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The Effectiveness of Conditional Cash Transfer Program: A Case of Rural and Urban Beneficiaries in Philippines

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Abstract: This paper analyzes the effectiveness of the Conditional Cash Transfer (CCT) program in the Philippines in terms of its effect on conditionality goods as reflected by food, health, and education expenditures of households from rural and urban areas that benefitted the program. The CCT program in the Philippines is known as Pantawid Pamilyang Pilipino Program (4Ps) that seeks to address the problem on poverty by improving the socioeconomic status of poor households through targeted investments in health and education. This study used the Propensity Score Matching methodology in estimating the average treatment effect on the treated to capture the effect of CCT on conditionality goods. The study finds that CCT has a significant effect on education for household beneficiaries in rural areas and has improved the quality of food consumed by household beneficiaries in urban areas. Also, a decreased in the per capita total expenditure and per capita food expenditure of the household beneficiaries is revealed in urban areas driven by their improved saving behavior. Thus, the CCT program, at some point, is effective in meeting its short-term goal, but it must be more targeted in order to improve its impact on other conditionality goods.

Keywords: CCT; Health Expenditure; Education Expenditure; Food Expenditure; PSM

JEL Classification: H53; I30; D1

Introduction

The Philippines persistently suffers from several sociological and economic problems. Based on the official Family Income and Expenditures Survey conducted by the Philippine Statistics Authority (2022), there has been an increase in the poverty incidence rate among Filipino families from 16.1% in 2018 to 18.1% in 2021. To address this issue of poverty and income inequality, the Philippine government has implemented the Conditional Cash Transfer (CCT) or Pantawid Pamilyang Pilipino Program (4Ps) as one of its social assistance initiatives. The program was institutionalized through Republic Act No. 11310, also known as the 4Ps Act, which was signed during the administration of President Rodrigo Roa Duterte on April 17, 2019 (Senate of the Philippines, 2019). The CCT has now become a regular anti-poverty program in the country, and each administration is expected to implement it unless the law is repealed. As of March 31, 2019, the program had 4,183,403 active household beneficiaries across 41,539 Barangays in 1,482 municipalities in the country (DSWD, 2019). This study generally aims to assess the effectiveness of CCT Program in the Philippines in reducing

poverty in terms of its effect on conditionality goods as reflected by food, health, and education expenditure of households who benefitted from the program. Consumption is more likely to be directly affected by the cash grant coming from CCT program. Thus, looking into the changes of the components of consumption expenditures such as food, health, and education will shed light whether the program has been successful in meeting its short-term objective.

Saucedo Delgado et al. (2018) used a longitudinal data on their evaluation of the impact of CCT on the use of public services of households in Mexico by employing Propensity Score Matching (PSM) in estimating ATT for their analysis. They found out that the program has a short-term impact on households' demand for health and educational services, however the effect varies in the long-term. Also, a study in 2012 concluded that targeting the poor children as the beneficiaries of CCT would have the largest impact (Meng & Pfau, 2012). They suggested that even with limited budget, targeting all poor children in ten poorest provinces will lead to a significant reduction of poverty. Han et al. (2016) investigated the effect of Dibao, which is China's largest social assistance program, to its beneficiaries' spending in rural using PSM method and their study revealed that the program has a positive impact on the health spending, but no effect on their food and education expenditure. A prioritized health spending over education was attributed to a wide gap of real returns to schooling between rural and urban areas in China (Gao et al., 2010; Gao et al., 2014). Similarly, an approach of difference-in-differences using logistic or linear regression was used in examining the impact of CCT program in urban and rural areas of Columbia (Lopez-Arana et al., 2016). Note that the authors also revealed stronger effects of CCT program in rural areas, the same finding found in countries such as Mexico, Nicaragua and Brazil (Adato et al., 2011; Barber and Gertler, 2009; Gitter and Barham; Lagarde et al.,2009).

An impact evaluation of CCT in Philippines during its early stage of implementation was conducted by Chaudhury et al. (2013). They revealed that CCT program is significant in changing the spending pattern of the households as more spending on education and health were observed, however no impact on aggregate consumption of households. An increased also in savings among beneficiary households was found in their paper, in which they suggested that it can be attributed to the less consumption of households to some adult goods like alcohol. Moreover, they concluded a noticeable difference of the impact of CCT by province. A study of Tutor (2014) on the short-term impact of CCT in the Philippines on consumption showed a significant positive impact in terms of expenditure shares on spending on education and clothing by 0.1 and 0.5 percentage points respectively. Furthermore, Tutor (2014) asserted that the effect of CCT on consumption is most evident among the poorest households due to the income-reducing effect. These households are more likely to comply with the conditions set by the program. Additionally, Tutor (2014) highlights the varying effect of the program in general by using a dummy variable of rural and urban. However, it should be noted that Tutor's analysis was based on data from the 2011 Annual Poverty Indicators Survey (APIS), which only included children aged 0-14 as qualified beneficiaries. Therefore, the impact of expanding the CCT Program to include children aged 15-18 was not addressed in the paper of Tutor (2014).

While there are lot of studies on the effect of different CCT programs on consumption in general, a less explored aspect is the differential impact of CCT programs among rural and urban beneficiaries. This perspective is important to consider given that poverty is almost three times more widespread in rural areas of the Philippines compared to urban areas, according to the PSA (2018). Statistically, 71.6% of poor households are situated in rural areas of the Philippines in 2018. This study will shed light on how effective the CCT program of the Philippines in improving the lives of the poor households particularly coming from rural areas but also looking into the effectiveness of the program in poor households from urban areas. In the case of the CCT in the Philippines, there is no known study yet looking into the differences of the impact of the CCT program on consumption between urban and rural household beneficiaries. Thus, this study aims to determine the magnitude of the effect of CCT on conditionality goods (i.e., food, health, and education) in rural and urban areas in order to assess whether the program has increased the household expenditures on conditionality goods (i.e., food, health, and education) from rural and urban areas beneficiaries.

Research Method

Sources of data

The study used secondary cross-section data of the 2016 Annual Poverty Indicators Survey (APIS) coming from the PSA. APIS aims to generate income and non-income-based indicators for researchers and policymakers to assess or monitor the various programs that seek to reduce poverty in the Philippines. CCT or known as 4Ps in the Philippines is one of the social protection programs in the Philippines that is included in the APIS questionnaire for monitoring. This enables the identification of households that are CCT household and non-CCT household from rural and urban areas.

APIS 2016 survey has a total of 10,332 households that were successfully interviewed. This study has only a total sample of 6,414 households as only the type I household (non-CCT household) and type II household (CCT household) are captured in the study. Out of the total 6,414 households, the 4,393 households are from rural areas, while the remaining 2,021 households are from urban areas. The study identified a total of 1,425 CCT households from rural areas and a total of 399 CCT households from urban areas.

Propensity Score Matching

This study utilizes Propensity Score Matching (PSM) to assess the effect of CCT program in the Philippines on households that have benefited from the program, referred to as CCT household. Specifically, the study examines how the expenditures of these beneficiaries on conditionality goods (such as food, health, and education) compared to the expenditures of non-CCT household, whom they have been matched with. PSM involves creating matched sets of treated and control groups, ensuring that they share similar observable pre-treatment characteristics (referred to as C), as described by

Rosenbaum and Rubin (1983). These pre-treatment characteristics C are the factors that make the CCT households eligible for the program.

To determine the effect of CCT on one of the conditionality goods like the household expenditure on education for instance, let *B* be the outcome variable which is the household expenditure on education. For every household, there are two potential outcomes of *B*, the outcome is B_1 if the household is a beneficiary of the CCT while B_0 if the household is non-beneficiary. These outcomes are defined for all individuals. More so, let CCT be denoted as *Z* by which it has two values such as *Z=1* if the household is CCT beneficiary and *Z=0* if the household is non-CCT beneficiary. Given that, for any household, *B* is defined by the following relationship:

$$B = ZB_1 + (1 - Z)B_O \quad \text{..... (1)}$$

The impact of the program (Δ) is measured by thedifference between B_1 and B_O. However, Holland (1986) said the equation could observe only one state, which is either *Bi* (1) or *Bi* (0) but not both, which only captures the impact of the program over the population. This indicates that equation (9) cannot be used to measure the impact of the program for every individual. Since, at a certain period, an individual is either a participant or non-participant of the program. Hence, the program impact (Δ) for each individual is missing.

By employing the Propensity Score Matching (PSM) method, the average treatment effect on the treated (ATT) can be computed. This is done by replacing the outcome of non-participating individuals (Bo) with $E[B_0|Z=1]$, and substituting the outcome of participating individuals (B1) with $E[B_1|Z=0]$.

The matching of CCT household beneficiary and non-CCT household beneficiary makes the estimated counterfactual valid as only the participation in the program is the only differentiating factor after matching happened. Thus, the ATT equation is written as:

$$ATT = [E(B_1|Z = 1) - E(B_O|Z = 1)] \quad \text{..... (2)}$$

However, based on equation (9), the only aspect that remains unknown is the outcome for the CCT households had they not been included in the program, denoted as $E(B_O|Z = 1)$. But $E(B_O|Z = 0)$ can be observed which refers to the counterfactual households, which refers to the non-CCT household being matched to CCT household with certain characteristics.

In order to establish a valid counterfactual, two matching assumptions must be satisfied: the Conditional Independence Assumption (CIA) and the assumption of Common Support (Heckman et al., 1998, Imbens & Wooldridge, 2009). The CIA requires that the observable characteristics of households that influence their participation in CCT (C) are conditioning factors. This assumption implies that the potential outcome of each household is independent of the treatment status. The second important assumption is the common support denoted as $0<Pr[Z=1|C]<1$ which implies that the probability of being CCT

household and of non-CCT household is positive. According to Heckman et al., (1999), this assumption guarantees that it is possible to compare observations from the CCT household group with observations from the non-CCT household group. When those assumptions are satisfied, then the average treatment effect on the treated is calculated following Heckman et al., (1997), Smith and Todd (2005) equation which is:

$$ATT_{PMS} = \frac{1}{N^{T=1}}[\sum_{i \epsilon T=1} B_{1i} - \sum_{j \epsilon T=0} w(i,j) B_{0i}] \quad (3)$$

where $\sum_{j \epsilon T=0} w(i,j) B_{0i} = E[B_{0i} | Z = 1, \Pr(i)$

$N^{T=1}$ denotes the number of observations of participant households in CCT within the common support and w(i,j) are the weights given to each matched household non-CCT households. Figure 2 summarizes the necessary steps in implementing PSM by which each step is discussed under results and discussions section.

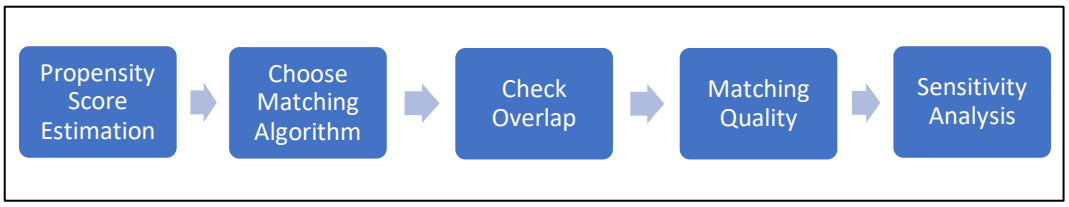

Figure 2 Steps in conducting Propensity Score Matching as adopted from Caliendo and Kopeinig, 2008.

Covariates for PSM

The implementing agency, the DSWD, utilized the Proxy Means Test in identifying the beneficiaries of the CCT. The following are some of the proxy variables included in identifying the beneficiaries of the program: ownership of assets, type of housing, education of the household head, and livelihood of the family. These mentioned proxy variables are used by this study in the propensity score estimation. Other variables like location characteristic, in terms of poverty rates, is included in the propensity score model. Variables such as the household size, number of children belonging to 13 to 18 years old, household belonging to income deciles 1 to 5 with income decile 6 as the based reference are the covariates of other household characteristics that are hypothesized to be influential in predicting participation in the program. Lastly, the provincial poverty rate is included as a proxy variable to represent the cost of living in households.

Theoretical Framework

This paper utilizes a theoretical model of the impact of CCT on consumption developed and discussed by Das et al. (2005). Consider a simple household optimization model where a typical household maximizes utility subject to a budget constraint by which utility is a function of goods *X* and *Y* where *X* is the conditionality goods (such as food, health, and education) and *Y* is the preferred goods. Suppose the household's utility function is Cobb-Douglas. The typical household's problem is thus:

$$Max\ U(x,y) = X^{\alpha}Y^{\beta} \quad \text{.....} \quad (4)$$

$$s.t \quad m = P_X X + P_Y Y \quad \text{.....} \quad (5)$$

where

$U =$ the utility of the household derived from their consumption of good *X* and good *Y*
$P_x =$ the price of good *X*
$P_Y =$ the price of good *Y*

For simplification of the analysis, the following assumptions were made: (a) without CCT, households can allocate their income based solely on their needs rather than their preferences and they can choose different combinations of *X* and *Y* so long the combination is within their budget constraint; (b) m, P_x , and P_Y are strictly positive and exogenous; and (c) $\frac{\partial m}{\partial X} > 0$ and $\frac{\partial m}{\partial Y} > 0$. This base model can represent the behavior of the non-CCT household where their optimal amount of good *X* and good *Y* is:

$$X^* = \frac{\alpha m}{(\alpha+\beta)P_x} \quad and \quad Y^* = \frac{\beta m}{(\alpha+\beta)P_Y} \quad \text{.....} \quad (6)$$

Figure 1 presents the household's optimization process [1]. Before the CCT, the consumption set of household beneficiaries is faced with the budget constraint *AB* in which the maximum amount of good *X* that they can consume is *B* when all income is spent on *X*, whereas *A* is the maximum amount of good *Y* if all income is spent on *Y*.

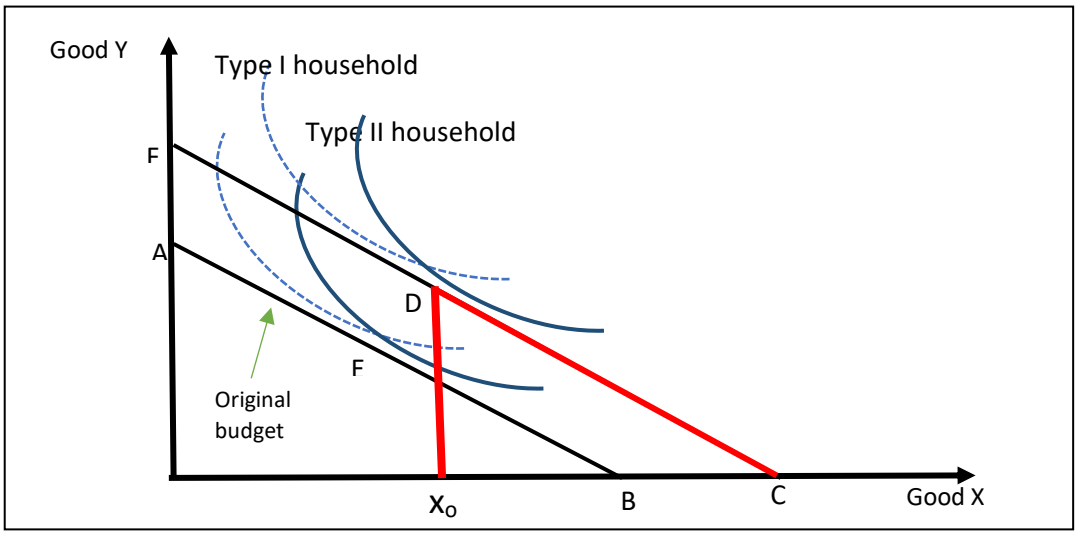

Figure 1 Impact of CCT on household utility maximization as adopted from Das et al. (2005).

[1]Figure 1 is a modified model of the impact of CCT on household utility maximization of Das, Dos, and Ozler (2005) as the type III household is not captured in the study. This type III household refers to the household that has been consuming more than x_0 of conditionality goods (i.e., food, health, and education) even before the CCT program started.

By incorporating the cash transfers the beneficiaries received into the model, it is anticipated that the income of the households will increase. Consequently, their budget constraint will shift to the right in a parallel manner, assuming other factors remain unchanged. Thus, the CCT households will be confronted with a new budget constraint, depicted by the budget line FC in figure 1. Mathematically, constraint can be presented as:

$$m + T_r \geq P_X X + P_Y Y \quad \text{.....} \quad (7)$$

Where:

T_r = amount of cash grant provided by the program to the CCT households

As shown in figure 1, the red line refers to the amount of conditionality goods *X* that must be consumed by the CCT households. This indicate that CCT households must consume at least x_o of the conditionality goods *X*. Hence, the CCT households are faced with additional constraint which is $X \geq x_0$ (5).

Given this, the CCT household's maximization problem is:

$$Max\ U(x, y) = X^{\alpha} Y^{\beta} \quad \text{.....} \quad (8)$$

$$s.t\ m + T_r \geq P_X X + P_Y Y \quad \text{.....} \quad (9)$$

$$X \geq x_0\ ,\ x_0 \text{ is constant} \quad \text{.....} \quad (10)$$

The Lagrangian is expressed as:

$$\mathcal{L} = \alpha \ln X + \beta \ln Y + \lambda_1(m + T_r - P_X X - P_Y Y) + \lambda_2(x_0 - X) \quad \text{.....} \quad (11)$$

Note that the CCT household's maximization problem deals with inequality constraints. This requires a derivation of the Kuhn-Tucker (KT) complimentary slackness conditions. Since Cobb-Douglas utility function is utilized then it is impossible to have $\lambda_1 = 0$ which means that $\lambda_1 > 0$. But having $\lambda_2 = 0$ is possible. More so if we let $X > 0$ and $Y > 0$, all the Kuhn-Tucker (KT) complimentary slackness conditions are satisfied. Then we have,

$$Y^* = \left(\frac{\beta}{\alpha+\beta}\right)\left(\frac{m+T_r}{P_Y}\right) \quad \text{.....} \quad (12)$$

$$X^* = x_0 \quad \text{.....} \quad (13)$$

In figure 1, the type I household represented by the dotted IC is the household that do not participate in the CCT program which indicates consuming less than x_o of conditionality goods (i.e. food, health, and food) despite receiving cash grant. Hence, type I household stays at old budget line *AE*. Whereas the household that participate in the CCT program is the type II household.

Result and Discussion

Outcome Variables for ATT

Table 1 presents a summary of the variables of CCT households in rural and urban areas. Based on the results, households have an average monthly per capita savings of Php 244.95 in rural areas and Php 255.27 in urban areas however the difference is not statistically significant. In terms of average monthly per capita total expenditure which is Php 1785.12 for CCT households in rural areas and Php 2119.32 for the CCT households in urban areas, their difference is statistically significant at 1% level. For conditionality goods (i.e., food, health, and education), only the difference in the monthly per capita food expenditure of the CCT households in rural and urban areas is revealed in Table 1 where CCT households in rural and urban areas spend Php 1055.48 and Php 1197.28, respectively.

Table 1 Descriptive statistics of the outcome variables for CCT households, Philippines, 2016

Outcome Variables	Rural (n=1425)		Urban (n=399)		Difference of means
	Mean	Standard Deviation	Mean	Standard Deviation	
Per capita per month (in pesos)					
Savings	244.95	496.18	255.27	537.51	-10.31
Total Expenditure	1785.12	742.91	2119.32	891.39	-334.20***
Food Expenditure	1055.48	405.24	1197.28	482.18	-141.80***
Health Expenditure	37.12	135.07	42.25	129.01	-5.13
Education Expenditure	165.58	445.67	188.30	484.34	-22.71
Recreation	20.60	24.45	23.22	29.29	-2.36
Protein Foods	301.72	195.37	345.07	206.55	-43.34***
Carbohydrate Foods	413.62	146.14	412.96	150.29	0.65
Fruits and Vegetables	63.36	53.01	62.64	57.81	0.72
Shares to total expenditure (%)					
Food Expenditure	0.61	0.11	0.58	0.10	0.03***
Health Expenditure	0.02	0.05	0.02	0.05	0.001
Education Expenditure	0.09	0.18	0.08	0.17	0.002
Recreation	0.01	0.01	0.01	0.01	0.0008
Protein Foods	0.17	0.07	0.16	0.06	0.006
Carbohydrate Foods	0.25	0.09	0.22	0.09	0.035***
Fruits and Vegetables	0.02	0.02	0.02	0.02	0.002

Note: n is the total number of type II households from rural and urban areas
Significant at 10%, **Significant at 5%, ***Significant at 1%

In addition, the CCT households in rural areas spend Php 37.12 for health and Php 165.58 for education. While in urban areas, the CCT households spend Php 42.25 for health and Php 188.30 for education. Note that the difference in the per capita expenditure on health and education of the 4Ps households in rural and urban areas are not statistically significant. In terms of share to total expenditures, food accounts the largest fraction which is 61% in rural and 58% in urban followed by education (9% in rural and 8% in urban) and health (2% in rural and 2% in urban) respectively which reflects poverty. Note that

the difference in the share of food to total expenditures of the CCT households in rural and urban areas is statistically significant at 1% level.

Three food consumption components are included in the study. These are carbohydrate foods, protein foods, and fruits and vegetables. In terms of the food items, carbohydrate foods which is the main source of energy account the highest share (25% in rural and 22% in urban) of food expenditure followed by the protein foods such as meat, fish, and dairy products (17% in rural and 16% in urban) and then fruits and vegetables (2% in rural and 2% in urban) in both CCT households in rural and urban areas. A significant difference in the share of carbohydrate foods of the CCT households from rural and urban areas is expected as rural households have easy access to food rich in carbohydrates such as corn and sweet potatoes, for instance. For recreation, both CCT households in rural and urban areas have the same share of 2% out of the total expenditure, which is equivalent to Php 20.60 in rural areas and Php 23.22 in urban areas in monthly per capita basis.

Propensity Score Estimation

Logistic regression is used in calculating the propensity scores. The estimates presented in Table 2 are the average marginal effect of logistic regression to see how each covariate may affect participation in the program, given the average values of the rest of the covariates with a dummy dependent variable equal to 1 if the household is CCT beneficiary and 0 otherwise.

Table 2 Parameter estimated of Logistic regression for CCT household, Philippines, 2016

Variables	Rural		Urban	
	dy/dx (average marginal effect)	Standard Error	dy/dx (average marginal effect)	Standard Error
HH head is married	0.061**	0.024	0.054	0.032
HH head is male	0.043*	0.025	0.042	0.031
HH head is employed	0.116***	0.023	0.085***	0.028
HH head has no education	0.043***	0.013	0.039**	0.016
HH size	0.054***	0.004	0.026***	0.004
No. of HH members 13-18 years old	0.064***	0.008	0.057***	0.009
Floor area of the house	-0.001***	0.000	-0.000	0.000
HH has at least 1 motorcycle	-0.075***	0.017	-0.009	0.021
HH belongs to income decile 1	0.122***	0.027	0.169***	0.029
HH belongs to income decile 2	0.103***	0.026	0.101***	0.029
HH belongs to income decile 3	0.101***	0.026	0.061**	0.028
HH belongs to income decile 4	0.052*	0.027	0.067**	0.027
HH belongs to income decile 5	0.047*	0.028	-0.005	0.027
Poverty Incidence of Province	0.000	0.0004	0.001**	0.001
Sample Size	4393		2021	
Prob>chi2	0.000		0.000	
Pseudo-R2	0.148		0.140	

Note: *Significant at 10%, **Significant at 5%, ***Significant at 1%

In terms of household head characteristics, a household with a married household head increases the probability of household participation in the program by 6.1% in rural areas and 5.4% in urban areas compared when the household head is headed by a single-parent or widowed. The said covariate is statistically significant at a 1% level. The reason for this can be attributed to the relatively higher number of married head households that are beneficiaries of CCT compared to household heads that are separated or widowed.

A male-household head is statistically significant at 5% only in rural areas, which indicates an increase in the probability of household participation in CCT by 4.3%. Also, a household head who is employed increases the probability of household participation in CCT by 11.6% in rural areas and 8.5% in urban, which are significant at 1% level. The result is sensible as the program is mostly participated in by housewives. The household head with no education is statistically significant at a 5% level in predicting participation in both rural and urban areas as it increases the probability of household participation in CCT by 4.3% in rural areas and 3.9% in urban areas. The result is sensible because the CCT is primarily for the poor households, and a household with uneducated household head has been associated with lower income compared to those with educated household head.

For the asset owned by the household, that household with a motorcycle is significant at a 5% level only in rural areas, and it negatively predicts household participation in CCT as it reduces the probability of household participation by 7.5%. The result is sensible because a motorcycle is more common in rural areas as households in rural areas typically do not have access to public transportation compared to households in urban areas. In terms of the housing characteristics, the floor area is statistically significant at a 1% level only in rural areas, which reduces the probability of household participation in the program by 0.10% for every square meter increase in floor area.

For household characteristics, in terms of the household size, for every new additional member in the household, it increases the probability of household participation in CCT by 5.4% in rural areas and 2.6% in urban areas. Whereas for every new member belonging to the 13-18 years old age category raises the probability of CCT participation by 6.4% in rural areas and 5.7% in urban areas. This is logical because children belonging to age category 13-18 years old are qualified for education grant. Income decile 6 is the reference variable for the dummy-income decile included in the model. The result shows that CCT households in both rural and urban areas belonging to income decile 1 are more likely to be admitted as its marginal coefficient is the highest compared to another income decile, which is sensible because they are the poorest households. Generally, based on the marginal effect of each income decile, households belonging to lowest-income deciles have a higher chance of being admitted to the program, followed by those belonging in income decile 2, income decile 3, and income decile 4 (which is only significant in urban areas) compared to those household belonging to income decile 6. While those household belonging to income decile 5 is no longer different from those household belonging to income decile 6 in terms of the chances of being admitted in the program.

The poverty incidence of the province is statistically significant at a 5% level in predicting participation in urban areas, which implies that those households located in the poorest

provinces are more likely to participate in CCT as it raises the probability of participation of the household by 0.10% for every 1% increase in the poverty rate.

Checking Overlap

The common support region among CCT (4Ps) households and non-CCT (non-4Ps) households in rural and urban areas is in Figure 3 and Figure 4, respectively. The overlap assumption is satisfied because no households were predicted with *Pr(C)*=0 or *Pr(C)*=1. Note that the area where a non-CCT household exists for each value of CCT household's propensity score is the common support region.

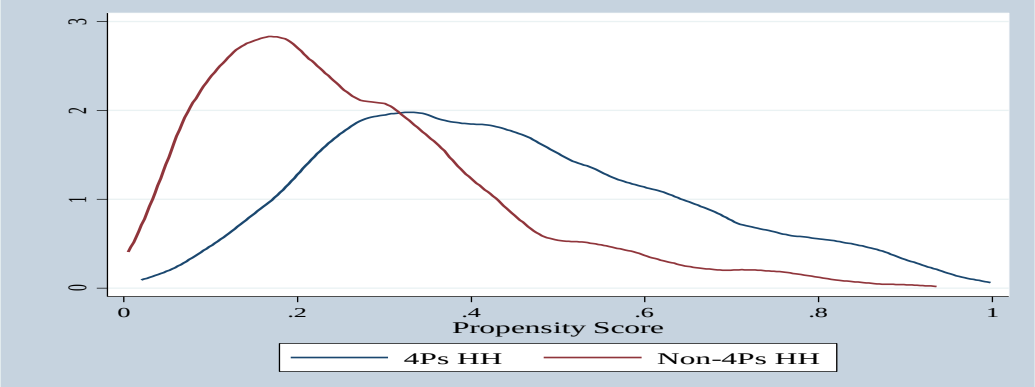

Figure 3 Region of Common Support, Rural

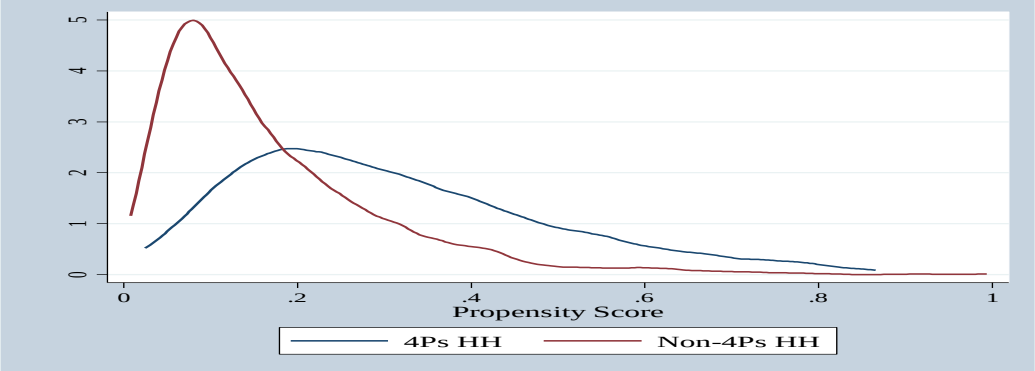

Figure 4 Region of Common Support, Urban

Checking on the Matching Quality for Different Matching Techniques

The researchers conduct different matching techniques to check and compare for the robustness of the estimates. The matching techniques that are performed are the following: nearest-neighbor (NN) matching, radius matching, and kernel matching. Note that before matching, the treatment (CCT households) and control (non-CCT households) groups are quite different in terms of the characteristics *C* identified in the propensity score model. With that, the balance tests is conducted to assess if the matching

techniques (i.e., NN matching, radius matching, and kernel matching) implemented able to construct a group of CCT households and non-CCT households that are similar in terms of the identified characteristics *C*. Based on the results, the matching techniques utilized indicate a well-balanced treatment since the two groups are no longer different in terms of the identified characteristics *C* based on the differences at the mean.

Sensitivity Analysis

Table 3 presents the summary of the results of the sensitivity test using Rosenbaum bounds analysis to determine how sensitive the estimated effects of CCT on outcome variables are to hidden bias (i.e., educational attainment of the spouse). The sensitivity test is done after estimating the effect of CCT on the outcome variables, especially on the conditionality goods (i.e., food, health, and education).

Table 3 Sensitivity analysis with Rosenbaum Rounds for eligible households, Philippines, 2016

Outcome Variables	Rural			Urban		
	NN (w=1275)	Radius (w=1417)	Kernel (w=1417)	NN (w=323)	Radius (w=323)	Kernel (w=399)
	Gamma	Gamma	Gamma	Gamma	Gamma	Gamma
Per capita per month expenditure (in pesos)						
Savings	Robust	Robust	Robust	1.3	1.4	1.3
Total Expenditure	1.1	Robust	Robust	Robust	1.1	Robust
Food Expenditure	Robust	Robust	Robust	Robust	Robust	Robust
Health Expenditure	Robust	Robust	Robust	Robust	Robust	Robust
Education Expenditure	1.1	Robust	Robust	1.1	Robust	Robust
Recreation	1.5	1.2	Robust	Robust	Robust	Robust
Protein Foods	Robust	Robust	Robust	Robust	Robust	Robust
Carbohydrate Foods	1.1	Robust	Robust	Robust	Robust	Robust
Fruits and Vegetables	Robust	Robust	Robust	Robust	Robust	Robust
Shares to total expenditure (%)						
Food Expenditure	1.2	1.2	1.2	1.2	1.1	1.1
Health Expenditure	Robust	Robust	Robust	Robust	Robust	Robust
Education Expenditure	1.2	Robust	Robust	1.1	Robust	Robust
Recreation	1.7	1.5	Robust	1.1	Robust	Robust
Shares to total food expenditure (%)						
Protein Foods	1.1	Robust	Robust	1.2	1.1	Robust
Carbohydrate Foods	1.1	1.1	1.1	Robust	Robust	1.1
Fruits and Vegetables	Robust	Robust	Robust	Robust	1.1	Robust

Note: Gamma is the log odds of differential assignment resulting from unobserved factors
w is the number of matched CCT household and non-CCT household

According to Rosenbaum (2002), a result is considered sensitive to hidden bias if values of gammas close to 1 cause a change in its significance, potentially shifting from significant to non-significant or vice versa. Therefore, a larger gamma value indicates that the result is more resilient to hidden bias. In Table 3, the term "robust" indicates that the outcome variable is not affected by hidden bias, as the respective bounds of these outcome variables remained significant from gamma 1 to gamma 2 without any changes.

In Table 3, the gamma factor equal to 1.1 indicates that the result is sensitive to a hidden bias that would increase the odds of being a CCT household by 10%. It is important to note that the Rosenbaum bounds analysis does not provide a specific threshold for determining whether a result is sensitive to hidden bias. In this study, the approach taken was to adopt the assertion of Duvendack and Palmer-Jones (2012) that a gamma factor below 2 signifies sensitivity to unobserved factors.

Based on the sensitivity analysis results, it shows that among the matching techniques employed in this study, the kernel matching technique has the greatest number of "robust" estimates for both rural and urban areas. The kernel matching technique is usually employed when the identified control group is quite large compared to the treatment group, which is applicable in this study. In this study, the matching technique that is perceived to be the most appropriate in estimating the effect of CCT on expenditures on conditionality goods (i.e., food, health, and education) in rural and urban CCT households is the kernel matching.

Estimates of average treatment effect on the treated

It can be gleaned in Table 4 the ATT estimates using kernel matching. The estimated ATT is the parameter of interest as it indicates the effect of CCT on the expenditures of CCT households on conditionality goods (i.e., food, health, and education).

As shown in Table 4, in urban areas, the program demonstrates a significant negative effect on the monthly per capita total expenditure of CCT households, with a notable decrease of Php 177.89, signifying a strong significance level at 1%. Conversely, for rural CCT households, the program shows no discernible impact on their monthly per capita total expenditure and savings, with p-values exceeding 5%. Furthermore, the data in Table 4 reveals a significant decrease of Php 68.64 in the monthly per capita food expenditure of urban CCT households. On the contrary, the estimates for the effect of CCT on both per capita food expenditure and the share of food to total expenditure are not statistically significant for rural CCT households. There is a notable reduction also in both the monthly per capita expenditure and the share of protein-based foods to total food expenditure in rural and urban CCT households, alongside a significant increase in the share of carbohydrate food to total food expenditure. However, the observed increase is relatively small, indicating that the per capita change in this category is not statistically significant. Additionally, the findings indicate a significant 1% level increase in the share of fruits and vegetables to total food expenditure solely for urban CCT households, translating to a noticeable 0.008 percentage point rise in their allocation towards fruits and vegetables. The program does not exhibit any impact on the health expenditures for both rural and

urban CCT households. On the other hand, among the CCT households, there is a significant increase of 0.013 percentage points in the share of education to total expenditures. Lastly, there is a slight but statistically significant increase in the share of recreation to total expenditure for both rural and urban CCT households.

Table 4 The estimated effects of CCT on the expenditures on conditionality goods of the CCT households, Philippines, 2016

Outcome Variables	Kernel Matching	
	Rural	Urban
Monthly per capita (in pesos)		
Savings	32.12	122.69***
Total Expenditure	-42.97	-177.89***
Food Expenditure	-11.48	-68.64**
Health Expenditure	-5.30	-3.12
Education Expenditure	22.98	-18.75
Recreation	3.83	2.85
Protein Foods	-18.15**	-36.07**
Carbohydrate Foods	8.75	-6.53
Fruits and Vegetables	-0.45	2.96
Shares to total expenditure (%)		
Food Expenditure	0.005	0.010
Health Expenditure	-0.003	0.002
Education Expenditure	0.013**	0.007
Recreation	0.003***	0.0001***
Shares to total food expenditure (%)		
Protein Foods	-0.012***	-0.013**
Carbohydrate Foods	0.009**	0.012**
Fruits and Vegetables	0.000	0.008***

Note: **Significant at 5%, ***Significant at 1% level

Discussion

The CCT households from rural and urban areas differ in terms of their expenditure on food and the total expenditure. The differences can be attributed to a higher cost of living in urban areas than in rural areas as prices of food on the average is higher in urban areas (Dandekar and Rath,1971). In terms of share to total expenditures, food accounts the largest fraction which is 61% in rural and 58% in urban followed by education (9% in rural and 8% in urban) and health (2% in rural and 2% in urban) respectively which reflects poverty.

For the logistic regression, the model for both rural and urban households are statistically significant at the 1% level. Most of the variables from both models are statistically significant at the 5% level in predicting household participation in the CCT program, which is in line with the targeting mechanism of CCT in the Philippines. The results indicate that certain household head characteristics, such as being married and being employed, have a significant positive impact on the probability of household participation in the CCT program, particularly in rural areas. Additionally, having no education and owning a motorcycle are associated with increased likelihood of participation in rural areas, while

larger floor areas and higher poverty incidence in the province are linked to reduced likelihood of participation in the urban areas. Furthermore, the study shows that household size, the number of children aged 13-18, and belonging to lower income deciles correlate with increased probability of participation in the program. Overall, the findings demonstrate various significant and logical associations between household characteristics and participation in the CCT program in both rural and urban areas.

The common support region between CCT and non-CCT households in rural and urban areas as depicted in Figures 3 and 4, respectively, indicate that the overlap assumption is satisfied. Different matching techniques, including nearest-neighbor (NN) matching, radius matching, and kernel matching, were employed to assess the robustness of the estimates. The balance tests conducted after matching revealed that the characteristics of the treatment and control groups became more similar. The results of the sensitivity analysis, as determined by the gamma factor, indicate that the kernel matching technique produced the highest number of "robust" estimates for both rural and urban areas. Based on these findings, the kernel matching technique is considered the most appropriate for estimating the effect of CCT on expenditures on conditionality goods in both rural and urban CCT households.

The effect of CCT on expenditures of CCT households are based on Engel's law and theory, and from previous studies. As shown in Table 4, for urban households, the program has a negative effect on the monthly per capita total expenditure of CCT households which is strongly significant at a 1% level. The reduction in per capita total expenditure of the CCT households in urban areas is possibly due to the increase of their monthly per capita savings by Php 122.69. The positive effect of CCT on savings supports Engel's theory that savings increases when there is an increase in income. However, for the case of CCT households in rural, the program does not affect their monthly per capita total expenditure and savings. The possible reason for this is that CCT households did not consume the entire cash grant as part of it is used to reduce debt or invest in other productive activities (Attanasio & Mesnard, 2014) like backyard pig raising, for instance, which is more common in rural areas. Also, the context of the extended family system, which is common in rural areas, can be a reason that weakens the positive relationship between income and savings (Lamberte & Bautista, 1990).

Moreover, the data in Table 4 shows that there is a significant decrease in the monthly per capita food expenditure of CCT households living in urban areas. This reduction is mainly driven by a decrease in the consumption of protein-rich foods such as meat. However, the negative impact of CCT on the share of food to total expenditure in urban areas is not statistically significant. This means that the decrease in per capita food expenditure is not substantial enough to cause a significant change in the proportion of total expenditure allocated to food. It is worth noting that food accounts for the largest share of total expenditure in urban areas, representing 61% of the total expenditure. On the other hand, for CCT households in rural areas, the estimates for the effect of CCT on both per capita food expenditure and the share of food to total expenditure are not statistically significant. These findings align with previous studies by Han et al. (2016),

Tutor (2014), and Chaudhury et al. (2013), which also found no significant impact of CCT on food expenditure.

The data in Table 4 also reveals that there is a significant reduction in both the monthly per capita expenditure and the share of protein-based foods to total food expenditure for CCT households in rural and urban areas. These findings are expected because protein-rich foods like meat and dairy products tend to be more expensive compared to other food components such as carbohydrates and fruits/vegetables. On the other hand, there is a significant increase in the share of carbohydrate food to total food expenditure for both rural and urban CCT households. This is sensible because, out of the food components, CCT households in rural and urban mainly spend on food that are rich in carbohydrates (i.e. corn, rice, and bread). However, the increase observed in the share of carbohydrate food to total food expenditure is relatively small, which means that the per capita change in this category is not statistically significant.

The findings also indicate that the share of fruits and vegetables to total food expenditure is significantly higher at a 1% level only for CCT households residing in urban areas. This translates to a noticeable increase of 0.008 percentage points in their allocation towards fruits and vegetables. However, this change has no impact on the expenditure of fruits and vegetables for CCT households in rural areas. It is worth noting that the retail food environment in urban areas tends to be superior to that in rural areas, with larger stores offering a wider variety of food options (Kaufman, 2005). Previous studies have established a connection between access to a greater variety of food and increased consumption of fruits and vegetables (Zenk et al., 2005). Given the improved retail food environment in urban areas and the cash transfers received by CCT households in those areas, their increased consumption of fruits and vegetables signifies an enhancement in the overall quality of their dietary intake.

Furthermore, the program does not affect the health expenditures for both CCT households in rural and urban areas, which is similar to the findings of Macours et al. (2008) and Tutor (2014). These health expenditures refer to expenditures on medical drugs for nutrition and the hospital services availed by CCT households. Note that the health conditionalities of CCT are typically provided for free by the public health services (Tutor, 2014). The compliance on health conditionalities will also improve the health condition of CCT households. Also, CCT beneficiaries tend to have more access to free health services (i.e., free iron and vitamin A supplementation) compared to non-CCT households (DSWD, 2014).

As to the effect of CCT on the share of education to total expenditures, among the CCT households, there is an increase of 0.013 percentage points, which is statistically significant. This aligns with Engel's theory, indicating that as income increases, the proportion spent on education also increases. While the increase is relatively small, it suggests that the program is effectively influencing CCT households to prioritize investment in education. However, it is important to note that there is no change in the per capita education expenditure per schooling member, supporting the results found by Tutor (2014). Additionally, there is a slight but statistically significant increase in the share

of recreation to total expenditure for both rural and urban CCT households, supporting Engel's theory that as income rises, the proportion allocated to recreation also increases. Although the increase in this case is minimal, it still confirms the relationship between income and expenditure on recreation.

Conclusion

The study finds that the program is only effective in increasing the share of education to total expenditures only for the CCT households in rural areas. This increase in education expenditure indicates that the program is effective in fostering the importance of human capital investment, particularly on education, to the CCT households in rural areas. Hence, CCT is more effective in rural areas compared to CCT households in urban areas.

The health expenditures of both CCT households in rural and urban areas are not affected by the program, possibly because CCT households have improved their health status through their compliance with conditionalities set for health that are typically provided for free. The improvement in the health status of the CCT households is apparent due to the significant increase in the share of their recreation expenditure to total expenditures as recreation is positively linked to health as it reduces stress and improves self-esteem (Morgan, 2018). However, the improvement in the health status of the CCT households in rural and urban areas did not translate to a decrease in health expenditures, possibly because they only spend a smaller portion of their income on health-related items making the change in its per capita terms and its share to total expenditures on health not to be statistically significant.

For food expenditure, the result revealed an improvement in the quality of food consumed by the CCT households in urban areas since the share of the fruits and vegetables to total food expenditures have increased. In addition, the significant negative effect of CCT on per capita total expenditures of the CCT households in urban areas can be attributed to the increase in their per capita savings.

Based on the overall analysis, it is recommended that CCT Program in the country must continue because it is effective in affecting education in terms of increasing its share to total expenditures, particularly for the CCT households in rural areas. The program also improves the saving behavior and the quality of food consumed by the CCT households in urban areas based on the increased share in fruits and vegetables to total expenditures. However, the program must be more targeted (i.e., targeting the poorest of the poor households) in order to improve its impact on conditionality goods (i.e., food, health, and education) in both per capita terms and its share to total expenditures.

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