fixed transfer size to identify the marginal effect of an increase in transfers *per capita*. Baseline household sizes do not vary systematically across treatment (and control) groups. Figure 6 plots the distribution of transfers per capita (at midline in early 2006) for all recipients demonstrating the variation across households conditional on the number of disbursements  $d$ . The two disbursement recipients obtained median transfers per capita of Rp150,000 (mean Rp179,000), and single disbursement recipients Rp75,000 (mean Rp91,000). To identify the intensive margin treatment effects, we can simply augment equation (1) with observed transfers/capita and an exhaustive set of indicators for household size. Of course, this source of identification is not without caveats of its own. We address these in turn.



## IV. EMPIRICAL RESULTS

Having shown (i) the baseline balance of reweighting control  $D=0$  households by their estimated odds of treatment and (ii) the plausible exogeneity of the staggering process, we present the main empirical results in this section. In what follows, we report estimates of the multivalued treatment effects  $\tau$ . In addition to pure OLS, we consider four alternative reweighting estimators. All are predicated on the inverse probability weighting (IPW) approach. The double robust estimator augments the IPW specification with controls for the linear propensity scores ( $\hat{p}_h$ ) or the covariates ( $X_h$ ) used to predict those scores. The heterogeneous control function estimator introduces a fifth-order polynomial in the propensity scores and allows it to vary across recipients and nonrecipients. A review of these estimators can be found in Busso et al. (2009) and Imbens and Wooldridge (2009). Following suggestions therein, we trim 38 households with  $\hat{p}_h > \tilde{p}$  where  $\tilde{p}$  is the optimal bound derived using the procedure in Crump et al. (2009). In all specifications, we also control for province fixed effects, which among other purposes, captures differential regional trends in (real) expenditure growth. Standard errors are clustered at the village level in keeping with the cluster-based sampling procedures of Susenas.

### 4.1 Expenditures

We begin by considering estimates of equation (1) for the log difference in consumption between  $t$  and  $t+1$ . The top panel in Table 5 presents our baseline results for the short-term period from 2005–6. We find a consistent pattern of differential treatment effects across all reweighting specifications discussed above: Recipients still awaiting their second disbursement at the time of enumeration in early 2006 have significantly lower expenditure growth—by roughly 7.5 percentage points—relative to nonrecipients *and* recipient households with both disbursements. Moreover, recipients of two disbursements have identical expenditure growth as nonrecipients.<sup>19</sup> These results are largely insensitive to the estimator used with the exception that the OLS estimates of  $\tau_{10}$  and  $\tau_{21}$  are slightly lower. However, had we pooled the two recipient groups and estimated a conventional binary treatment effect—essentially a weighted sum of  $\tau_{10}$  and  $\tau_{21}$  with the weights equal to one and the share of recipients with two transfers, respectively—we would have understated the expenditure gains to receiving the full two transfers as expected by early 2006.

Retaining the same specifications and moving ahead to 2007, the bottom panel of Table 5 shows that the differential treatment effects dissipate over the two-year time horizon. This is intuitive since the UCT program had terminated by the time of enumeration in February–April 2007, and all UCT recipients had received the full set of four quarterly disbursements.<sup>20</sup>

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<sup>19</sup>Interestingly, the OLS estimates are statistically indistinguishable from the re-weighting estimates. An optimistic interpretation of this similarity would be that selection bias is limited after taking first-differences of the dependent variable and hence may be largely confined to the cross-section. The less favorable reading would be that the re-weighting approach (i.e., our estimated propensity scores) has not purged the sample of selection bias. Unfortunately, it is not possible to distinguish among these opposing alternatives.

<sup>20</sup>These estimates are not an artifact of the attrition of households between 2006 and 2007 survey rounds (see Section 3.1). Key results remain largely unaffected when re-weighting the sample to account for the probability of attrition, which is unconditionally identical across treatment levels and largely an artifact of administrative randomness rather than systematic household or regional characteristics.

**Table 5. Baseline Estimates of Multi-valued Treatment Effects, Short- and Medium-Term**

| Estimator                                | OLS                  | IPW                  | Double Robust         |                       | Control              |
|--|----------------------|----------------------|-----------------------|-----------------------|----------------------|
|  | (1)                  | (2)                  | ( $P_h$ )             | ( $X_h$ )             | Function             |
|  | (1)                  | (2)                  | (3)                   | (4)                   | (5)                  |
| <i>Short-Term: 2005-2006</i>             |                      |                      |                       |                       |                      |
| $\tau_{10}$ : receipt of disbursement 1  | -0.064<br>(0.027) ** | -0.089<br>(0.035) ** | -0.089<br>(0.034) *** | -0.089<br>(0.030) *** | -0.075<br>(0.030) ** |
| $\tau_{21}$ : receipt of disbursement 2  | 0.051<br>(0.030) *   | 0.073<br>(0.036) **  | 0.075<br>(0.035) **   | 0.070<br>(0.032) **   | 0.076<br>(0.033) **  |
| $\tau_{20} \equiv \tau_{21} + \tau_{10}$ | -0.013<br>(0.014)    | -0.016<br>(0.021)    | -0.014<br>(0.020)     | -0.019<br>(0.017)     | 0.001<br>(0.017)     |
| Re-weighted                              | No                   | Yes                  | Yes                   | Yes                   | Yes                  |
| Propensity Score Control(s)              | No                   | No                   | Yes                   | No                    | Yes                  |
| $X_h$ Controls                           | No                   | No                   | No                    | Yes                   | No                   |
| Number of Households                     | 9,010                | 9,010                | 9,010                 | 9,010                 | 9,010                |
| $R^2$                                    | 0.045                | 0.088                | 0.091                 | 0.170                 | 0.104                |
| <i>Medium-Term: 2005-2007</i>            |                      |                      |                       |                       |                      |
| $\tau_{10}$ : receipt of disbursement 1  | -0.037<br>(0.040)    | -0.057<br>(0.039)    | -0.066<br>(0.039) *   | -0.045<br>(0.034)     | -0.025<br>(0.038)    |
| $\tau_{21}$ : receipt of disbursement 2  | 0.029<br>(0.045)     | 0.032<br>(0.044)     | 0.035<br>(0.043)      | 0.009<br>(0.038)      | 0.031<br>(0.042)     |
| $\tau_{20} \equiv \tau_{21} + \tau_{10}$ | -0.008<br>(0.020)    | -0.026<br>(0.024)    | -0.031<br>(0.024)     | -0.036<br>(0.022)     | 0.006<br>(0.022)     |
| Reweighted                               | No                   | Yes                  | Yes                   | Yes                   | Yes                  |
| Propensity Score Control(s)              | No                   | No                   | Yes                   | No                    | Yes                  |
| $X_h$ Controls                           | No                   | No                   | No                    | Yes                   | No                   |
| Number of Households                     | 6,992                | 6,992                | 6,992                 | 6,992                 | 6,992                |
| $R^2$                                    | 0.044                | 0.056                | 0.062                 | 0.146                 | 0.069                |

*Note:* The dependent variable in all specifications is  $\Delta \log$  total household expenditures per capita between 2005 and 2006/2007. In the top panel, the constant term in columns 1 and 2 (i.e., average nonrecipient log expenditure growth, or  $\kappa$  in equation (1)) equal 0.107 and 0.109, respectively. In the bottom panel, the constant term equals 0.113 and 0.153 in columns 1 and 2, respectively. Columns 2–5 are estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_h / (1 - \hat{p}_h)$ , where the normalization is over the entire sample for the given time horizon. Column 3 controls linearly for the propensity score and column 5 for a fifth-order polynomial in the propensity score allowing it to vary by treatment and control. Column 4 controls for all covariates  $X_h$  used to estimate the propensity score. Standard errors clustered by village. All columns include province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

The main findings in Table 5 hold up to a number of robustness checks:<sup>21</sup>

### **Timing of the Midline Survey**

One concern with exploiting the staggered rollout is that we are merely picking up differences in the time at which households received Susenas enumerators. The identification strategy hinges on there being differences in the disbursement schedule across households observed at roughly identical points in time. To ensure that differential enumeration dates are not driving our results, we control for 65 distinct days of enumeration across the country. Doing so leaves the results unchanged.

### **Alternative “per capita” Formulations**

Some authors argue that when looking at household expenditure outcomes, one should account for the fact that children require less consumption (particularly of food) than adults to attain equivalent levels of welfare (see Deaton, 1997; Olken, 2006). We allow for this possibility by treating children as 0.5 or 0.75 adult equivalents where children are aged 0–9 or 0–14 years. Again, the results are unchanged.

### **Regional Differences in Inflation**

By including province fixed effects, we remove trend differences across regions in terms of inflation and hence of the pass through from fuel price increases to other consumer goods. We take two additional steps to ensure that local price differences are not driving our results. First, we deflate nominal expenditures using the nearest of the fifty regional CPI measures. Second, we control for increases in the price of the goods basket used to construct the *kabupaten*-specific poverty lines.

### **Durable Goods Expenditures Beyond the Last Month**

In the baseline regressions, we measure durable goods expenditures in the last month. In so doing, our measure of expenditures may have missed important purchases using UCT funds prior to January 2006. In other words, the UCT may have led to an increase in expenditures several months prior to midline enumeration and perhaps immediately after UCT receipt in October-December 2005. Hence our comparison of durable goods purchases in the early months of 2005 and 2006 might understate the large positive effects of the UCT had we compared those purchases going back over the full year prior to enumeration. This does not seem to be the case. Pro-rating annual nonfood expenditures to the monthly level (or identically, pro-rating food expenditures to the annual level) leaves our key parameter estimates unchanged.

### **Alternative Geographic Fixed Effects and Clustering**

All of the results in Table 5 are robust to including *kabupaten* fixed effects as well as to clustering standard errors at any administrative division above the village.<sup>22</sup>

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<sup>21</sup>Detailed tables for all of these robustness checks will be made available in an online appendix. We also consider a range of alternative estimators for the binary treatment effect of receiving any UCT benefits including nearest-neighbor matching (Abadie and Imbens, 2005), local linear matching (Heckman et al., 1998), inverse probability tilting (IPT) (Graham et al., 2012), and quantile re-weighting (Firpo, 2007). In all cases, the main qualitative and quantitative findings remain unchanged from those binary treatment effect estimates recoverable from Table 5.

<sup>22</sup>Including *kecamatan* or village effects removes nearly all of the exogenous variation in the staggering of the second quarterly transfer and pushes the estimates closer to a simple binary treatment effects specification, which as noted earlier understates the expenditure response.

### Participation in Other Social Programs

Several other previously operative social programs continued alongside the UCT. Receipt of such programs might confound our estimates of  $\tau$  parameters if, for example, the UCT disbursement schedule was timed so as to reach those households lacking other programs first. We control for participation in other programs (including a rice subsidy scheme, scholarships for poor students, and subsidized health insurance for the poor) and the results remain similar to the baseline.

### Systematic Underreporting of Expenditures

One concern is that in the midst of public scrutiny over perceived program leakage and undercoverage, UCT recipients and particularly those still awaiting their second disbursement systematically under-reported their expenditures. This would lead to nonclassical measurement error and could explain the null or negative treatment effects. We (partially) test for this by controlling for whether the household was assigned to the initial list by the village head (potentially more prone to patronage) or by a regional government official outside the village (less prone to patronage). Again, we find no systematic departures from the baseline findings.

### **Decomposing Expenditure Growth**

In Table 6, we find that the observed treatment effects are driven by differences in expenditures on food rather than nonfood items. Using the most flexible, control function estimator, we cannot reject the null hypothesis that all three groups  $d \in \{0,1,2\}$  have identical nonfood expenditure growth. Over the medium term period 2005–2007, we find similar patterns with the minor exception that two disbursement recipients have slightly larger food expenditure growth than nonrecipients ( $\tau_{21} \approx 0.04$ ).

**Table 6. Multi-valued Treatment Effects by Expenditure Type**

| Growth Horizon —<br>Expenditure Type — | 2005-2006           |                      |                   | 2005-2007         |                   |                   |
|--|---------------------|----------------------|-------------------|-------------------|-------------------|-------------------|
|  | total<br>(1)        | food<br>(2)          | nonfood<br>(3)    | total<br>(4)      | food<br>(5)       | nonfood<br>(6)    |
| $T_{10}$ : receipt of disbursement 1   | -0.075<br>(0.030)** | -0.093<br>(0.030)*** | -0.048<br>(0.047) | -0.025<br>(0.038) | -0.029<br>(0.035) | 0.008<br>(0.052)  |
| $T_{21}$ : receipt of disbursement 2   | 0.076<br>(0.033)**  | 0.097<br>(0.034)***  | 0.036<br>(0.050)  | 0.031<br>(0.042)  | 0.068<br>(0.040)* | -0.033<br>(0.057) |
| $T_{20} \equiv T_{21} + T_{10}$        | 0.001<br>(0.017)    | 0.005<br>(0.017)     | -0.013<br>(0.024) | 0.006<br>(0.022)  | 0.039<br>(0.021)* | -0.024<br>(0.033) |
| Rewighted                              | Yes                 | Yes                  | Yes               | Yes               | Yes               | Yes               |
| Propensity score polynomial            | Yes                 | Yes                  | Yes               | Yes               | Yes               | Yes               |
| Number of households                   | 9,010               | 9,010                | 9008              | 6,992             | 6,992             | 6,992             |

*Note:* The dependent variable in all specifications is  $\Delta \log$  household expenditures on the given commodity group per capita between 2005 and 2006/2007. All columns estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_t / (1 - \hat{p}_t)$ . All columns include a 5th order polynomial in the propensity scores that is allowed to vary by treatment and control. Standard errors clustered by village. All columns include province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

In Table 7, we further disaggregate food and nonfood expenditure items. In keeping with the specification for aggregate expenditure growth, we restrict the estimates for each commodity group to those households with nonzero expenditures in both periods.<sup>23</sup> We find the same general pattern as with aggregate expenditure growth in Table 5. For most expenditure subcategories, recipients still awaiting their second disbursement have statistically significantly lower expenditure growth than recipients of two disbursements and nonrecipients.<sup>24</sup> Moreover, the second disbursement almost entirely eliminates the gap between recipient and nonrecipient expenditure growth. However, we do observe slightly lower growth in recipient expenditures on prepared foods and substantially higher growth ( $\approx 11.2$  percentage points) on durable appliances. Other statistically precise differences are observed for non-staple food expenditures and transport/communications.

**Table 7. Multi-valued Treatment Effects by Disaggregated Expenditure Group**

|                          | <b>T<sub>10</sub></b>       | <b>T<sub>21</sub></b>     | <b>T<sub>20</sub></b>     | <b>No. of Households</b> |
|--------------------------|-----------------------------|---------------------------|---------------------------|--------------------------|
| <b>total</b>             | -0.075<br>(0.030)**         | 0.076<br>(0.033)**        | 0.001<br>(0.017)          | 9,010                    |
| <b>food</b>              | <b>-0.093</b><br>(0.030)*** | <b>0.097</b><br>(0.034)** | <b>0.005</b><br>(0.017)** | <b>9,010</b>             |
| rice                     | -0.039<br>(0.038)           | 0.056<br>(0.044)          | 0.017<br>(0.23)           | 8,777                    |
| tubers                   | 0.075<br>(0.075)            | 0.005<br>(0.086)          | 0.079<br>(0.055)          | 2,733                    |
| fish, meat, dairy        | -0.18<br>(0.063)***         | 0.125<br>(0.070)*         | -0.055<br>(0.034)         | 8,338                    |
| fruit, nuts, vegetables  | -0.128<br>(0.046)***        | 0.121<br>(0.051)**        | -0.007<br>(0.021)         | 8,850                    |
| other                    | -0.083<br>(0.039)**         | 0.088<br>(0.045)*         | -0.005<br>(0.021)         | 8,885                    |
| prepared food            | -0.226<br>(0.070)***        | 0.154<br>(0.078)**        | -0.072<br>(0.037)*        | 7,653                    |
| alcohol, tobacco         | -0.185<br>(0.069)***        | 0.155<br>(0.081)*         | -0.031<br>(0.049)         | 5,330                    |
| <b>Nonfood</b>           | <b>-0.077</b><br>(0.058)    | <b>0.042</b><br>(0.063)   | <b>-0.035</b><br>(0.030)  | <b>9,008</b>             |
| education, health        | -0.158<br>(0.112)           | 0.189<br>(0.128)          | 0.031<br>(0.063)          | 6,507                    |
| housing, utilities       | 0.010<br>(0.054)            | -0.030<br>(0.057)         | -0.190<br>(0.024)         | 9,008                    |
| transport, communication | -0.306<br>(0.105)***        | 0.269<br>(0.117)**        | -0.033<br>(0.056)         | 5,480                    |
| appliances               | -0.014<br>(0.067)           | 0.126<br>(0.077)*         | 0.112<br>(0.044)**        | 8,904                    |
| debt, taxes              | 0.065<br>(0.124)            | -0.145<br>(0.137)         | -0.079<br>(0.056)         | 5,997                    |

*Note:* Each row corresponds to a separate regression with the log difference in the given expenditure category on the left hand side. All rows estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_h / (1 - \hat{p}_h)$ . All estimates include a 5th order polynomial in the propensity scores that is allowed to vary by treatment and control. Standard errors clustered by village. All estimates include province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

<sup>23</sup>The presence of zeros in one or both periods gives rise to a panel data sample selection problem. A fully specified demand system is beyond the scope of the present study, and lacking instruments for the extensive margin, we focus on the intensive margin of expenditure growth.

<sup>24</sup>Two commodity groups, housing/utilities and debt/taxes, depart from this general pattern, though the results are statistically imprecise.

## Intensive Margin Treatment Effects

Having found robust differential treatment effects according to the timing (and total magnitude) of transfers received, we now consider an additional source of variation in the intensive margin of treatment. In particular, we estimate the following equation:

$$\Delta \ln C_{ht} = \kappa + \tau_{10} \mathbf{1}\{D_h > 0\} + \tau_{21} \mathbf{1}\{D_h = 2\} + \psi \frac{\text{transfer}}{\text{capita}_h} + \sum_{j=1}^{13} \beta_j \mathbf{1}\{HH \text{ size}_h = j\} + \Delta \varepsilon_{ht}, \quad (2)$$

Where (i) we retain the IPW reweighting strategy, and (ii) *transfers* is the total amount of UCT funds (in 100,000s of Rupiah) received by enumeration in early 2006, and (iii) *capita* and *HH size* are household size. After removing (i) the multivalued treatment effects through reweighting and the disbursement indicators, and (ii) the independent effects of household size through  $\beta_j$  terms, all that remains is information on the scale (or intensity) of UCT benefits. Under the assumption that  $E[\Delta \varepsilon_{ht} | HHsize_h] = 0$  (after reweighting),  $\psi$  then identifies the marginal effect of an additional unit of nonlabor income per capita.

Before considering estimates of equation 2, we address two potential concerns with the identification strategy underlying equation (2). First, if the UCT program caused changes in household size, then any observed effect on expenditures may reflect this intermediate relationship.<sup>25</sup> We rule this out in Table 8, which applies the same reweighting estimators to the difference in household size as the dependent variable.

**Table 8. UCT Benefits Had No Effect on Household Size**

| Estimator                               | OLS               | IPW               | Double Robust          | Control           | Function          |
|---|-------------------|-------------------|------------------------|-------------------|-------------------|
|   | (1)               | (2)               | ( $\hat{P}_h$ )<br>(3) | ( $X_h$ )<br>(4)  |                   |
| $\tau_{10}$ : receipt of disbursement 1 | 0.004<br>(0.057)  | 0.033<br>(0.065)  | 0.033<br>(0.065)       | 0.013<br>(0.066)  | 0.031<br>(0.062)  |
| $\tau_{21}$ : receipt of disbursement 2 | -0.006<br>(0.063) | -0.036<br>(0.067) | -0.036<br>(0.068)      | -0.011<br>(0.069) | -0.050<br>(0.068) |
| Reweighted                              | No                | Yes               | Yes                    | Yes               | Yes               |
| Propensity score control(s)             | No                | No                | Yes                    | No                | Yes               |
| $X_h$ controls                          | No                | No                | No                     | Yes               | No                |
| Number of households                    | 9,010             | 9,010             | 9,010                  | 9,010             | 9,010             |
| $R^2$                                   | 0.005             | 0.011             | 0.011                  | 0.054             | 0.015             |

*Note:* All columns estimated by linear probability regressions with  $\Delta \log$  household size between 2005 and 2006 on the left hand side. Columns 2–5 are estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_h / (1 - \hat{p}_h)$ . Standard errors clustered by village. All columns include province fixed effects

<sup>25</sup>Note that controlling for the difference in household size does not solve the problem (see Angrist and Pischke, 2009, on the “bad” control problem).

**Table 9. Idiosyncratic vs. Spatial Variation in the “Tax” on UCT Recipients**

|  | (1)               | (2)              | (3)              | (4)               |
|--|-------------------|------------------|------------------|-------------------|
| household size, $t-1$                  | -0.001<br>(0.004) | 0.001<br>(0.002) | 0.003<br>(0.005) | -0.000<br>(0.002) |
| Fixed effects (FE)                     | Province          | <i>Kecamatan</i> | Province         | <i>Kecamatan</i>  |
| $X_{h,t-1}$ controls                   | No                | No               | Yes              | Yes               |
| p-value joint statistical significance |                   |                  | [0.52]           | [0.99]            |
| Number of households                   | 2,410             | 2,410            | 2,410            | 2,410             |
| $R^2$                                  | 0.113             | 0.822            | 0.187            | 0.827             |

Note: All columns estimated by linear probability regressions of the following specification:  $P_r(\text{transfer}_r < \text{full amount} | D) = \beta X_{h,t-1} + \theta_{FE} + \epsilon_{it}$ , where  $X_{h,t-1}$  includes all the baseline household characteristics used to estimate propensity scores. Standard errors clustered by village.

Second, local officials in some regions extracted a portion of the officially mandated Rp300,000 disbursement per beneficiary. Approximately 6.5 (8.5)% of recipients were subject to these informal taxes at the time of obtaining their first (second) UCT disbursement.<sup>26</sup> If the incidence of informal taxes varied systematically across recipients depending on household size or other characteristics, then the estimated elasticity of outcome  $Y$  with respect to transfers per capita might be biased. In Table 9, we show that the probability of recipient household  $h$  being taxed is orthogonal to observable household characteristics. Tables 8 and 9 point to the plausible exogeneity of household size with respect to other variation of interest.

**Table 10. Intensive Margin Treatment Effects by Expenditure Group**

|  | (1)                 | (2)                 | (3)                 | (4)                 |
|--|---------------------|---------------------|---------------------|---------------------|
| <b>Dep. Var.: <math>\Delta \log</math> total expenditures/capita</b>   |                     |                     |                     |                     |
| transfers per capita (Rp 000,000s)                                     | 0.045<br>(0.008)*** | 0.045<br>(0.008)*** | 0.038<br>(0.008)*** | 0.066<br>(0.011)*** |
| <b>Dep. Var.: <math>\Delta \log</math> food expenditures/capita</b>    |                     |                     |                     |                     |
| transfers per capita (Rp 000,000s)                                     | 0.045<br>(0.008)*** | 0.045<br>(0.009)*** | 0.040<br>(0.009)*** | 0.066<br>(0.011)*** |
| <b>Dep. Var.: <math>\Delta \log</math> nonfood expenditures/capita</b> |                     |                     |                     |                     |
| transfers per capita (Rp 000,000s)                                     | 0.056<br>(0.013)*** | 0.056<br>(0.013)*** | 0.049<br>(0.015)*** | 0.091<br>(0.023)*** |
| Treatment indicators   | Yes                 | Yes                 | Yes                 | Yes                 |
| Rewighted  | No                  | Yes                 | Yes                 | Yes                 |
| Propensity score polynomial  | No                  | No                  | Yes                 | Yes                 |
| Household size indicators  | No                  | No                  | No                  | Yes                 |
| Number of households   | 9,010               | 9,010               | 9,010               | 9,010               |
| $R^2$  | 0.106               | 0.121               | 0.106               | 0.121               |

Note: Each cell corresponds to a separate regression. Transfers are rescaled to 100,000s of Rupiah (approx. 10 USD). Columns 2–4 are estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_t / (1 - \hat{p}_t)$ . Standard errors clustered by village. All columns include province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

<sup>26</sup>These taxes went primarily to officials in the village. According to recipients subjected to these taxes, the proceeds were meant to cover local ID/certificate administration, security at disbursement centers, but most were intended for redistribution to nonrecipients deemed deserving by local officials. The portion allocated to supposed local redistribution increased from 40% at the first disbursement to 62% at the second disbursement. Among those taxed, the median amount also increased from Rp20,000 to Rp50,000. These increases were likely due in part to the rising discontent with the initial eligibility lists.

In Table 10, we report estimates of  $\psi$  from equation (2) for total, food, and nonfood expenditures per capita. Columns 1-3 impose  $\beta_j=0$  for all  $j$ , and column 4 allows  $\beta_j \neq 0 \forall j$  to allow for unconditional scale effects in the growth in household expenditures/capita (e.g., larger households can better cope with shocks). The point estimates of 0.04–0.065 for total expenditures per capita imply a marginal propensity to consume (MPC) out of transfer income of around 0.08–0.11, where the MPC is simply the elasticity of expenditures per capita with respect to transfers per capita. The estimated MPC is slightly higher for nonfood expenditures and when allowing for unconditional scale effects. Although small, these elasticities are economically meaningful. The estimates imply that an increase in household transfers per capita by US\$10 per quarter implies roughly a 5% increase in monthly expenditures per capita. We return to these estimates in Section 5 when discussing the theoretical implications.

## Expenditure-Based Poverty Transitions

Before turning to labor supply results, we report in Table 11 the effects of the UCT program on changes in the poverty status of households. We estimate a multinomial logit equation with four possible outcomes: chronic poverty (i.e., poor in both of the periods  $t$  and  $t+1$ ), moving into poverty (i.e., nonpoor in  $t$ , poor in  $t+1$ ), moving out of poverty (i.e., poor in  $t$ , nonpoor in  $t+1$ ), and never poor (i.e., nonpoor in  $t$  and  $t+1$ ). The Indonesian poverty lines are *kabupaten*-specific and are calculated separately for urban and rural areas based on a local food consumption basket relevant to relatively low-income households. When estimating the multinomial logit equation, we retain the flexible, control function reweighting specification as in earlier results.

**Table 11. Poverty Transitions and the UCT (Multinomial Logit AME)**

|  | (1)<br>chronic poor  | (2)<br>into poverty | (3)<br>out of poverty | (4)<br>never poor    |
|--|--|---------------------|-----------------------|----------------------|
|  | $Pr(poor_{t-1} = 1, poor_t = 1), Pr(poor_{t-1} = 0, poor_t = 1), Pr(poor_{t-1} = 1, poor_t = 0), Pr(poor_{t-1} = 0, poor_t = 0)$ |                     |                       |                      |
|  | <i>Short-Term: 2005-2006</i>   |                     |                       |                      |
| $\tau_{10}$ : receipt of disbursement 1  | 0.218<br>(0.047)***  | 0.099<br>(0.023)*** | 0.014<br>(0.021)      | -0.331<br>(0.041)*** |
| $\tau_{21}$ : receipt of disbursement 2  | 0.003<br>(0.026)   | -0.023<br>(0.019)   | 0.040<br>(0.022)*     | -0.020<br>(0.033)    |
| $\tau_{20} \equiv \tau_{21} + \tau_{10}$ | 0.221<br>(0.042)***  | 0.076<br>(0.076)*** | 0.053<br>(0.053)***   | -0.351<br>(0.033)*** |
| Reweighted                               | Yes  | Yes                 | Yes                   | Yes                  |
| Propensity score polynomial              | Yes  | Yes                 | Yes                   | Yes                  |
| Actual probability                       | 0.081  | 0.084               | 0.063                 | 0.772                |
| Predict probability                      | 0.080  | 0.085               | 0.065                 | 0.770                |
| Number of households                     | 9,010  | 9,010               | 9,010                 | 9,010                |



|  | <i>Medium-Term: 2005-2007</i>   |                                 |                                 |                                  |
|--|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
| $\tau_{10}$ : receipt of disbursement 1  | 0.086<br>(0.021) <sup>***</sup> | 0.112<br>(0.030) <sup>***</sup> | 0.105<br>(0.029) <sup>***</sup> | -0.303<br>(0.038) <sup>***</sup> |
| $\tau_{21}$ : receipt of disbursement 2  | 0.014<br>(0.017)                | 0.009<br>(0.017)                | 0.024<br>(0.027)                | -0.047<br>(0.034)                |
| $\tau_{20} \equiv \tau_{21} + \tau_{10}$ | 0.099<br>(0.017) <sup>***</sup> | 0.121<br>(0.028) <sup>***</sup> | 0.129<br>(0.018) <sup>***</sup> | -0.349<br>(0.028) <sup>***</sup> |
| Reweight                                 | Yes                             | Yes                             | Yes                             | Yes                              |
| Propensity score polynomial              | Yes                             | Yes                             | Yes                             | Yes                              |
| Actual probability                       | 0.034                           | 0.054                           | 0.110                           | 0.803                            |
| Predicted probability                    | 0.040                           | 0.066                           | 0.107                           | 0.786                            |
| Number of households                     | 6,992                           | 6,992                           | 6,992                           | 6,992                            |

*Note:* The poverty line varies across *kabupaten*  $\times$  urban or rural administrative divisions. The average marginal effects (AME) are based on multinomial logit (base outcome is “into poverty”) where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega(\cdot) = \hat{p}_h / (1 - \hat{p}_h)$ . Standard errors clustered by village. The regression includes province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

The average marginal effects in Table 11 suggest that the UCT program had heterogeneous effects on poverty over the short-term period from early 2005 to early 2006. On the one hand, transfer recipients are more likely to stay poor and also become poor. Yet, we also observe that transfer receipt, particularly the second disbursement, is associated with movement out of poverty.

We observe similar patterns over the medium-term time horizon (in the bottom panel of Table 11) albeit with a few important exceptions. Firstly, UCT benefits are associated with a large increase (of 0.13) in the probability of moving out of poverty. This holds regardless of the timing of second quarterly transfer at midline enumeration in 2006. Secondly, the correlation between UCT receipt and the probability of remaining poor falls by half relative to the short-term time horizon. In sum, although the UCT benefits did not lead to dramatic increases in household expenditures, the program did enable some households to move out of (officially-defined) poverty over both the short- and medium-term.

**Table 12. Multi-valued Treatment Effects on Labor Supply, 2005-6**

| Estimator                                |                     |                     | Double Robust       |                     | Control Function    |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|
|  | OLS                 | IPW                 | $(\hat{P}_h)$       | $(X_h)$             |                     |
|  | (1)                 | (2)                 | (3)                 | (4)                 |                     |
| <i>Short-Term: 2005-2006</i>             |                     |                     |                     |                     |                     |
| $\tau_{10}$ : receipt of disbursement 1  | -0.535<br>(0.737)   | -1.710<br>(0.887)*  | -1.700<br>(0.859)** | -1.838<br>(0.842)** | -0.437<br>(0.773)   |
| $\tau_{21}$ : receipt of disbursement 2  | 0.422<br>(0.846)    | 1.168<br>(0.934)    | 1.240<br>(0.927)    | 1.411<br>(0.920)    | 0.843<br>(0.874)    |
| $\tau_{20} \equiv \tau_{21} + \tau_{10}$ | -0.113<br>(0.451)   | -0.543<br>(0.585)   | -0.461<br>(0.563)   | -0.427<br>(0.532)   | 0.406<br>(0.525)    |
| Rewighted                                | No                  | Yes                 | Yes                 | Yes                 | Yes                 |
| Propensity score Control(s)              | No                  | No                  | Yes                 | No                  | Yes                 |
| $X_h$ controls                           | No                  | No                  | No                  | Yes                 | No                  |
| Number of households                     | 9,010               | 9,010               | 9,010               | 9,010               | 9,010               |
| $R^2$                                    | 0.015               | 0.027               | 0.031               | 0.102               | 0.051               |
| <i>Medium-Term: 2005-2007</i>            |                     |                     |                     |                     |                     |
| $\tau_{10}$ : receipt of disbursement 1  | -2.309<br>(0.946)** | -2.571<br>(1.085)** | -2.623<br>(1.100)** | -2.285<br>(1.105)** | -2.565<br>(1.053)** |
| $\tau_{21}$ : receipt of disbursement 2  | 2.061<br>(1.065)*   | 2.129<br>(1.167)*   | 2.148<br>(1.163)*   | 2.111<br>(1.157)*   | 2.114<br>(1.179)*   |
| $\tau_{20} \equiv \tau_{21} + \tau_{10}$ | -0.248<br>(0.577)   | -0.442<br>(0.669)   | -0.475<br>(0.686)   | -0.173<br>(0.666)   | -0.451<br>(0.599)   |
| Rewighted                                | No                  | Yes                 | Yes                 | Yes                 | Yes                 |
| Propensity score control(s)              | No                  | Yes                 | Yes                 | No                  | Yes                 |
| $X_h$ controls                           | No                  | No                  | No                  | Yes                 | No                  |
| Number of households                     | 6,992               | 6,992               | 6,992               | 6,992               | 6,992               |
| $R^2$                                    | 0.013               | 0.017               | 0.018               | 0.074               | 0.021               |

Note: The dependent variable in all specifications is  $\Delta$  weekly hours worked per adult between 2005 and 2006, which is calculated as total hours worked divided by number of adult household members. Columns 2–5 are estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_h / (1 - \hat{p}_h)$ . Standard errors clustered by village. All columns include province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

## 4.2 Labor Supply

In this subsection, we briefly discuss the potential effects of the UCT on the labor supply of household members >10 years old and not currently enrolled in school. (In results available upon request, we find no evidence that the UCT program led to changes in the labor supply of children enrolled in school.) Our preferred metric of labor supply is total hours worked per household divided by the number of working age adults not currently enrolled in school. We advocate this measure instead of a simple average over household members for several reasons. First, we wish to remain relatively agnostic as to the complex determinants of the intra-household substitutability of labor. Second, we aim to capture implicitly the dependency ratios for a given household. For example, if a certain household relies on the labor supply of

two individuals, we would prefer to assign a larger increase in labor supply for a given hour compared with a household relying on the labor of three individuals. Third, lacking strong priors on functional form or a readily available instrumental variable, we avoid distinguishing between the extensive and intensive margins of labor force participation.

In Table 12, we consider the difference in labor supply between periods as the dependent variable and deploy the same set of reweighting estimators as before. We find that the first UCT disbursement is associated with a reduction of around 1.7 hours worked per adult in the last week. These are economically meaningful effects given a baseline mean of 22 hours worked per adult. However, they are not robust to the most flexible control function specification in column 5. Nor do they appear to be any statistically meaningful differences between nonrecipients and recipients that received two quarterly transfers by midline ( $\tau_{20}$  is null). In other words, the negative labor supply response in columns 2–4 is largely confined to those recipient households still awaiting their second transfer at the time of enumeration in early 2006. A potential explanation for this finding is that in early 2006 households had re-optimized their labor supply to a lower level in anticipation of receiving transfers at a given date in the near future. Inasmuch as those decisions had persistent effects (e.g., previously declined positions were already filled), it may have been difficult for households to increase their labor in response to the delayed receipt of the second quarterly transfer.

The bottom panel of 12 shows that short term labor supply effects remain several months after the final disbursement arrived in late 2006. It is somewhat puzzling that these labor supply differentials persist well after the time by which all recipients should have received the full set of four quarterly transfers. One possibility is that the short-run persistence argument has long-run consequences.

**Table 13. Intensive Margin Treatment Effects on Labor Supply**

| Estimator                             | OLS               | IPW               | Double Robust     |                   | Control Function  |
|---------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                                       |                   |                   | $(\hat{p}_h)$     | $(X_h)$           |                   |
|                                       | (1)               | (2)               | (3)               | (4)               | (5)               |
| <b>Δ 2005-2006</b>                    |                   |                   |                   |                   |                   |
| transfers per capita<br>(Rp000,000s ) | 0.373<br>(0.363)  | -0.592<br>(0.610) | -0.609<br>(0.603) | -0.391<br>(0.481) | -0.202<br>(0.458) |
| <b>Δ 2005-2007</b>                    |                   |                   |                   |                   |                   |
| transfers per capita<br>(Rp000,000s)  | -0.329<br>(0.483) | -0.406<br>(0.561) | -0.437<br>(0.566) | -0.256<br>(0.531) | -0.280<br>(0.561) |
| Treatment indicators                  | Yes               | Yes               | Yes               | Yes               | Yes               |
| Household size indicators             | Yes               | Yes               | Yes               | Yes               | Yes               |
| Reweighting                           | No                | Yes               | Yes               | Yes               | Yes               |
| Propensity score control(s)           | No                | Yes               | Yes               | No                | Yes               |
| $X_h$ controls                        | No                | No                | No                | Yes               | No                |

*Note:* The dependent variable in all specifications is Δweekly hours worked per adult between 2005 and 2007, which is calculated as total hours worked divided by number of adult household members. Columns 2–5 are estimated by weighted least squares where the weights for treatment households equal one and the weights for control households are given by the normalized  $\omega = \hat{p}_h / (1 - \hat{p}_h)$ . Standard errors clustered by village. All columns include province fixed effects.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

Lastly, in Table 13, we show that although hours worked per adult are declining in transfers per capita (conditional on disbursements received), these effects are relatively small and statistically imprecise. Nor are there meaningful differences in the estimated effects over the short- versus medium-term.

## V. DISCUSSION

In this section, we reconcile the main empirical results (for expenditures) with a conceptual framework based on the permanent income hypothesis (PIH).

### 5.1 Interpreting Treatment Effects through the PIH

Starting from a standard Euler equation for household  $b$  in period  $t$ ,

$$u'(C_{b,t-1}) = (1+\delta)^{-1} E_{t-1} \left[ (1+r) u'(C_{bt}) \right],$$

the PIH under certainty equivalence (quadratic preferences, intertemporal separability, perfect credit markets) and income uncertainty implies

$$\Delta C_{bt} = \frac{r}{1+r} \left[ 1 - \frac{1}{(1+r)^{T-t+1}} \right]^{-1} \sum_{\tau=0}^{T-t} (1+r)^{-\tau} (E_t - E_{t-1}) Y_{b,t+\tau} \quad (3)$$

where  $Y_{b,t+\tau} = \varepsilon_{b,t+\tau}$  is income at time  $t+\tau$  (see Jappelli and Pistaferri, 2010). Adding a permanent component to income  $Y_{b,t+\tau} = P_{b,t+\tau} + \varepsilon_{b,t+\tau}$  (where  $P_{b,t+r} = P_{b,t+r-1} + v_{bt}$ ) and pushing out to infinity, we obtain

$$\Delta C_{bt} = \frac{r}{1+r} \varepsilon_{bt} + v_{bt},$$

where period  $t$  savings is given by

$$S_{bt} = - \sum_{j=1}^{\infty} \frac{E_t \Delta Y_{b,t+j}}{(1+r)^j} = \frac{1}{1+r} \varepsilon_{bt} \quad (4)$$

These equations provide a simple framework for understanding the observed effects of the UCT program on consumption or expenditures.

In keeping with the empirical context, we consider expenditure growth between periods  $t$  (or  $t+1$ ) and  $t-1$  and abstract away from permanent components of income. Restating the above expressions in logs (after imposing the relevant assumptions on the utility function), equation (3) implies

$$\Delta \ln C_{bt} = \left( \frac{r}{1+r} \right) (\ln Y_{bt} - E_{t-1} \ln Y_{bt}). \quad (5)$$

Suppose income  $\ln Y_{bt} = W_{bt} + D_{bt}$  where  $W_{bt}$  is the real wage and  $D_{bt}$  is a potentially nonzero nominal government transfer, which by definition (and public law) is transitory. For simplicity, let  $W_{bt} = \varepsilon_{bt}$

Using equation (5), we consider several possibilities for the expenditure patterns of UCT recipients and nonrecipients. First, consider nonrecipients. Suppose that nonrecipient household  $h'$  had no prior expectation of being a transfer beneficiary (i.e., they were informed at time  $t-1$  that they would not be receiving any benefits in the future). This implies that their expenditure growth can be written as

$$\Delta \ln C_{bt'} = \left( \frac{r}{1+r} \right) \varepsilon_{bt'} \quad (6)$$

There are now multiple cases to consider for UCT recipients. First, suppose that all identified beneficiaries anticipated (at time  $t-1$ ) that they would have received two transfer disbursements by time  $t$  in early 2006. Then, for recipients that realized two transfer disbursements  $D$  by enumeration in early 2006, we obtain

$$\Delta \ln C_{bt} = \left( \frac{r}{1+r} \right) \varepsilon_{bt} \quad (7)$$

That is, on average, these households exhibit identical expenditure growth to nonrecipients. Empirically, the reweighting procedure detailed above ensures that recipient and nonrecipient households draw from same income distribution (i.e.,  $E[\varepsilon_{bt}] = E[\varepsilon_{bt'}]$ ). However, for those recipients that realized only one transfer by enumeration in early 2006,

$$\Delta \ln C_{bt} = \left( \frac{r}{1+r} \right) (\varepsilon_{bt} - D_{bt}), \quad (8)$$

where the  $-D_{bt}$  term captures the “surprise” effect of not having received the second disbursement by the time anticipated ex ante. In other words, these households would have drawn down savings in anticipation of the second disbursement (see equation (4)). However, its late arrival meant that the household was left with insufficient liquidity in the week(s) just prior to Susenas enumeration.

If we define  $t-1$  as the period immediately after the announcement of the program benefits and implementation schedule, then equations (6)-(8) provide a justification for the treatment effects reported in Table 5. These equations are also consistent with the largest expenditure differences being observed for food rather than nonfood items (see Table 6) since the former is reported over the week immediately prior to enumeration whereas the latter is reported over the month prior to enumeration. Moreover, this framework can also explain why the differential treatment effects in Table 5 dissipate by 2007. Taking a longer two-period difference in log expenditures between  $t-1$  and  $t+1$ , the surprise effect in equation (8) no longer holds as all recipients received all four quarterly transfers as expected by the end of 2006.

On the other hand, if eventual recipient households did not anticipate the UCT program at time  $t-1$ , then equation (5) implies

$$\Delta \ln C_{bt} = \left( \frac{r}{1+r} \right) (\epsilon_{bt} + 2D_{bt}) \quad (9)$$

for households realizing two disbursements by early 2006 and

$$\Delta \ln C_{bt} = \left( \frac{r}{1+r} \right) (\epsilon_{bt} + D_{bt}) \quad (10)$$

for households realizing only one disbursement. For  $r > 0$ , this implies (i) that recipients should have higher expenditure growth than nonrecipients and (ii) that recipients of two disbursements should have higher growth than recipients of one disbursement. Implication (ii) is borne out in Table 5, but implication (i) is not.

Although both formulations are informative, neither is dispositive. Taking the period around baseline enumeration in February–April 2005 as  $t-1$  (and the midline follow-up enumeration period in February–April 2006 as  $t$ ), no Indonesian household could have anticipated the subsidy cuts and cash transfer program implemented later that year since the government had not yet publicized their plans for such a program. Given this timeline, it is difficult to justify the initial formulation despite its obvious appeal. Yet, the second formulation in which the transfers were entirely unexpected requires ignoring the sharp break in expectations over future income that occurred around September 2005 midway between baseline and midline follow-up enumeration. One can see the potential problems with this by taking subannual time horizons in equation (3) and recalling that food expenditures are reported over the last week while nonfood expenditures are reported over the last month (or last year).

Despite their stark differences, the two timing regimes coincide in the predicted expenditure growth differential between recipients of one relative to two disbursements over the short term. Under both expectations regimes, recipients of two disbursements should have expenditure growth that is roughly  $[r/(1+r)] \times D$  greater than recipients still awaiting their second disbursement at the time of enumeration. Taking the estimates of  $\tau_{21}$  from Table 5, we obtain  $\hat{r} \approx 0.075$ . Moreover, as discussed above, the estimates of  $\psi$  in Table 10 imply a marginal propensity to consume out of transfer of around 0.08–0.10, implying similar estimates of  $r$ .

In practice, all of the above predictions hinge on the real interest rate  $r$  being nonzero. While nominal interest rates quoted by the government were indeed quite high around this time, so was inflation on account of the fuel subsidy cutbacks. Even if  $r \approx 0$ , households may respond to transitory income shocks if they are liquidity-constrained because, for example, credit markets are imperfect. We turn now to a test of this prediction among Indonesian households in our sample in order to rule out concerns that the household response to the UCT was somehow anomalous and the PIH-based explanation spurious.

## 5.2 Household Responses to Other Transitory Income Shocks

Given evidence that Indonesian households respond to transitory UCT benefits, we examine in this brief subsection whether households exhibit similar responses to other types of transitory income shocks. Following others in the development literature beginning with Paxson (1992), we exploit spatial and time series variation in rainfall, a transitory source of income fluctuations across the Indonesian archipelago. For individual  $b$  residing in village  $v$ , we measure the transitory rainfall shock in year  $t$  as the log rainfall level in that *kabupaten* over the province-specific growing season minus the log mean rainfall level for that *kabupaten* over the forty years/seasons prior to  $t$ .<sup>27</sup>

<sup>27</sup>Due to merging difficulties, we are forced to drop households residing in villages in Papua.

**Table 14. (Agricultural Household) Expenditures Respond to Transitory Rainfall Shocks**

|  | (1)              | (2)               | (3)                | (4)               | (5)                |
|--|------------------|-------------------|--------------------|-------------------|--------------------|
| log rainfall mean deviation              | 0.031<br>(0.074) | -0.048<br>(0.100) | -0.041<br>(0.078)  | -0.055<br>(0.080) | -0.028<br>(0.072)  |
| 1(rural village)                         |                  | -0.005<br>(0.020) |                    |                   |                    |
| 1(rural village) × rainfall shock        |                  | 0.126<br>(0.112)  |                    |                   |                    |
| 1(agriculture primary income)            |                  |                   | 0.017<br>(0.015)   |                   |                    |
| 1(agri. primary income) × rainfall shock |                  |                   | 0.218<br>(0.090)** |                   |                    |
| 1(own any agri. land)                    |                  |                   |                    | -0.001<br>(0.015) |                    |
| 1(own any agri. land) × rainfall shock   |                  |                   |                    | 0.171<br>(0.094)* |                    |
| agri. land (Ha)                          |                  |                   |                    |                   | 0.001<br>(0.003)   |
| agri. land (Ha) × rainfall shock         |                  |                   |                    |                   | 0.063<br>(0.029)** |
| Number of households                     | 8,922            | 8,922             | 8,922              | 8,922             | 8,922              |
| $R^2$                                    | 0.042            | 0.043             | 0.044              | 0.043             | 0.045              |

*Note:* The dependent variable in all specifications is  $\Delta$ log total household expenditures per capita between 2005 and 2006. The rainfall shock is the log deviation of the seasonal rainfall level in the *kabupaten* from the long-run (1952–2004) *kabupaten* mean. Standard errors clustered by *kabupaten*. All columns include province fixed effects. The interaction terms are as observed at baseline.

\*Significant at 10%.

\*\*Significant at 5%.

\*\*\*Significant at 1%.

The key message from Table 14 is that transitory rainfall shocks are associated with higher growth in household expenditures. However, the expenditure response is largely confined to those households in the agricultural sector, and particularly those with any land-holdings. In column 1, we find no relationship between rainfall shocks and consumption. However, allowing the elasticity to vary across rural and urban areas in column 2, we find a positive elasticity of expenditure growth with respect to rainfall shocks that is around 0.13 albeit imprecisely estimated. Moreover, in columns 3–5, we find that households reporting agricultural activities as their primary income and owning any agricultural land exhibit a small albeit statistically precise and economically meaningful expenditure response to transitory changes in income associated with rainfall shocks. The estimate in column 3 suggests that in agricultural households, a 10% deviation of rainfall from its long-run mean yields roughly a 2.2% increase in consumption. The elasticity is of similar magnitude in column 4 when restricting to land-owning households. Taken together, these results suggest that Indonesian household expenditures are more responsive to transitory income shocks than would be predicted under the classical permanent income hypothesis in the absence of borrowing constraints.<sup>28</sup>

<sup>28</sup>Although rainfall shocks only affect the transitory income and hence expenditures of certain segments of the (rural) population, the UCT benefits and especially the intensive margin of treatment do not have heterogeneous effects along

## VI. CONCLUSION

This paper has considered the importance of timing and expectations in interpreting the household expenditure response to unconditional cash transfers in Indonesia. Our empirical strategy relied on nationally representative panel data, difference-in-difference re-weighting estimators, and the staggered rollout of the second quarterly transfer. Our findings highlight the benefit of having multiple sources of variation in transfer income. The staggered rollout allowed us to identify differential treatment effects depending on the timing of the second transfer. On average, beneficiary households that received the full two transfers as expected by early 2006 do not differ from comparable nonbeneficiaries in terms of per capita expenditure growth and changes in labor supply per adult. However, beneficiaries still unexpectedly awaiting their second transfer report 7 percentage point lower expenditure growth and a differential reduction in labor supply by an additional 1.5 hours per adult per week on average. Using the third wave of panel data, we find that the expenditure differences dissipate by early 2007, several months after the final transfer was received by all beneficiaries. Using the fact that the transfer amount per disbursement was fixed across households, we are able to identify a small, short-run marginal propensity to consume out of transfer income of around 0.10. We reconcile our findings with insights of a simple permanent income model and largely rule out alternative explanations based on missing or imperfect data.

In addition to offering a new way of understanding the household response to unconditional cash transfers, our paper also relates more generally to the literature on the role of cash transfers in policy reform in developing countries. Unlike numerous programs in Latin America and elsewhere, the UCT in Indonesia was not explicitly designed as a transformative poverty alleviation program. Rather, the government used the program as means of transitioning away from regressive fuel subsidies. Similar subsidy reforms have either recently been implemented or are being considered across a number of developing countries (Coady et al., 2010). These programs have a number of important welfare implications and warrant further study. Our results from Indonesia suggest that the household response to cash transfers in such contexts may hinge strongly on perceived program duration as well as the timing of the transfers with respect to subsidy cutbacks.

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these same dimensions. These results (available upon request) increase our confidence in the interpretation of the UCT benefits as a transitory income shock in the context of the PIH framework considered above.



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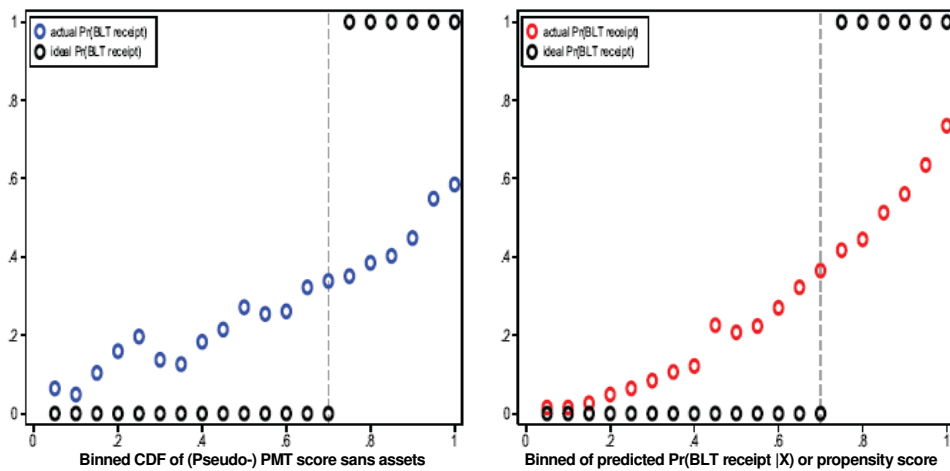
# APPENDIX

## Propensity Scores and Reconstructed Quasi-PMT Scores

To estimate the probability that household  $b$  receives treatment  $d$ ,  $P(D_b=d | X_b)$ , we consider the following specification, which roughly approximates information on household  $b$  available to enumerators and local officials in mid-2005,

$$P(D_b=d)=F\left(\beta X_b^{fam} + \gamma X_b^{house} + \alpha X_b^{head} + \delta X_b^{welfare} + \zeta_b^d > 0\right), \quad (11)$$

All right-hand variables are observed in February 2005:  $X_b^{fam}$  is a vector of demographic variables including household age structure, gender breakdown;  $X_b^{house}$  contains variables pertaining to the quality of the physical structures in which household  $b$  lives;  $X_b^{head}$  are characteristics of the head of the household,  $X_b^{welfare}$  contain indicators for employment among household members, prior participation in government welfare programs, and amount of land owned;  $F$  is the relevant CDF; and  $\zeta_b$  captures all variables unobservable to the econometrician but possibly observable to program administrators. We also control for province fixed effects to subsume some of the regional differences in targeting infrastructure (among other things). A full elaboration of the coefficient estimates was reported in Table 2.<sup>29</sup> Given our large set of dummy variables, there is little advantage estimating equation (11) nonparametrically.<sup>30</sup>



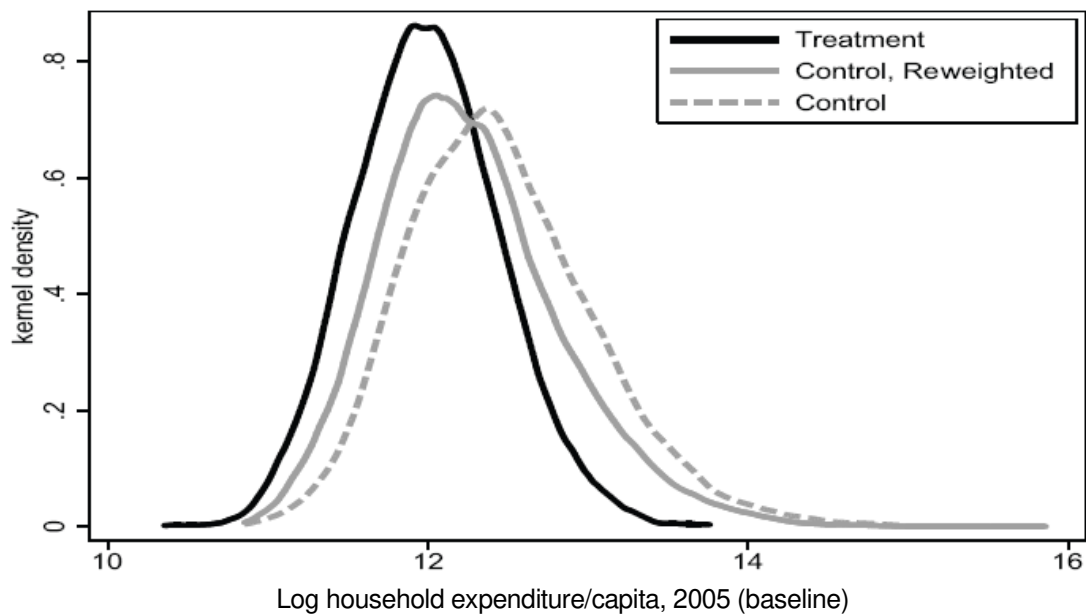
**Figure A1. Comparing propensity score estimates and approximated quasi-PMT scores**

Note: LEFT—The circles capture the share of UCT (BLT) recipients within the given bin where the bins are 0.05 width slices of the CDF of the quasi-PMT scores approximated using the procedures described in the text. The dashed vertical line constitutes the 30% threshold above which households were (in theory) supposed to receive the program. RIGHT—The circles capture the share of UCT (BLT) recipients within the given bin where the bins are 0.05 width slices of the CDF of the propensity scores obtained from estimating a binary version of equation (11) by maximum likelihood where  $\zeta_b$  is logistic distributed.

<sup>29</sup>The official eligibility survey grouped several response categories to questions in Susenas concerning household characteristics. Whether one leaves the individual responses as separate indicators (in a fully saturated sense) or groups them according to the rubric in the original survey does not matter for the qualitative findings presented below.

<sup>30</sup>Doing so using the Klein and Spady (1993) estimator yields an estimated propensity score that has a 0.95 correlation with the simpler parametric logit.

As discussed in Section 3.1, although we made every effort to reconstruct the underlying PMT scores using available data, the resulting scores were not discriminating enough to allow for even a fuzzy regression-discontinuity research design. After transforming applicable questions in *Susenas* 2005 into the corresponding variable-specific eligibility criteria, we apply the *kabupaten*-specific PMT coefficients corresponding to the given variables to produce a measure  $P_h$ . This variable reflects a data-constrained approximation to the actual PMT scores based on the original eligibility survey.<sup>31</sup> According to program guidelines, households with PMT scores above the 70th percentile should qualify for benefits. We take this rule to our estimates  $P_h$  in search of a potential discontinuity. Unfortunately, as seen in Figure A1, no such discontinuity can be found—perhaps unsurprisingly given the evidence on leakage and undercoverage. Moreover, the actual probability of UCT receipt looks quite similar across the distribution of the estimated propensity scores  $P_h$ . Yet, if we predict the probability of program receipt using  $P_h$  as the only regressor—effectively fixing  $(\beta, \gamma, \delta, \alpha)$  in equation 11 at the *kabupaten*-specific PMT coefficients—and accordingly reweight households in the control group, the balance at baseline is much worse than when using our arguably more flexible approach based on a richer set of variables plausibly in the information set of local officials engaged in community-based alongside or possibly in defiance of official targeting. This can be seen by comparing the effect of reweighting the control group in Figure A2, which uses  $P_h$ , and Figure 5 discussed in the paper, which uses our estimated propensity scores.



**Figure A2. Baseline expenditure distributor by treatment status**

Note: All distributions estimated using Epanechnikov kernel and a rule-of-thumb bandwidth. The “Control (Reweighted)” observations are adjusted using inverse probability weights (IPW) based on normalized estimated odds of treatment  $\omega = \hat{p} / (1 - \hat{p})$ , where  $\hat{p}_h$  is as described in Appendix A.

<sup>31</sup>Prior to this, we rescale the coefficients to ensure that they sum to 1 after dropping the questions not available in *Susenas*.

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