Joint Evaluation of Cash and In-kind Transfer programs in Indonesia:

What are the roles in Food and Nutrition Security?

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Selected Paper prepared for presentation at the 2015 Agricultural & Applied Economics Association and Western Agricultural Economics Association Annual Meeting, San Francisco, CA, July 26-28

Abstract

Social protection plays crucial roles in the response of rising food prices. It helps households to maintain access to food and other basic needs, leading to an increase in food and nutrition security, and ultimately prevent an increase in poverty. In this paper, we evaluate the relative and multiple overlapping effects of two main social protection programs in Indonesia, namely Conditional Cash Transfer (CCT) and in-kind transfer/Subsidized Rice Program (Raskin), on food and nutrition security indicators. Using panel data from household surveys which recorded both CCT and Raskin recipient status, we estimate the impact of CCT and Raskin on food and nutrition security using both Inverse Probability Weighting models and conventional regression method. We find that CCT had a much greater impact on food and nutrition security. However, the multiple-treatment effect between CCT and Raskin is not significantly different from zero. Thus, it is important to re-formulate these two overlapping policies.

1. Introduction

Despite the tremendous progress in decreasing poverty rates in the past decades, 17% people in developing world lived at or below international poverty line $1.25 a day. The governments of many developing countries have implemented a range of social protection programs as part of its broader poverty reduction strategy to help the poor and vulnerable households to face livelihood risk and maintain an adequate access to food and other basic needs. Although the capacities to design and implement social protection policies have become more widespread over the past two decades (von Braun et al. 2009), their impacts in improving real outcomes are still questioned. Some of the programs are crucial for the poor, but some programs could also be redundant with the existence of other programs. Many researchers have studied the impact of a social protection program, however to best of our knowledge, none has examined the joint effect/synergy between programs. This paper aims to fill this gap by investigating the synergy impacts of social protection programs in Indonesia, specifically on food and nutrition security outcomes.

Indonesia has four main active social protection programs: in-kind transfer/subsidized rice program (Raskin/*Beras untuk Rakyat Miskin*), Conditional Cash Transfer (CCT) – also known as PKH (*Program Keluarga Harapan*), health fee waiver (Jamkesmas/*Jaminan Kesehatan Masyarakat*, previously *Askeskin/Asuransi Kesehatan Masyarakat Miskin*), and scholarship for the poor (BSM/*Beasiswa Siswa Miskin*). Each program has specific objectives and different delivery mechanism. Raskin aims to ensure food security for the poor by delivering rice at highly subsidized price. CCT delivers cash transfers to its recipients who are obliged to fulfill specific health and education conditions (e.g. routine checkup for pregnant woman and infants, school attendance for school-aged children). CCT aims to cover three common risks: consumption, health, and education. The long-term objective of CCT is to break inter-generational transmission of poverty by encouraging people to invest in human capital through utilization of health and education services. BSM transfers cash for poor students and aims to help those overcoming financial difficulties in accessing education including opportunity costs. Jamkesmas provides an insurance card allowing the cardholder to utilize outpatient and inpatient both in public and private health care facilities.

All of these programs are currently implemented at national level. The eligibility criteria are often almost similar from one to another program. Consequently, these programs may have overlapping or joint effects if they are delivered to the same household and implemented at the same time. It is important to evaluate the synergy between programs, as it will inform the policy makers on how effective their social protection programs as an integrated system in reducing poverty. Most of previous studies typically focus on the impact of each program separately. They do not examine the effect of multiple interventions. Furthermore, in the case of Indonesia, there are very limited empirical impact evaluation literatures that are conducted at micro level. Therefore this study attempts to fill the gaps by analyzing the joint effect of multiple social protection policies on household's level outcomes. This paper attempts to address the questions of: (1) whether one program is better than another in selected outcomes (2) whether multiple programs have a larger impact than a single program. It specifically examines synergies between the cash and in-kind transfers - CCT and Raskin - in promoting food and nutrition security among poor household.

There are several motivations of why this paper focuses on these two programs. First, CCT and Raskin have similar main objective – improving household access to food either by delivering cash or subsidizing the price of main staple food to increase buying power. However, they have different mechanism. CCT transfers cash to its recipient, while Raskin provide rice (Indonesian staple food) at highly subsidized price. It is important to note that CCT has other important goals in health and education sector, while Raskin focuses in improving food security.

The second motivation on focusing on Raskin and CCT is their unique characteristics. The heterogeneity characteristics of these programs make an interesting case to analyze their synergy. CCT is known to have the smallest coverage as well as government budget among all major social protection programs. CCT was just launched in 2007 as a pilot program and benefited about 400 thousand households. Impact evaluation design has been incorporated into the program. Participation into the program has been randomized at sub-district level. Although the program's coverage is still small and program implementation is far from perfect (Febriany et al, 2011), CCT is found to have positive impact on household's welfare and health outcomes (World Bank, 2011). On the other hand, Raskin is the oldest social protection program in Indonesia. It is originally launched in 1998 as a response to Asian Financial Crisis. Raskin is also

the largest program as it covers about half of the population and costs more than half of total government budget for social programs (See figure 1). However, many has found that Raskin has numerous implementation issues which make Raskin is ineffective in addressing problems of poor households (Hastuti et al 2008, Isdijoso et al, 2011, Tabor & Sawit 2011).

Figure 1. Central Government 2012 Budget Composition for Indonesian Main Social Protection Programs.
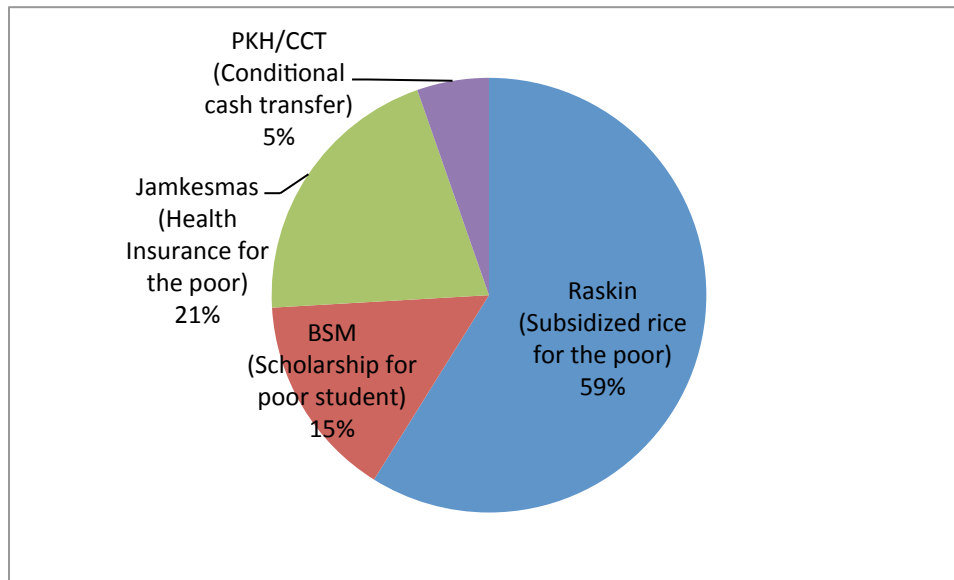
Source: Financial Note and Indonesian Budget Fiscal Year 2013, Ministry of Finance.

This paper puts strong emphases on food and nutrition security outcomes. Food is one of human's basic needs. The World Food Summit 1996 highlights the multidimensionality of food security: food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO 2000). This concept was specified by the four pillars of food security: availability, accessibility, utilization and stability. Sen (1981) elaborates the importance of access to food through his concept of entitlement. He argues that the problem of food security is not about food supply as in Malthusian theory, but is more about food access. In his renowned work, Sen highlighted that the institutional failures that led to suboptimal food distribution can also lead to food insecurity.

The poor Indonesians, like in many others in developing countries, spend more than half of their income on food (von Braun and Tadesse, 2012). Poor consumers who cannot maintain their consumption stability reduce their food and nutrition intake as part of their survival strategy. Reduction of food and nutrition intake can have short and long term effects (Block et al., 2004). Although nutrition was regarded as one of the most important parts in development priorities, articles published in a special series of the Lancet on "Maternal and Child Undernutrition" stress that it still receives less attention from donor and developing countries[1].

This paper attempts to evaluate which program is better in improving outcomes and analyze whether there is significant impacts on multiple treatment. The impacts are analyzed at the micro level. The outcomes selected are related with the main objective Raskin and CCT; addressing consumption risk of the poor. Two dimensions of food and nutrition security that can be assessed at household level; accessibility, and utilization will be analyzed. The indicators are average share of food expenditures in total household expenditures (Maxwell 1996 and Timmer 2005) and diet Diversity Score (DDS) (Ruel, 2003) to represent food accessibility, and utilization respectively.

The remainder of this paper is organized as follows. The next section provides the background information of CCT and in-kind transfer programs both worldwide and specifically in Indonesia. The third and fourth sections describe the data and empirical strategy used in the study respectively. The fifth section is on results discussion. The last section provides some concluding remarks.

2. Background Information

2.1 Conditional Cash Transfer

Conditional Cash Transfer (CCTs) have become very popular in developing countries over the last decade. It has been studied across the globe from low to middle-income countries. CCTs are one of safety net programs that transfer cash to poor households with several conditions on education- and health-promoting behavior. The conditions may include periodic check-up for

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[1] *The Lancet* January-February 2008, Volume 371, No. 9608-9612

pregnant women, growth monitoring and vaccinations for infant, enrolment and school attendance for school-aged children, and sometimes educational performance such as standardized test scores.

CCT aims to reduce poverty as well as breaking intergenerational cycle of poverty through development of human capital. Cash component from CCT is expected to raise households' consumption level and therefore lift their life up from poverty. Furthermore, the education- and health- promoting behaviors resulted from CCT may have long-term impact in employment and earning prospects of participants.

The pioneer of CCT is Brazil's Bolsa Familia program and Mexico's Opportunidades program. They were launched in 1997 and now have covered millions of poor households (Lindert et. al, 2007; Levy, 2006). CCTs have now been implemented in more than 30 countries worldwide (Fiszbein & Schady, 2009). Various reports and journal articles have been produced analyzing the impact of the program. Generally CCT programs are found to have positive impact; increased consumption levels among the poor (Fiszbein & Schady, 2009), increased school enrolment (see Khandker, et. al, 2003 for Bangladesh, Maluccio and Flores, 2005 for Nicaragua; Galasso, 2006 for Chile, and Chaudhury & Parajuli, 2008 for Pakistan), increased utilization rates of health care provider (see Morris et al, 2004 for Honduras; Attanasio, 2005 for Colombia; Levy & Ohls, 2007 for Jamaica). However there are mixed evidence on final outcomes in health and education such as educational achievement through standardized cognitive test scores (see Paxson & Schady, 2008; Macours et. al, 2008) or child height and/or weight for age (see IFPRI, 2003; Behrman & Hodinott, 2005; Attanasio et. al, 2005).

CCT in Indonesian context, which is known as PKH/*Program Keluarga Harapan,* was just launched in 2007 as a pilot program. As in other countries, PKH aims to improve economy of the poor, increase access and utilization of health services for pregnant women, infant, and toddler, increase enrolment and attendance rates for school-aged children. In its inaugural year, PKH delivered cash transfer with varied amount depending on household characteristics (see Table.1) to over 432,000 households in 7 provinces. The program has expanded its coverage to over 1.4

míllion households in 2012. The eligibility criteria to receive the cash transfer are very poor households[2] with children aged 15 or below and/or lactating and/or pregnant women.

Table 1. CCT/PKH benefit (in IDR, per year)

Fixed amount	200,000
Cash amount for household with:	
Pregnant or lactating mother	800,000
Infant/child age less than 6 years	800,000
Children of primary-school age	400,000
Children of secondary-school age	800,000

Source: Program's guideline, Ministry of Social Affairs (MoSA). Note: Minimum and maximum transfers per household are 600,000 and 2,200,000 respectively.

Randomization at sub-district level was incorporated into the design of the program, making it possible to measure impact of the program by directly comparing outcomes between participants and non-participants. The World Bank (2011) has evaluated the impacts of CCT and found that Indonesian CCT recipients experienced a 10 percent increase in their average monthly consumption. The number of children age < 5 weighed in health facilities was also higher (15–22 percentage points) in CCT areas. However, the impact on education outcomes is not significant.

There has been many debates over "to condition or not to condition" the cash transfer program. De Brauw and Hodinott (2011) take advantage of the fact that some beneficiaries did not receive the form needed to monitor the attendance of their children at school. They run several methods, including nearest neighbor matching and household fixed effect regressions and show that the absence of this form reduce the likelihood of children attendance at school. The likelihood was even more severely reduced when children making the transition to lower secondary school. Their findings are consistent with the broader argument of de Janvry and Sadoulet (2006) that there can be considerable efficiency gains to CCTs through more careful design for example by improving targeting among poor households and focusing on children who have a high probability of not enrolling in school without a conditional cash transfer and who have a high response to the amount offered.

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[2] Poverty lines are defined by the BPS (Biro Pusat Statistik / Statistics Indonesia).

Most of CCTs usually delivers the cash directly to mother, including CCT in Indonesia. One reason behind this is that mothers are more likely to allocate more resources to food and children's health and education when they have greater control over resources (Hoddinott & Haddad (1995), Doss (2006), Schady and Rosero (2008)). Contradicting evidence from Indonesia revealed that the increase of women's access to an additional resource from CCT does not immediately raise their bargaining position in the household or against the husband because the usage of most of this money remains in the corridor of routine household needs that have so far been the responsibility of women (Arif et. al, 2011). Another qualitative study found that CCT contribution to the improvement in service utilization was observed only in one (out of two provinces). Improvements were indicated by the increase in mothers' attendance at *posyandu* (integrated health service posts) and of students attendance in class (Febriany et. al, 2011).

2.2 In-kind transfer

In-kind transfer programs provide additional resources to households by making the resources available when they need it the most in the form of food, school-related resources (e.g. uniform, books, etc), or health-related resources (e.g. medicines, medical equipment, etc). The most common in-kind transfer is food transfers in the form of food rations, school feeding program, supplementary, or emergency food distribution.

In-kind transfer has been used since ancient Egypt and the Roman Empire. Recent food-based transfers can be found in South Asia since the 1944 Bengal famine (Grosh et. al,2008). Many similar programs are similarly implemented in Ethiopia (Adams and Kebede 2005, del Ninno et. al 2005), Bangladesh (Ahmed 2005, del Ninno & Dorosh 2003), Philippines (Economics and Social Commission for Asia and the Pacific 2001), and Indonesia (Yonekura 2005, Timmer 2004). Food-based transfer generally aims to reduce uncertainty of a household in acquiring a certain minimum amount of food staples (Pinstrup-Andersen, 1988). Food subsidies program, another well-known of food based programs in developing countries, can serve as additional resource of income for its recipients. These income transfers strengthen the purchasing power of poor households (Pinstrup-Andersen & Alderman, 1988; von Braun, 1988).

In-kind transfer in Indonesia is also known as food subsidy program under the name Raskin (Rice for the Poor). This program was originally launched to strengthen food security of poor household in the response of Asian Financial Crisis in 1998. The original name of the program is OPK (Operasi Pasar Khusus/Special Operation Market) which then changed into Raskin in 2002. Since then, the objective of the program has been expanded not only as an emergency response but also part of social protection program. Raskin provides rice at subsidized price. In 2010, the subsidized price was IDR 1,600/kg, around only 18% of average market price of rice at the same year. General guideline of Raskin program stated that each eligible household entitled to purchase 14 kg/month Raskin rice. This makes the value of annual benefit per household is about IDR 1,2 million. However, many implementation issues has caused de facto of average raskin rice purchased by each households is only 4 kg/month (World Bank, 2012).

Raskin program encounters many problems in the distribution of the rice from the primary distribution point to the beneficiaries. The program lacks of socialization & targeting accuracy (Hastuti et. Al, 2008). Apart from the rice distribution issue, Raskin rice was often found to have low quality and/or unacceptable (Isdijoso et al, 2011). In some areas, Raskin rice was divided equally among recipients to avoid conflicts and social jealousy (Tabor and Sawit, 2011). Despite of having various implementation issues, Raskin is found to have positive impacts on expenditures of higher nutrient food (meat, fish, dairy product). The impact on adult goods expenditures was higher than on expenditures of higher nutrient food (Pangaribowo, 2012).

2.1.Implementation of CCT and Raskin

Targeting performance of Raskin is poorer than CCT (see Figure 2 below). About 70% of the poorest two deciles received Raskin. The coverage is still high in the next deciles up to the richest. About 10% of the richest decile answering yes to the question of whether their households receive Raskin in the past 3 months. Average Raskin purchased by households is approximately equal across deciles (around 4kg/month). In contrast, CCT targeting performance is much better. Although the overall coverage is small, the coverage in decile 7 and above is nearly zero. The highest coverage (about 7%) is in the poorest decile.

Figure 2. Raskin and CCT targeting performance
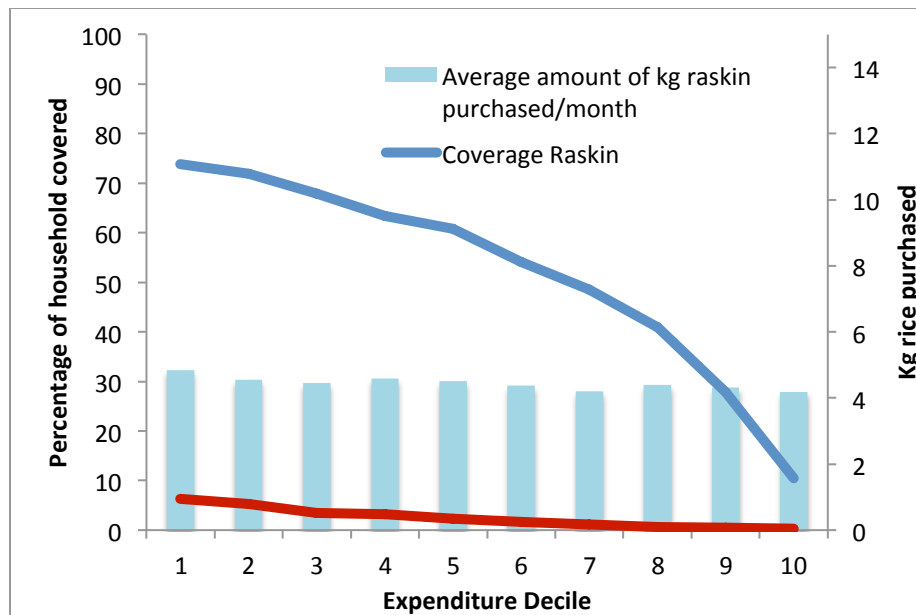
Source: Susenas 2013

Table 2. PKH/CCT and Raskin characteristics

	PKH/CCT	**Raskin**
Inauguration year	2007	1998
Delivery method	Cash transfer conditional upon participation on health and education services	Subsidized rice
Implementing agencies	Ministry of Social Affairs	Kemenkokesra, Bulog
Target population	Very poor households with pregnant mother and/or infants and/or school-aged children*	Poor households**
Official benefits	Cash transfer based on household's characteristics	14 kg Raskin rice/month at highly subsidized price
Coverage of population	2.25%	50%
Coverage of poor population	6%	75%
Budget	IDR 1.9 trillion	IDR 20.9 trillion

*Source: Program manual guidelines, Susenas (BPS), and Budget data from Ministry of Finance. Note: * Poor households are defined as households with percapita expenditure below the national poverty line. **Very poor households are defined as households with percapita expenditure below the extreme national poverty line or 0.8*poverty line.*

3. Data and Descriptive Statistics

This study uses panel data from a baseline survey that was fielded in June – August 2007 (before PKH implementation) and a follow-up survey in 2009 (approximately 26-30 months after PKH implementation). PKH was implemented immediately after the baseline survey as a government pilot program in 7 provinces: West Java, East Java, North Sulawesi, Gorontalo, East Nusa Tenggara, West Sumatra, and DKI Jakarta. The provinces were selected to represent Indonesia's geographic and socio-economic heterogeneity e.g. high/medium/low poverty rates, urban/rural areas, coastal/islands, accessible/difficult-to-access areas (Sparrow et. al, 2008). Within each province, the districts were ranked based on district poverty rates, incidence of malnutrition, and transition rates from primary to secondary schooling. The richest 20% of districts were excluded (World Bank, 2011). Districts implementing the rural-community driven development project were eligible to participate in PNPM-Generasi (PNPM Healthy and Smart Generation Program *(PNPM Generasi Sehat dan Cerdas*)) PNPM generasi is community cash transfer program that provides annual block grants to communities that have committed to improve health and education outcomes. The grants can be used in improving the supply of local health and education services e.g. improving health care and education facilities, providing supporting tools for health and education services (e.g. medicines or health equipment, books, stationary, uniform, etc). While PKH is cash transfer program targeted to eligible very poor households. PKH eligible districts were then taken from the remaining pool of PNPM districts, as well as eligible districts in West Sumatra and DKI Jakarta. Sub-districts that have sufficient health and education facilities were eligible to participate in the pilot program. From total 588 eligible sub-districts, 259 sub-districts were randomly selected to PKH treatment groups. The remaining 329 sub-districts were kept as control groups.

PKH is intended to serve extremely poor households that were identified by BLT (Bantuan Langsung Tunai/Direct cash transfer) beneficiaries list that were surveyed by Statistics Indonesia in 2005. From this list with additional group of eligible household who were in excluded from BLT list, Statistics Indonesia used health and education survey data to demographically identify eligible household that met PKH criteria: households with pregnant and/or lactating women and/or with children aged 0-15 years and/or with children aged 16-18 years who have not yet completed 9 years of basic education. The list of PKH eligible household was then reviewed by the implementing agency; Ministry of Social Affairs. In the end, approximately 430,000 beneficiary households were identified through this selection process.

The baseline and follow-up surveys were conducted in 180 treatment and 180 control sub-districts that were randomly selected from the list of randomly assigned treatment and control sub-districts respectively. Within sub-district, eight villages were randomly selected to be surveyed. Within village, two households were randomly selected from eligible households[3] with pregnant/lactating mother, and three households from eligible households with children 0-15 yrs old. The follow up survey visited the same households and individuals that are in the baseline with attrition rates approximately 2.5% (World Bank, 2011).

Both baseline and follow-up surveys collect household information on socioeconomic and demographic characteristics as well as schooling, health, and nutrition outcomes for mother and infant/children. Questions regarding recipient status for each social protection programs including CCT and Raskin were also asked in the surveys. Furthermore, the question of last time a household receiving Raskin was also recorded in both baseline and follow-up survey. This information helps us to categorize which household received both Raskin and CCT at about the same time that is relevant for our analysis e.g. between the baseline and follow-up surveys.

To assess the synergy impact of CCT and Raskin program on food security, certain outcomes were measured to cover the two dimensions of Food and Nutrition Security (FNS). The first outcome, average share of food expenditures in total household expenditures is measured to examine food accessibility. And to analyze the last dimension – utilization – we use Diet

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[3] Eligibility criteria are defined by the Statistics Indonesia and include housing characteristics, education attainment levels, fuel sources, assets, access to source of lighting, clean water, education, and health services, type of employment.

Diversity Score (DDS). DDS is defined as the number of different of different foods or food groups consumed by the household over the past month. We use the most popular measurement approaches for DDS in developing countries: single food count (DDS_1) and food group count (DDS_2). List of food groups for both DDS measures are shown in table 3 below. The major different between two measures of DDS is that DDS_2 contains the most important building blocks for a healthy diet than DDS_1. This allows us to see whether the impacts of the programs are more significant for healthy diet consumption. Share of food expenditure is defined as the share of total household's monthly expenditures on food out of total household's monthly expenditures.

Table 3. Food groups used in the DDS measures

DDS_1	DDS_2
1. Grains (rice, corn, wheat, rice flour, corn flour, etc.).	1.Grains (rice, corn, wheat, rice flour, corn flour, etc.).
2. Tubers (sweet potato / cassava, sweet potatoes / yams, potatoes, cassava, taro, sago, etc.)	2.Tubers (sweet potato / cassava, sweet potatoes / yams, potatoes, cassava, taro, sago, etc.)
3. Fish (fresh, preserved fish / salted, shrimp, etc.).	3.Fish (fresh, preserved fish / salted, shrimp, etc.) & meat (beef/lamb/pork/ chickens, etc)
4. Meat (beef/lamb/pork/ chickens, etc)	
5. Eggs and dairy products (eggs, fresh milk, condensed milk, milk powder, etc.)	4.Eggs and dairy products (eggs, fresh milk, condensed milk, milk powder, etc.)
6. Vegetables (spinach, kale, cucumber, carrots, beans, chickpeas, onions, peppers, tomatoes, etc.)	5.Vegetables (spinach, kale, cucumber, carrots, beans, chickpeas, onions, peppers, tomatoes, etc.)
7. Nuts (Peanuts / green / soy / red / stump / cashews, tofu, tempeh, tauco, oncom, etc.)	6.Nuts (Peanuts / green / soy / red / stump / cashews, tofu, tempeh, tauco, oncom, etc.)
8. Fruits (oranges, mango, apple, durian, rambutan, bark, Duku, pineapple, watermelon, banana, papaya, etc.)	7.Fruits (oranges, mango, apple, durian, rambutan, bark, Duku, pineapple, watermelon, banana, papaya, etc.)
9. Oils and fats (coconut oil / cooking oil, butter, etc.)	8.Oils and fats (coconut oil / cooking oil, butter, etc.)
10. Material drinks (sugar, brown sugar, tea, coffee, chocolate, syrup, etc.)	
11. Spices (salt, nutmeg, coriander, pepper, shrimp paste, soy sauce, MSG, etc.)	
12. Other consumption (crackers, chips, noodles, vermicelli, macaroni, etc.).	
13. Ready food and drinks (bread, biscuits, cakes, porridge, ice syrup, lemonade, gado-gado, rice Rames, etc.)	

Table 4 shows the means of selected household characteristics for each treatment groups. We see that main household characteristics are relatively similar across treatment groups. They are also relatively similar compared to group 0 who received no program. The group 0 should rationally come from non-poor households which have higher per capita expenditures and assets. However, the surveys have been designed to include a random sample of CCT eligible households. This means all respondents come from very poor households and satisfy CCT eligibility criteria. This gives advantage in our analysis in ensuring that our analysis satisfies the balance property.

Table 4. Summary Statistics of Selected Household Characteristics in Baseline survey

Household characteristics	Treatment Group			
	0	1	2	3
Household size	5.20	5.19	5.18	5.10
Age of household head	42.22	41.80	40.63	40.51
Female-headed household	0.08	0.09	0.07	0.07
Household head works in agriculture	0.65	0.69	0.60	0.70
Education of household head	1.95	1.84	2.09	2.02
SLT/BLT recipient	0.93	0.95	0.81	0.90
Askeskin recipient	0.48	0.53	0.33	0.32
Access to electricity	0.86	0.80	0.89	0.81
Access to a proper toilet	0.44	0.36	0.47	0.36
Access to clean water	0.79	0.74	0.80	0.76
Total number of assets	2.98	2.56	2.92	2.00
House is private/own property	0.88	0.87	0.79	0.76
Mother is pregnant	0.06	0.06	0.06	0.08
Proper roof	0.91	0.87	0.89	0.77
Proper floor	0.68	0.58	0.80	0.67
Proper sanitation	0.28	0.19	0.33	0.18
Proper wall	0.46	0.31	0.52	0.26
Main fuel of cooking is firewood	0.22	0.15	0.28	0.16
Percapita expenditure 2007	199,866	183,593	228,317	191,071
Percapita expenditure 2009	247,544	236,037	257,283	240,735
Percapita food expenditure 2007	133,418	126,335	140,916	137,977
Percapita food expenditure 2009	155,937	153,424	167,011	162,564
Number of observations	9,675	3,025	521	107

Note: BLT : Bantuan Langsung Tunai or Unconditional Cash Transfer. Askeskin is original name of Jamkesmas, health fee waiver for the poor. BLT and Askeskin are social protection programs that are also targeted to very poor and poor households.

4. Empirical Strategy

The causal evaluation problem has been defined by the standard model of Roy (1951) and Rubin (1974). It has been extended to the multiple treatment case by Imbens (2000) and Lechner (2001). There are less work in multiple treatment literature, Imbens (2000) derives generalization of propensity score and shows that the results by Rosenbaum and Rubin (1983) still hold for multiple treatment.

To perform multiple-treatment analysis, instead of dividing households into treatment or control group as in regular treatment effect estimation method, we create a categorical variable of four type of household:

- Group 0: No policy; consist of households that never received Raskin or CCT
- Group 1: PKH only; consist of households that never received Raskin, but received CCT
- Group 2: Raskin only; consist of households that never received CCT, but received Raskin
- Group 3: Both CCT and Raskin; consist of households that received both programs

The last category highlights the case of overlapping policies; one household received two programs at the same time.

Our interest is to have a control group (group 0) that consists of households who never received CCT or Raskin before and after the baseline. Group 1 consists of households that received only CCT after the baseline. Group 2 consists of households that received only Raskin after the baseline and never received Raskin before the baseline. And finally group 3 consists of households who received both CCT and Raskin after the baseline and never received any of these two programs before the baseline.

Table 5. Program recipient status by treatment group

Group Category	Before Baseline	After Baseline
Group 0	Raskin: x CCT: x	Raskin: x CCT: x
Group 1	Raskin: x CCT: x	Raskin: x CCT: √
Group 2	Raskin: x CCT: x	Raskin: √ CCT: x
Group 3	Raskin: x CCT: x	Raskin: √ CCT: √

It is tricky to arrange criteria for these four groups, especially because Raskin program has been implemented since long time before CCT was launched. Therefore many of poor households have been receiving Raskin before the baseline survey conducted. However fortunately both baseline and follow-up surveys recorded information of when the last time a household received Raskin. With this information, we are able to distinguish households who never received Raskin before the baseline and just started receiving Raskin after the baseline.

After creating 4 different treatment groups, we employ Inverse Probability Weighting (IPW) method (Hirano et. al, 2003) to study treatment effect of multiple treatments. The underlying assumptions of IPW are (1) the conditional-independence assumption that restricts the dependence between the treatment model and the potential outcomes, (2) overlap assumption that ensures each individual's probability to receive any treatment level is greater than zero and (3) independent and identically distributed sampling assumption that ensures the treatment status of each individual is independent to the potential outcomes and treatment statuses of other individuals in the population.

Consider multivalued treatment level which we label treatment variable $t \in \{0,1,2,3\}$ and potential outcomes y_0, y_1, y_2, and y_3 respectively. To estimate potential-outcome means for treatment i or $E(y_i)$, we can use the observed data, y_i. t_i is y_{1i} when $t = 1$, but y_{1i} is unobserved when $t = 0$. IPW estimator for $E(y_i) =$

$$y_{ig} \frac{1}{N \sum_{i=1}^{N} \frac{y_i t_i}{p(\mathrm{x}_i)}}$$

Where $p(\mathrm{x}_i)$ is the probability that $t_i = 1$

IPW uses weighted means instead of using simple unweighted means to disentangle the treatment effect and other covariates,. The weights come from the inverse of probability of being observed treatment group. These probabilities are obtained by fitting a model of treatment status on subject's characteristics. A common parametric approach would be to use a multinomial logit (MNL) model with flexible function in x_i.

To check consistencies of our results, we also produce results based on regression analysis using specification below:

$$y_{it_2} - y_{it_1} = \alpha + \beta.CCT_i + \gamma.Raskin_i + \sigma.CCT_i.Raskin_i + \lambda.x_i + \varepsilon_i \tag{2}$$

Where i denotes household, y_{it_1} and y_{it_2} denote outcome values at the baseline and follow-up survey respectively. CCT is dummy of receiving cash transfer program, Raskin is dummy of receiving rice from Raskin program, x_i is a vector of household characteristics, ε_i is the error term.

Another interesting analysis would be to see the impact of CCT on the existing Raskin recipient. Therefore we similarly provide the analysis sub-sample of existing Raskin recipient, that is the group of households who have been receiving Raskin since before the baseline survey implemented.

Table 6. Program recipient status by treatment group for sub-sample of existing raskin recipients

Group Category	Before Baseline	After Baseline
Group 0	Raskin: √ CCT: x	Raskin: √ CCT: x
Group 1	Raskin: √ CCT: x	Raskin: √ CCT: √

We similarly produce results using both IPW method and regression analysis based on equation (2) above.

5.   Results and Discussion

5.1 Treatment effects of social protection policies relative to no treatment

As mentioned earlier, eligibility criteria were generally almost similar among social protection programs, including CCT and Raskin. Although it is important to note that CCT has smaller size of target group since it only targets extremely poor households with pregnant mother and/or infants and/or school-aged children. We select socioeceonomic and demographic characteristics that observed and influence the program's participation. This includes household welfare conditions and household head characteristics.

Before doing the calculation of the impact of each treatment, we present the difference of food and nutrition security outcomes between the treated and the control group capturing the period of before and after intervention in table 7. Table 7a and 7b show that the treatment and control group had a significant different on food and nutrition security outcomes before and after treatment exposure for total population and sub-sample of existing Raskin recipients respectively.

Table 7a. Average difference (between baseline and follow-up survey) of Food and Nutrition Security outcomes for each treatment group

Treatment group	DID in DDS_1	DID in DDS_2	DID in Share of food exp.
1 vs 0	0.175***	0.112***	0.008**
	(0.0471)	(0.032)	(0.004)
2 vs 0	0.176***	0.074	0.036***
	(0.101)	(0.069)	(0.010)
3 vs 0	0.379**	0.057	0.010
	0.219	0.150	(0.021)

Table 7b. Average difference (between baseline and follow-up survey) of Food and Nutrition Security outcomes for each treatment group using a group sample of existing Raskin recipients

Treatment group	DID in DDS_1	DID in DDS_2	DID in Share of food exp.
1 vs 0	0.152***	0 .097***	0.006*
	(0 .049)	(0 .034)	(0.005)

The plot of estimated densities of the probability of getting each treatment level is presented in the appendix. The estimated densities have most of their masses in the same regions in which they overlap each other. This means that the overlap assumption is not violated. The regression model coefficients from the model used to predict each treatment status are also presented in the appendix.

Table 8a below shows the results using IPW method. The results include the effect or average treatment effects on the treated (ATT) of CCT (treatment 1), Raskin (treatment 2) or both CCT and Raskin (treatment 3) on Diet Diversity Score (DDS) and share of food expenditures as well as the estimate potential outcome means for the control group. In each case, the control groups are the group of households who are not receiving any program.

The analysis found that CCT causes the difference in DDS_1 (between after and before intervention) to be increased by an average 0.12 from average estimate potential outcomes of 0.6 of households who do not receive any programs with 5 percent significance level (see Table 6a). We found no significant impact of treatment 2 (receiving Raskin) and as well as of treatment 3 (receiving both CCT and Raskin). From the policy perspective, the results are very interesting. Relatively to the similar households with no treatment, household with CCT has more significant impact compare to household with Raskin as well as household with both CCT and Raskin. One of possible explanations is that implementation issues of Raskin which make the program inefficient in delivering its assistance. The absence of control mechanism to ensure recipients receiving full amount of allocated Raskin rice each month is a big issue in the program implementation (Hastuti et. Al, 2008, Tabor & Sawit, 2011). Furthermore, to explain the insignificant impact of households who received both treatments, we consider food consumption behavior of Indonesian households. Rice is the main staple food for Indonesians. It accounts for

more than two-third of their total cereal's calorie intake[4]. Therefore it can be understood that households who received Raskin, whenever they have rice in their hands, they would think that most of their calorie needs has been fulfilled by consuming this rice. And there would less incentive for them to buy other kind of foods.

The estimated impacts on DDS_2 are in-line with the results on DDS_1 but with lower level of ATT. This means that households intend to consume foods that belong to the same group or that do not belong any of main important food groups. This is similarly important to inform policy makers that education on food combination and utilization is urgently needed, especially for poor households. We can also easily see this by comparing average difference of DDS_2 after and before the intervention, that is less than average difference of DDS_1 for all treatment categories (see Table 7a and Table 7b).

The estimated ATT on food accessibility of going from no policy to treatment 1 and treatment 2 are very small. Furthermore, they are only weakly significantly different from zero. This implies that none of CCT or Raskin has made a positive and significant impact on food accessibility outcome that is measured using share of food expenditures out of total expenditures.

When we consider the effect of multiple overlapping policies (treatment 3), the policy effects on DDS_1 are larger than the effects of treatment 1 and 2, however they are not significantly different from zero. Similarly on the impacts of treatment 3 on share of food expenditures, the policy effects are smaller than CCT and Raskin, but they are not significantly different from zero. This is important in policy evaluation to investigate the interaction between policies, whether the complementarities between CCT and Raskin are worth to implement or better to re-formulate these two overlapping policies.

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[4] Own estimation based on data from FAOSTAT.

Table 8a. Estimation results of each treatment group with intervention(s) relative to no intervention (treatment 0)

	Treatment	Outcome 1: Difference in DDS_1	Outcome 2: Difference in DDS_2	Outcome 3: Difference in food share expenditures
	(1) vs (0)	0.119**	0.082**	0.008*
		0.05	0.03	0
Estimate average treatment effect on the treated:	(2) vs (0)	0.18	0.059	0.026*
		0.13	0.09	0.01
	(3) vs (0)	0.274	-0.035	0.022
		0.28	0.19	0.02
Estimate potential outcome means:	Treatment 0	0.594***	0.375***	-0.055***
		0.03	0.02	0

*Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.1$*

When we look at the results on the sub-sample of existing Raskin recipients, we end up with having only two treatment groups: (1) treatment group: a group of households who have been receiving Raskin before the baseline and receiving PKH after the baseline, and (2) control group: a group of households who have been receiving Raskin before the baseline and not receiving PKH after the baseline. The estimation results show that the impacts of receiving PKH for existing Raskin recipients are positive and significant with 5 percent significance level both for DDS_1 and DDS_2 with slightly smaller magnitude than using the full sample. The impacts on the share of food expenditures are similarly insignificant as in the full sample. These results could be interpreted as PKH impacts on food and nutrition security indicators are higher for the groups who have not had benefits from any of food based transfer programs. However, since the difference in magnitude of the impacts are small, we could similarly interpret the results as the impact of existing food based transfer program, in this case Raskin, is actually small.

Table 8b. Estimation results using the sample of existing Raskin recipients

	Treatment	Outcome 1: Difference in DDS_1	Outcome 2: Difference in DDS_2	Outcome 3: Difference in food share expenditures
Estimate average treatment effect on the treated:	(1) vs (0)	0.103**	0.074**	0.006
		0.05	0.035	.004
Estimate potential outcome means:	Treatment 0	0.607***	0.384***	-0.053***
		0.027	0.018	0.002

Notes: *** p<0.01, ** p<0.05, * p<0.1

The regression results show consistent results with the previous estimation using IPW method although we notice there are small differences in the magnitude and significance level of coefficients.

Table 9. Estimation results based on conventional regression analysis for the full sample

	Outcome (1) Difference in DDS_1	Outcome (2) Difference in DDS_2	Outcome (3) Difference in food share expenditures
Dummy of receiving *only* after baseline survey	0.200*	0.088	0.033***
	0.1	0.07	0.01
Dummy of receiving PKH	0.115**	0.082**	0.009*
	0.05	0.03	0
Dummy of receiving PKH and Raskin *only* after the baseline	-0.003	-0.131	-0.035
	0.26	0.18	0.02
Dummy of living in a house with proper roof	0.277***	0.220***	-0.034***
	0.08	0.06	0.01
Dummy of living in a house with proper floor	-0.226***	-0.144***	-0.003
	0.05	0.03	0
Dummy of having access to proper sanitation system (septic tank)	-0.003	0.01	0.017***
	0.05	0.03	0
Dummy of living in a house with proper wall	0.034	0.068**	-0.014***
	0.04	0.03	0
Dummy of having a private toilet	-0.197***	-0.144***	0.001
	0.04	0.03	0
Dummy of having access to clean water	-0.059	-0.055	-0.003
	0.05	0.03	0
Dummy of having access to electricity	0.200***	0.154***	-0.002
	0.07	0.05	0.01

Dummy of having main fuel for cooking is firewood	-0.013	-0.046	0.016***
	0.05	0.03	0
Dummy of housing is own property	-0.052	-0.048	-0.020***
	0.06	0.04	0.01
Total number of asset	-0.111***	-0.061***	0.003***
	0.01	0.01	0
Dummy of BLT recipient	-0.167**	-0.139**	-0.009
	0.08	0.05	0.01
Dummy of Askeskin/Jamkesmas recipient	0.073*	0.050*	0.005
	0.04	0.03	0
Dummy of having a pregnant mother in the household	0.129	0.029	0.003
	0.08	0.06	0.01
Dummy of household head never attended school	0.129**	0.140***	-0.004
	0.06	0.04	0.01
Dummy of education attainment of household head is primary school	0.132**	0.132***	-0.002
	0.05	0.04	0.01
Constant	0.768***	0.410***	-0.004
	0.13	0.09	0.01

Notes: ***p < 0.01, **p < 0.05, *p < 0. 1

Table 10 below shows the regression results when we use the sub-sample of existing Raskin recipients. As in the previous estimation, the results are generally consistent with the ones produced by IPW method (table 8b) that is the impacts of receiving PKH for existing Raskin recipients are positive and significant with 5 percent significance level both for DDS_1 and DDS_2 with slightly smaller magnitude than using the full sample. The impacts on the share of food expenditures are similarly insignificant as in the full sample.

Table 10. Estimation results using conventional regression analysis for sub-sample of existing Raskin recipients.

	Outcome (1) Difference in DDS_1	Outcome (2) Difference in DDS_2	Outcome (3) Difference in food share expenditures
	0.096*	0.071**	0.007
	0.05	0.03	0
Dummy of living in a house with proper roof	0.302***	0.237***	-0.028***
	0.09	0.06	0.01
Dummy of living in a house with proper floor	-0.192***	-0.120***	-0.004
	0.05	0.03	0
Dummy of having access to proper sanitation system (septic tank)	0.003	0.009	0.018***
	0.05	0.04	0.01

Dummy of living in a house with proper wall	-0.007	0.044	-0.015***
	0.05	0.03	0
Dummy of having a private toilet	-0.221***	-0.149***	0.003
	0.05	0.03	0
Dummy of having access to clean water	-0.081	-0.059	-0.006
	0.05	0.04	0.01
Dummy of having access to electricity	0.169**	0.137***	-0.002
	0.07	0.05	0.01
Dummy of having main fuel for cooking is firewood	-0.018	-0.04	0.016***
	0.05	0.04	0.01
Dummy of housing is own property	-0.02	-0.042	-0.018***
	0.07	0.05	0.01
Total number of asset	-0.098***	-0.056***	0.003**
	0.01	0.01	0
Dummy of BLT recipient	-0.201**	-0.143**	-0.01
	0.09	0.06	0.01
Dummy of Askeskin/Jamkesmas recipient	0.056	0.039	0.005
	0.04	0.03	0
Dummy of having a pregnant mother in the household	0.142*	0.044	0.009
	0.09	0.06	0.01
Dummy of household head never attended school	0.145**	0.153***	0.001
	0.06	0.04	0.01
Dummy of education attainment of household head is primary school	0.122**	0.127***	0.001
	0.06	0.04	0.01
Constant	0.785***	0.404***	-0.01
	0.14	0.1	0.01

Notes: ***p < 0.01, **p < 0.05, *p < 0. 1

5.2.2. The relative effects of multiple social protection policies

Table 11 below shows estimates of the relative effects between single treatment and multiple treatments. The analysis reveals the estimated ATT of going from both treatment 1 (CCT) and treatment 2 (Raskin) to treatment 3 (both receiving CCT and Raskin) on all indicators are not

significantly different from zero. This confirms the results in previous section that the effect of multiple overlapping treatments is not significantly different from zero.

Table 11. Estimates of the relative effect

	Treatment	Difference in DDS_1	Difference in DDS_2	Difference in food share expenditures
Estimate average treatment effect on the treated	(3) vs (2)	0.182	0.096	0.013
		0.33	0.16	0.03
	(3) vs (1)	0.25	-0.003	0.036
		0.31	0.15	0.03
Estimate potential outcome means	Treatment 2	0.685***	0.298***	-0.022*
		0.11	0.06	0.01
	Treatment 1	0.617***	0.397***	-0.044***
		0.04	0.03	0

*Notes: *** p<0.01, ** p<0.05, * p<0.1*

6. Conclusion

The findings of our analysis show that for households receiving single program, it was group with CCT that had the greatest impact on food utilization. None of CCT and Raskin has made positive and significant impact on food accessibility. In terms of the effect of multiple treatments, the policy effects are not significantly different from zero. The implication for policy makers is that the importance to reformulate these overlapping policies especially when we consider that Raskin consumed more than half of social protection budget.

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Appendix

Table 12. The coefficients in the probit model to predict:

	Treatment 1	Treatment 2	Treatment 3
Dummy of living in a house with proper roof	0.011	-0.522***	-0.695**
	0.08	0.18	0.29
Dummy of living in a house with proper floor	-0.146***	0.507***	0.228
	0.05	0.12	0.22
Dummy of having access to proper sanitation system (septic tank)	-0.275***	0.009	-0.447
	0.06	0.11	0.3
Dummy of living in a house with proper wall	-0.394***	0.091	-0.593**
	0.05	0.1	0.24
Dummy of having a private toilet	-0.154***	0.008	-0.041
	0.05	0.1	0.23
Dummy of having access to clean water	-0.065	0.022	0.041
	0.05	0.12	0.25
Dummy of having access to electricity	-0.086	0.244	0.333
	0.07	0.18	0.32
Dummy of having main fuel for cooking is firewood	-0.196***	0.142	-0.173
	0.06	0.11	0.28
Dummy of housing is own property	-0.032	-0.546***	-0.520**
	0.07	0.12	0.23
Total number of asset	-0.098***	-0.048	-0.303***
	0.01	0.03	0.07
Dummy of BLT recipient	0.209**	-1.021***	-0.640*
	0.1	0.13	0.33
Dummy of Askeskin/Jamkesmas recipient	0.104**	-0.544***	-0.702***
	0.04	0.1	0.21
Dummy of having a pregnant mother in the household	-0.033	-0.121	0.385
	0.09	0.2	0.35
Dummy of household head never attended school	0.196***	-0.217*	-0.45
	0.07	0.13	0.28
Dummy of education attainment of household head is primary school	0.141**	-0.215*	-0.221
	0.06	0.12	0.25
Constant	-0.731***	-1.249***	-1.752***
	0.14	0.26	0.51

*Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.1$*

Figure 2a. Plot of estimated densities to test overlap assumption (full sample)
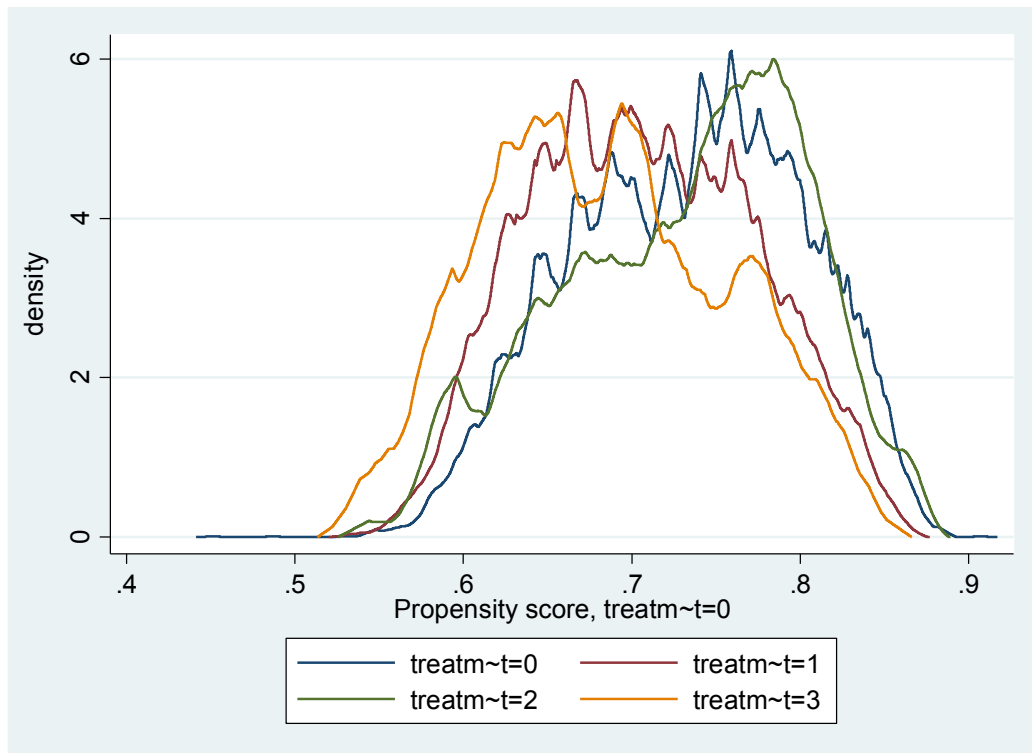

Figure 2b. Plot of estimated densities to test overlap assumption (sub-sample of existing Raskin recipients)