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Abstract

Although global poverty reduction strategies have achieved some positive results, 1.2 billion people still live in extreme poverty. Two principal strategies are commonly used to tackle poverty: the provision of public services and social protection programs. This dissertation explores the links between the two strategies and poverty reduction in Indonesia. The study starts by exploring the persistence of poverty in rural Indonesia. Using panel data of household and community surveys, the study found evidence of state dependence of poverty, that is, the likelihood of being poor is significantly associated with poverty status in the previous period. Therefore, policies aimed at lifting the poor out of poverty may not only reduce current poverty rates but might also boost long-term growth. The results also suggest the importance of public services and community infrastructures in determining household poverty status. Secondly, this dissertation analyzes the impact of decentralized public spending on education on educational outcomes. Using a panel dataset of Indonesian districts from 2001-2012, combining household surveys, village censuses, and district fiscal data, the analysis reveals that decentralized public spending on education by local governments has a negligible impact on education outcomes across income distribution, including the poor. The results suggest that improving the quality of public spending on education is essential for better outcomes of decentralized public service delivery. Thirdly, this research highlights the roles of social protection programs in response to rising food prices. Social protection helps poor households maintain their food and nutrition security, especially during crises. This study evaluates the synergy impacts of two main social protection programs in Indonesia – Conditional Cash Transfer (CCT) and Subsidized Rice Program (Raskin) – on food and nutrition security. The analysis reveals that CCT had a much greater impact on food and nutrition security for existing Raskin recipients. The study also found that providing both CCT and Raskin may not always yield better outcomes than providing only CCT. The study suggests to consider the importance of reformulating these overlapping programs, especially because Raskin consumes more than half of the social protection budget.

Zusammenfassung

Obwohl die globalen Armutsbekämpfungsstrategien einige positive Ergebnisse erzielt haben, leben 1,2 Milliarden Menschen noch immer in extremer Armut. Zwei Hauptstrategien werden häufig verwendet, um Armut zu bekämpfen: die Bereitstellung von öffentlichen Diensten und Sozialschutzprogramme. Diese Dissertation untersucht die Beziehung zwischen den beiden Strategien einerseits und der Verringerung der Armut in Indonesien andererseits. Die Studie beginnt mit der Untersuchung der Persistenz der Armut im ländlichen Indonesien. Durch Paneldatenanalyse von Haushalts- und Community-Befragungen fand die Studie Anzeichen für eine Statusabhängigkeit der Armut, das heißt, die Wahrscheinlichkeit, arm zu sein, ist signifikant assoziiert mit dem Armutsstatus in der Vorperiode. Daher könnten Strategien zur Befreiung der Armen aus der Armut nicht nur aktuelle Armutsquoten reduzieren, sondern auch das langfristige Wachstum steigern. Des Weiteren legen unsere Ergebnisse die Bedeutsamkeit von öffentlichen Dienstleistungen und den Infrastrukturen der Gemeinden für die Bestimmung des Armutsstatus nahe. Zweitens analysiert diese Dissertation die Auswirkungen dezentraler öffentlicher Ausgaben für Bildung auf die Bildungsergebnisse. Mit Hilfe eines Paneldatensatzes zur Situation der indonesische Bezirke von 2001-2012, der Haushaltsbefragungen, Zensusdaten auf Ebene der Dörfer und Haushaltsdaten von Bezirken kombinierte, zeigt die Analyse, dass die dezentralen öffentlichen Bildungsausgaben der lokalen Regierungen einen vernachlässigbaren Einfluss auf die Bildungsergebnisse in der Einkommensverteilung, einschließlich der Armen, haben. Die Ergebnisse legen nahe, dass die Verbesserung der Qualität der öffentlichen Ausgaben für Bildung essentiell ist, um durch die dezentrale Erbringung öffentlicher Dienstleistungen bessere Ergebnisse zu erreichen. Drittens hebt diese Forschung die Rolle der Sozialschutzprogramme als Reaktion auf steigende Lebensmittelpreise hervor. Sozialschutz hilft armen Haushalten, ihre Ernährungs- und Nahrungssicherheit zu erhalten, vor allem in Krisenzeiten. Diese Studie bewertet die Synergiewirkungen von zwei Sozialschutzprogramme in Indonesien – dem Conditional Cash Transfer (CCT) und dem subventionierten Reisprogramm (Raskin) – auf die Ernährungs- und Nahrungssicherheit. Wir fanden, dass CCT einen viel größeren Einfluss auf die Ernährungs- und Nahrungssicherheit für bestehende Raskin-Empfänger hatte. Außerdem stellten wir fest, dass die gleichzeitige Unterstützung durch CCT und Raskin nicht immer zu besseren Ergebnissen führt als die alleinige Bereitstellung von CCT. Die Studie legt nahe, diese überlappenden Programme neu zu formulieren vor allem, da Raskin mehr als die Hälfte des Sozialschutzbudgets verbraucht.

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Abbreviations

APBD	*Anggaran Pembelanjaan Belanja Daerah* - Local Government Revenue and Expenditure
Askeskin	*Asuransi Kesehatan Masyarakat Miskin* – Health insurance for the poor
ATE	Average Treatment Effect
ATT	Average Treatment on the Treated
BPS	*Biro Pusat Statistik* – Central Bureau of Statistics Indonesia
BSM	*Beasiswa Siswa Miskin* – Scholarship for the poor
CCT	Conditional Cash Transfer
DAU	*Dana Alokasi Umum* – General Allocation Funds
DAK	*Dana Alokasi Khusus* – Special Allocation Funds
DDS	Diet Diversity Score
ELF	Ethno Linguistic Fractionalization
FAO	Food and Agricultural Organization
FNS	Food and Nutrition Security
GDP	Gross Domestic Product
ICP	International Comparison Program
IFLS	Indonesian Family Life Survey
IPW	Inverse Probability Weighting
Jamkesmas	*Jaminan Kesehatan Masyarakat* – Health fee waiver program for the poor
MDG	Millenium Development Goals
MoF	Ministry of Finance
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
PISA	Programme for International Student Assesment

PKH	*Program Keluarga Harapan*
Podes	Village Potential Census
PPP	Purchasing Power Parity
Raskin	*Beras miskin* - Subsidized rice program for the poor
RE	Random Effect
Susenas	National Socioeconomic Survey
SIKD	*Sistem Informasi Keuangan Daerah* - Regional Financial Information System
UN	United Nations
WCML	Wooldridge Conditional Maximum Likelihood

Chapter 1. Introduction

1.1. Background

The United Nations (UN) Millennium Development Goals (MDG) report for 2014 stated that global poverty has been halved five years ahead of the 2015 time frame. Thus, global poverty reduction strategies have had some positive results. However, 1.2 billion people still live in extreme poverty. They are left behind because poverty reduction has most often benefited people living close to the poverty line rather than those at the very bottom of the income distribution (von Braun et al., 2009). World leaders have now agreed on the long-term agenda to improve people's lives and protect the planet for future generations as the current MDG targets expire at the end of 2015. The first transformation shift in this post-2015 development agenda is to leave no one behind, to move the goal from reducing to ending poverty. This means that no single person, regardless of race, ethnicity, gender, or other status, should be denied universal human rights and basic economic opportunities.

Among the 1.2 billion people who live on less than $1.25 a day, nearly 50% lives in sub-Saharan Africa. The second biggest concentration of the extremely poor is in Asia, and less than 20% lives in Latin America/Caribbean and North Africa (UN MDG Report, 2014). Although poverty is scattered across the globe, the related issues are more critical in developing countries, including Indonesia. Indonesia is ranked as the world's 10th largest economy based on the 2011 International Comparison Program (ICP); however, poverty is still a serious problem for the country. Indonesia's rapid economic growth has not been balanced with a rapid reduction in poverty rates.

As in many other developing countries, tackling poverty in Indonesia requires a multisectoral approach. Poverty and deprivation are indeed multidimensional realities (Sen, 1976). Poverty can be interpreted as a lack of access to various basic needs, including nutrition, health, education, housing, security, and opportunity for future improvement (Deaton, 2006). Hence, ending poverty means dealing with problems in education, health, agriculture, infrastructure, water and sanitation, energy, and governance, as well as information and technology. In addition,

Indonesia has great diversity in culture, ethnicity, and geographic and ecological conditions that bring many challenges to ending poverty.

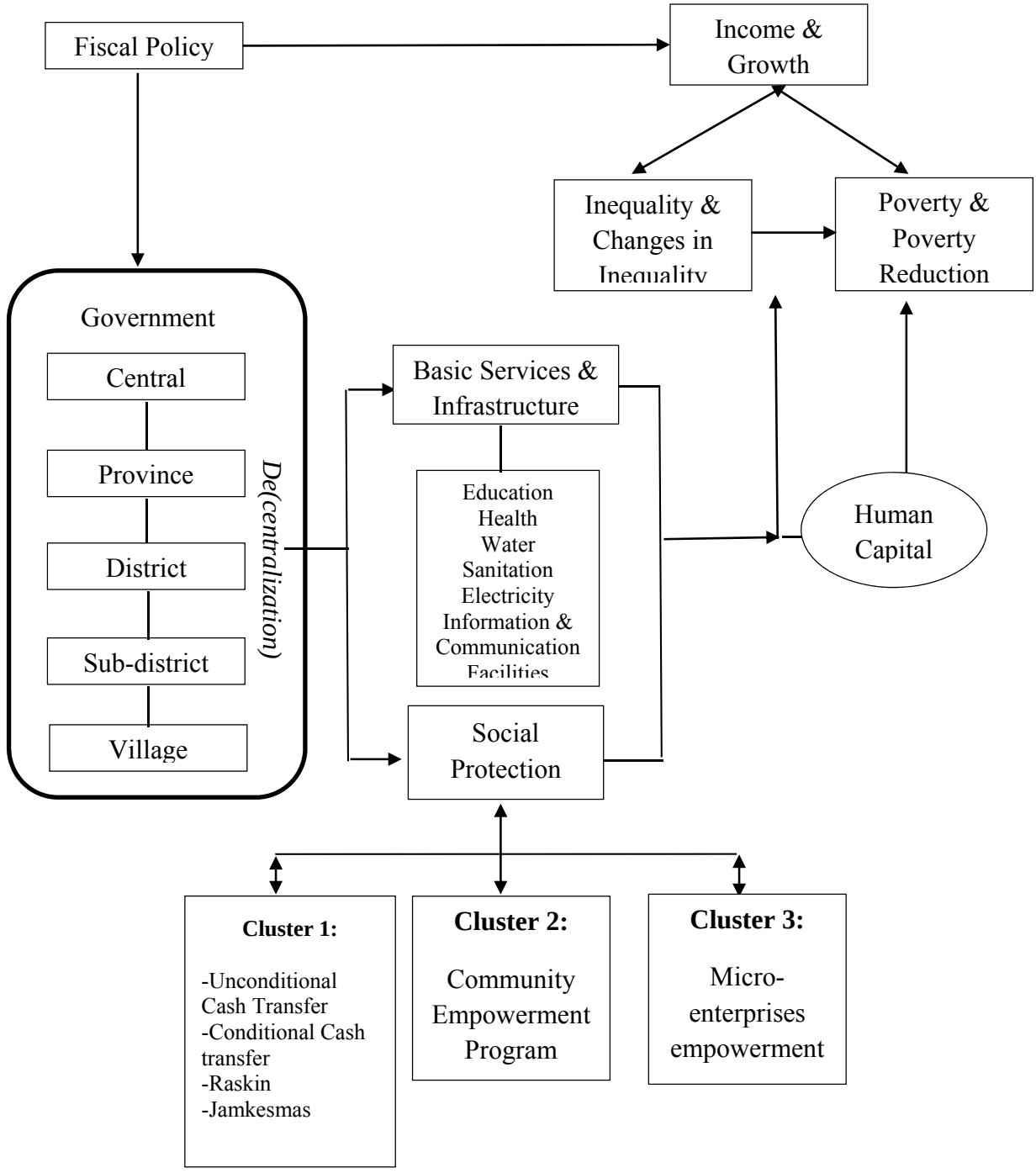
Poverty reduction remains as a mainstay in the country's development agenda. It is always stated as the highest priority in all the government's key policy and planning documents. Indonesia's official poverty rate in 2013 was 11.6%. That number reflects a decrease from about 40% in the 1970s. Despite this success in reducing poverty, another quarter of the population is still vulnerable to poverty. Small economic shocks like a job loss, conflict, disaster, or illness can easily bring the non-poor into poverty (Banerjee & Duflo, 2007; Collier, 2007; Carter et al., 2007, von Braun et al., 2004). The larger the loss from a shock, the slower the recovery (Dercon, 2004). Indeed, negative long-term impacts occur when households must reduce their expenditure for education, pulling children out of school (Behrman et al., 2001), or reduce their food consumption, including for their children (Hoddinott & Kinsey, 2001).

To end poverty, a country needs poverty reduction strategies that are effective enough to reach the poor and improve their lives. This dissertation intends to shed light on this issue, specifically on basic public services/infrastructures and social protection programs – two main government policies in alleviating poverty – to understand their effectiveness in improving outcomes for the poor.

1.2. Objectives of the Study

This dissertation consists of three empirical chapters integrated by the elements of poverty. As mentioned in the previous section, there are two principal strategies that are commonly used to tackle poverty: provision of basic services/infrastructures and social protection programs. This study particularly examines the links between public services, social protection, and poverty reduction in Indonesia. The conceptual framework is shown as follows:

Figure 1.1 Conceptual Framework



Source: Own illustration based on Bourguignon (2004)

These two strategies require active involvement of different levels of government, from the central level down to the village level. Access to basic services and infrastructures can reduce poverty both directly and indirectly through human capital accumulation. Likewise, some social protection programs aim to reduce poverty

through human capital accumulation (e.g., conditional cash transfer (CCT) program) and some intend directly to lift up the beneficiaries from poverty (e.g., rice subsidy program).

The specific research objectives of the dissertation are outlined as follows:

- to investigate the persistence of poverty in Indonesia with a particular focus on the state dependence approach and the role of public services and community infrastructures
- to examine how changes in educational outcomes relate with changes in local government expenditures on education under decentralization era
- to evaluate the impact of two main social protection programs: CCT and Subsidized Rice for the Poor (Raskin), as well as their synergy impact, on food and nutrition security indicators

1.3 Structure of the Dissertation

1.3.1. Poverty Persistence in Rural Indonesia

This dissertation starts by analyzing the persistence of poverty in rural Indonesia. Although poverty has been falling over the past few decades, 15 million Indonesian households frequently fall in and out of poverty (World Bank, 2012a). In addition, the gap in the access to infrastructure, health, and educational facilities has persisted in recent years, especially in the rural areas. The first analytical chapter investigates the dynamics of poverty prevalence in rural Indonesia focusing on the state dependence approach, as well as the roles of geographic/community endowments in the form of publicly provided goods, such as community infrastructure and public services. State dependence in poverty means the current poverty is driven by the previous status of poverty. This implies the policies to reduce risks of poverty and mitigate its consequences are important for both short-term poverty reduction and long-term growth. There are some previous studies on poverty persistence in Indonesia, however they do not focus on the state dependence approach or the roles of community infrastructures and public services (Bidani and Ravallion, 1993; Suryahadi et. al, 2009; Alisjahbana and Yusuf, 2003; Dewi and Suryahadi, 2014). The first analytical chapter of this dissertation attempts to fill this gap by investigating whether the state dependence of poverty is applicable for the case of

Indonesia. Furthermore, the combination of household and community panel data is used to explore the roles of public services and community infrastructures in determining household's poverty status. This study uses the Indonesia Life Family Survey (IFLS), a longitudinal socioeconomic and health survey of individuals, households, communities, and facilities. The survey has been conducted in 1993, 1997, 2000, and 2007. The state dependence of poverty and other relevant covariates of poverty are analyzed using dynamic probit random effect model and Wooldridge Conditional Maximum Likelihood estimator.

1.3.2. Decentralization, Public Spending, and Education

The provision of public services is often associated with governance and institutional arrangements. Decentralization, one of the most common governance reforms, has been observed to have potential in improving efficiency in public service delivery (Oates, 1972; Ahmad and Brosio, 2009; Birner and von Braun, 2015). Indonesia implemented such a reform in 2001. The responsibilities for planning, financing, and providing public services were transferred from the central government to the local governments at the district level, with expectations that local needs and preferences will be better represented. The evidence for whether decentralization plays any role in improving public service delivery, especially the public services that matter the most for the poor, is currently inconclusive (Reinikka and Svensson, 2001; Barankay and Lockwood, 2006). The second empirical chapter of this dissertation attempts to fill this gap by analyzing the effectiveness of decentralized public spending allocated by the local governments at the district level in improving educational outcomes e.g. high school net enrolment rates, transition rates to high school, and number of junior high school per 1000 junior-secondary-aged-children. This study combines household survey, village census, and local government fiscal data from 2001 – 2012 and performs the analysis using standard OLS (Ordinary Least Square), fixed-effect, and instrumental variable method.

1.3.3. Social Protection and Food and Nutrition Security

The last empirical chapter examines synergies between two main Indonesian social protection programs: CCT and Raskin on food and nutrition security indicators. Many developing countries have implemented a range of social protection programs as part of their broader poverty reduction strategies to help poor and vulnerable households confront the risk to their livelihood and maintain 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 in question. Many researchers have studied the impact of social protection programs (Ahmed et al., 2002; Schultz, 2004); however, to the best of my knowledge, none has examined the joint effect/synergy between programs. The third analytical chapter of this dissertation aims to fill this gap by investigating the synergy impact of CCT and Raskin on food and nutrition security outcomes. Using panel data from baseline and follow-up household surveys, this chapter performs multiple treatment analysis combining Inverse Probability Weighting and Difference-in-Difference method. The outcomes selected are indicators covering a dimension of food and nutrition security that can be assessed at household level: food utilization (measured by Diet Diversity Score (DDS)).

Chapter 2. Poverty Persistence in Rural Indonesia: What are the Roles of Public Services and Community Infrastructures?

2.1. Introduction

Poverty in Indonesia has been falling over the past few decades. Despite this, about 15 million Indonesian households are still vulnerable and frequently fall in and out of poverty (World Bank, 2012a). The gap between the rich and the poor has also been deepening since 2000. Not only is Indonesia facing increasing inequality in household income/consumption, it is also experiencing serious inequality problems in terms of access to public services. The gap in the access to infrastructure, health, and educational facilities has persisted in recent years, especially in the rural areas. Consequently, this paper contributes to the literature by investigating the dynamics of poverty prevalence in rural Indonesia. Focus is placed on the state dependence approach, as well as the roles of geographic capital in the form of publicly provided goods, such as community infrastructure and public services.

Poverty is a complex problem. To end extreme poverty and reduce inequality, collective actions are needed from different actors in many sectors (e.g., health, education, and infrastructure). Health and/or educational facilities would not be able to provide their services to the needy if they are not accessible, due to being a large distance away or having a lack of accessible roads to reach them. Health and/or educational facilities similarly would not be able to function properly if they do not have sufficient electricity or running water to support their main services. Therefore, integrated actions from the many sectors are important to reduce poverty and inequality.

Furthermore, there is a difficulty in reaching the poor, who usually sit at the margins of systems. This can be explained by a set of distances (e.g., being located in remote or harsh environments) and social distances (e.g., being excluded, discriminated against, or not having rights or access to services or opportunities). It may also be related to technological and institutional infrastructure deficiencies (von Braun &

Gatzweiler, 2014). Thus, the integration of poverty concepts with those of social exclusion, geography, and ecology is needed to address this problem.

There is extensive evidence on the persistence of poverty in the geographic areas of Brazil, China and Bangladesh (Ferreira & Lanjouw, 2001; Park et al., 2002; Khandker et al., 2010). A poverty persistence experience does not exclude areas located in countries with high economic growth (e.g., China, India, Indonesia, Nigeria, Peru, and Mexico). Jalan and Ravallion (2002) present several aspects that contribute to this phenomenon. One aspect is because of the role of persistent spatial concentrations of individuals with personal attributes which constrain their welfare improvement. This would cause identical individuals that have the same opportunity to grow wherever they live. This model is also known as the *individualistic model* (Ravallion, 1998). Another aspect is because geography plays a causal role in determining household's welfare. This means that living in a well-endowed area means that a poor household can eventually escape from poverty (known as *geographic model*).

In the individualistic model, it is important to distinguish different possibilities that may influence poverty prevalence. The first possibility is that individuals are poor because of their characteristics that make them particularly prone to poverty. These characteristics may be observed (e.g., educational attainment, health conditions, household welfare) or unobserved (e.g., lack of motivation, ability, unfavorable behaviors). These characteristics may persist over time and increase the probability of being poor in the future. Another possibility is that poverty conditions in one period have a causal effect on future poverty, due to the depreciation of human and physical capital stocks. This mechanism is usually called the true state dependence effect. There are several examples of state dependence effects: a poverty experience that is connected to demoralization, a loss of motivation or a depreciation of human capital. These effects could increase the risk of future poverty. Another example is if the poverty experience is associated with having many connections with 'bad' contacts, which may lead to drug/alcohol problems or have detrimental effects on the quality of job opportunities available (Biewen, 2009). These different possibilities imply different policy recommendations. If the persistence of poverty is due to a state dependence effect, then it makes sense to focus on efforts to help households out of poverty in order to reduce their probability of being poor again in the future.

In the case of an insignificant effect of state dependence, which means the persistence of poverty is only due to the household's unobserved characteristics, any policy aimed at helping households out of poverty (e.g., cash/in-kind transfer) does not reduce their chance of experiencing poverty in the subsequent periods. Hence, in this paper, we analyze the poverty dynamics by examining the true state dependence effect, while allowing for the presence of a household's unobserved characteristics.

In the geographic model, geography has a causal role in determining a household's welfare. Hence, it is important for policy makers to better understand the role of geographic factors in growth prospects and poverty prevalence (Engerman and Sokoloff, 1998). Indonesia's geographic diversity, including the unequal spatial distribution of geographic and community endowments that comes from publicly provided goods (e.g., public services and community infrastructure), makes an appropriate case to analyze the existence of geographic poverty traps. Therefore, this paper focuses on the roles of geographic capital in the form of public infrastructure and services in a community on poverty prevalence, especially in rural areas, where the infrastructure and public services are still lacking.

The next section presents the literature review related to the state dependence of poverty and specific studies about poverty in Indonesia. Section 2.3 describes the data used in the analysis and the descriptive statistics of the main variables. Section 2.4 discusses the methods used to capture poverty persistence. Section 2.5 presents the estimation results and the last section concludes the chapter.

2.2. Literature Review

Poverty dynamics have commonly been analyzed in three ways: 1) income or consumption models with a lag structure of the error terms (e.g., Lillard & Willis, 1978), 2) probabilities of ending poverty (Bane & Ellwood, 1986; Stevens, 1994), and 3) approaches to separate chronic and transient poverty (Hulme & Shepherd, 2003; Jalan & Ravallion, 2000). Many studies exist on poverty dynamics in developing countries, such as South Africa (Aliber, 2003), Uganda (Deiniger & Okidi, 2003), Cote d'Ivoire (Grootaert & Kanbur, 1995), Egypt (Haddad & Ahmed, 2003), India (Krisna, 2004), Ethiopia (Dercon and Krishnan, 2000), Argentina

(Cruces and Wodon, 2003), Bangladesh (Sen, 2003), Kenya and Madagascar (Barret et al., 2006). Most of these studies focus on the mobility in the poverty status. They attempt to distinguish chronic from transient poverty and did not take into account the issue of unobserved heterogeneity and the state dependence effect.

Few papers have analyzed the issue of unobserved heterogeneity, the state dependence effect in poverty or the issues of the endogeneity of the initial conditions (Stevens, 1999; Cappellari and Jenkins, 2002). Alem (2015) applies a dynamic probit model to analyze the persistence of poverty. The results revealed that there is a statistically strong state dependence in poverty in urban Ethiopia. Alem also analyzes the occupational and demographic characteristics of all household members that were found to have important roles in determining poverty. Bigsten and Shimeles (2008) explore the persistence of poverty in both urban and rural Ethiopia. They did not control for the initial conditions problem, as in Alem (2015). They found a slightly higher coefficient for the state dependence variable.

More studies have been conducted on the state dependence in poverty in developed countries, as opposed to developing countries. Arranz and Canto (2010) examine poverty exit and re-entry rates in Spain and found that the rates varied according to personal or household characteristics, spell accumulations and the duration of past spells. Their results indicate the importance of duration dependence. Giraldo et al. (2002) presents no evidence of a significant effect of the true state dependence in poverty using panel data from an Italian household income and wealth survey. Their analysis reveals that the length of a panel does not make any significant difference for the degree of dependence between the states during the different time periods.

A few studies about poverty in Indonesia exist. However, most of these studies focus on static poverty (Bidani and Ravallion, 1993; Suryahadi et al., 2009). The dynamics of poverty have not been widely explored in Indonesia. Suryahadi and Sumarto (2001) use cross-sectional data to estimate poverty and vulnerability in Indonesia before and after the 1997-1998 crisis. They found that the level of poverty and vulnerability increased after the crisis. Much of the increase was due to an increase in chronic poverty. Alisjahbana and Yusuf (2003) use panel data (1993 and 1997) to explore the factors that explain chronic and transient poverty. They found that the

education of a household head, the assets, and the household demographics significantly contributes to the prevalence of chronic and transient poverty.

Dartanto and Nurkholis (2011) examine the determinants of poverty dynamics using panel data for the years of 2005-2007. They find that 28% of poor households were classified as poor (remained poor in the two time periods), while 7% of non-poor households are vulnerable to being transient poor. Dewi and Suryahadi (2014) study poverty dynamics in Indonesia and assess its impact on the efficiency of the poverty program's targeting. They use panel data from Susenas (National Socio Economic Survey) for the years of 2008-2010. They found that there is a high level household poverty dynamics in Indonesia. This leads to the inefficient targeting of poverty programs, particularly in terms of the inability of the poor to access poverty programs. These previous studies do not focus on the measure of the state dependence in poverty or the effects of the geographic/community's endowments.

This paper attempts to fill the gap by analyzing the dynamics of poverty prevalence in Indonesia by focusing on a state dependence approach. We also investigate the role of geographic/community endowments in explaining the prevalence of poverty that has been scarcely explored.

2.3. Data & Descriptive Statistics

2.3.1. Provincial differences in poverty prevalence, access to health, education, and infrastructure facilities

To provide an overview of the inequality in geographic capital and endowments across Indonesia, we analyze the provincial differences in poverty prevalence and access to infrastructure, health, and education facilities.

Figure 2.1 illustrates the large range of poverty rates in the Indonesian provinces. The poverty rates in the eastern islands of Indonesia are about eight times that of the rates in Jakarta/Bali. Several provinces have poverty rates that are three times that of the rates in the other provinces in the same regions. For example, the Bangka Belitung islands has a poverty rate of 5.37%, while Bengkulu has a poverty rate of 17.5%.

Figure 2.1 Indonesian map and poverty map of Indonesia

Source: Own calculation based on Susenas (2012)

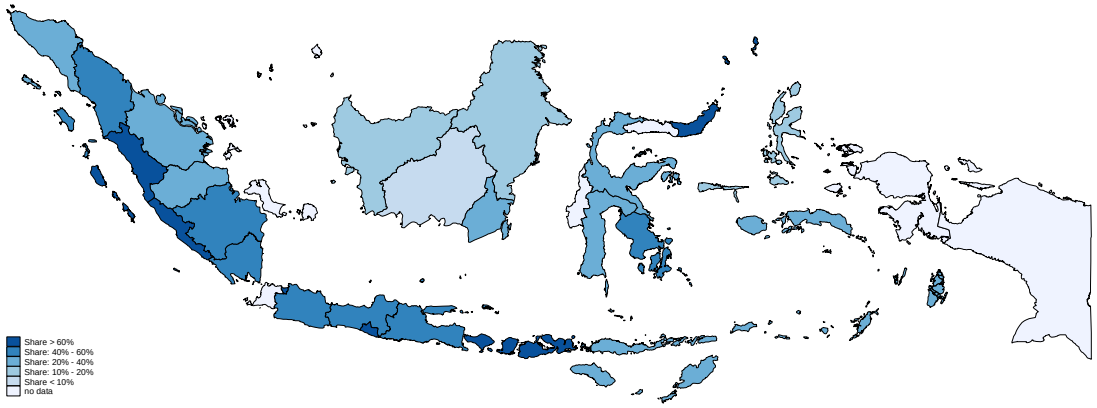
To see the gaps in access to health, education and infrastructure facilities across the provinces, we also use a village census that contains information about the availability of infrastructure, health, and educational facilities in a village. The census was conducted three times every ten years, from 1983 to 2011. We use data from 1990 and 2008 to capture the time period used in the regression analysis. The village census recorded information from 67,515 villages in 1990 and 75,410 villages in 2008.

Figure 2.2 presents a provincial map with the share of villages that had access to paved roads in each province. In 1990, 10% of the villages in Central Kalimantan and West Kalimantan had paved main roads. The share of paved roads in most

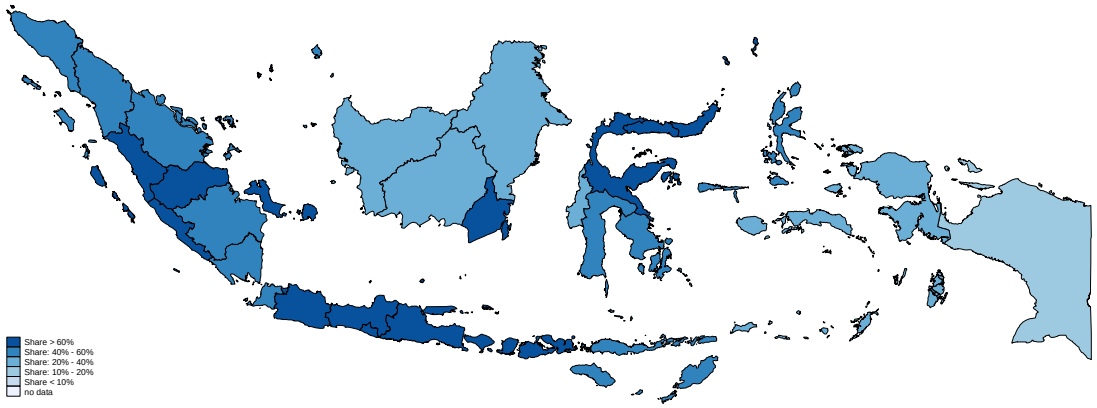
provinces in Java was 50 percent or more. The discrepancies are very apparent in both years, although there have been some noticeable improvements between 1990 and 2008. More provinces have a higher share of villages with access to paved roads in 2008. Improvements are concentrated in Java and Sumatera Island. Nevertheless, the gap remains large. In 2008, the lowest share was Papua, with only 13% of villages having access to a paved road. In the other part of the country, more than three quarters of the villages in Java had access to paved roads.

Figure 2.2 Shares of villages with access to paved roads

1990



2008

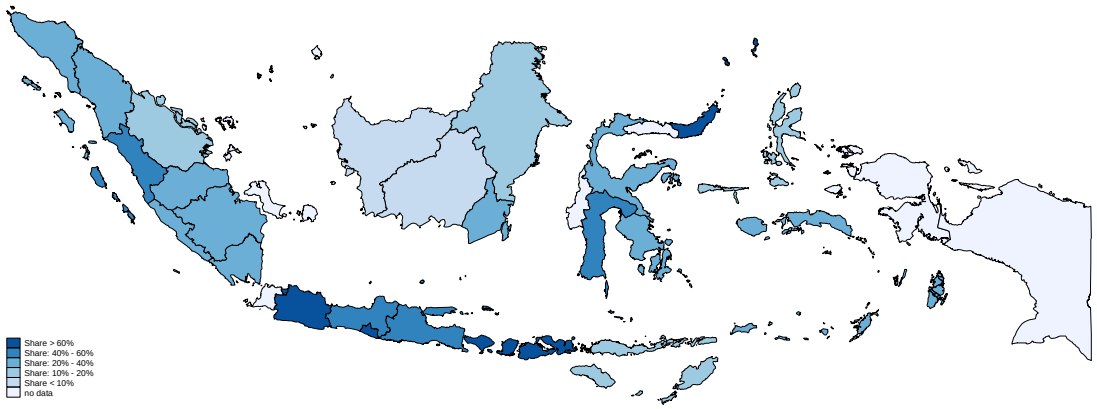


In 1990, three provinces in Kalimantan (west, central, and east) had the lowest average (less than 10%) of household shares with electricity in a village (Figure 2.3). In the meanwhile, all provinces in Java, Bali, and West Nusa Tenggara had at least a 50% share of villages with access to electricity. There have been many

improvements in the access to electricity in the past few decades. In 2008, some provinces in Sulawesi and Kalimantan and almost all provinces in Java, Bali, Sumatera have the average household shares with access to electricity about 90 percent or higher. While in the other part Indonesia, only less than half of population in each village in West Sulawesi, Riau, East Nusa Tenggara, and Papua had access to electricity.

Figure 2.3 Average household shares with access to electricity

1990

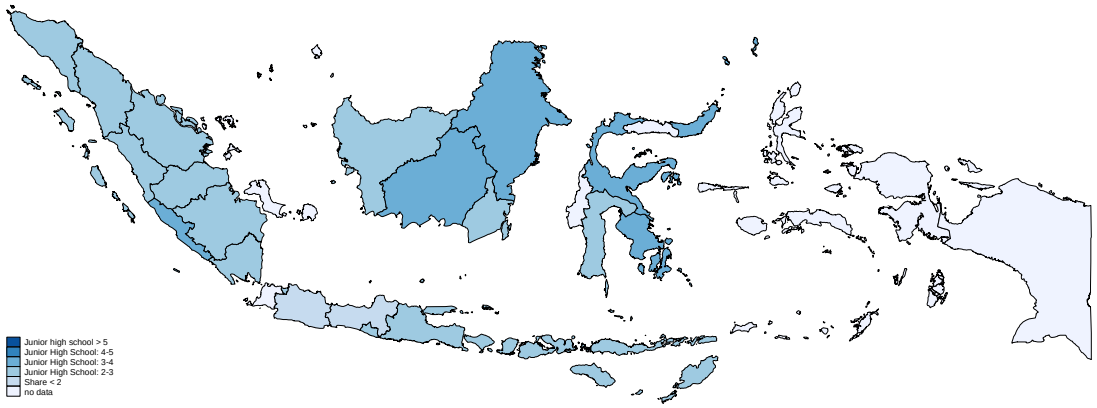


2008

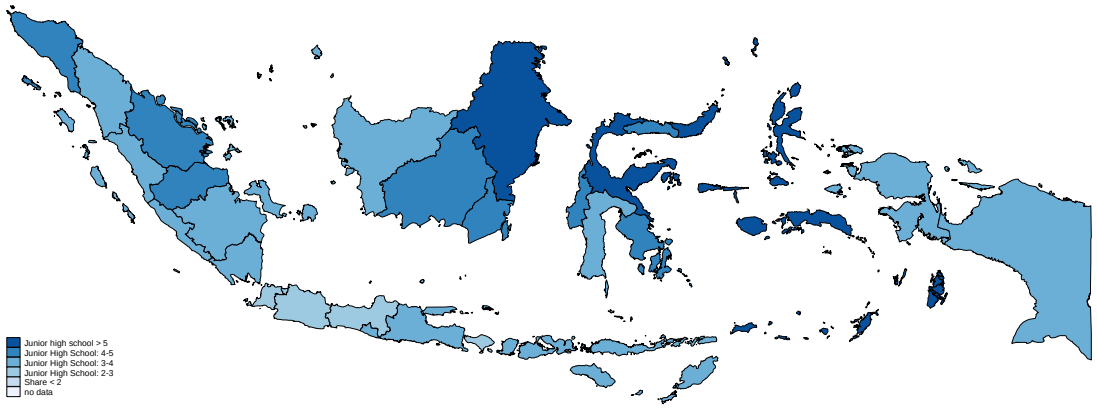
Figure 2.4 shows that the discrepancies in the number of junior high schools per 1000 students across the provinces in 1990 was not large. The lowest number was 1.5 in West Java and the highest was 3.6 in Central Sulawesi. In 2008, most of the provinces in Java had a low number of less than 3 junior high schools per 1000 (junior-high-school-aged students). Maluku, North and West Sulawesi, and East Kalimantan had a higher number of junior high schools per 1000 students (more than 5 schools per 1000 students). The low number of junior high schools in Java in recent years is not surprising, considering the large numbers of people migrating to the Java islands and the urbanization in the past few decades.

Figure 2.4 Number of junior high schools per 1000 students

1990



2008

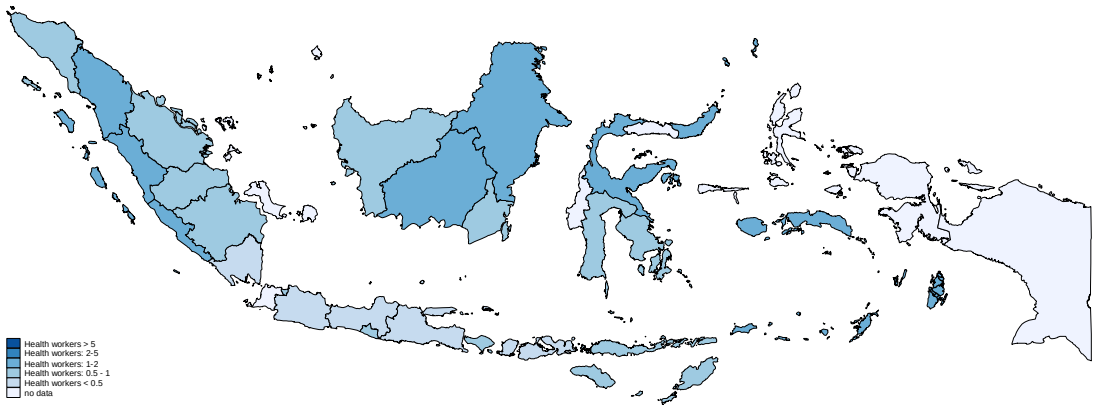


The average number of health staff per 1000 people in each province, in general, was very low, considering it includes physicians, nurses, and other paramedics. In 1990, the average was 0.4 to 1.6 health staff per 1000 people. Lampung and West Java had

the lowest number of health staff per 1000 people with 0.4. North Sulawesi had the highest number with 1.6. In 2008, some provinces had a higher number of health staff (e.g., Aceh, Maluku, North Sulawesi, Papua), while some provinces, especially in Java, experienced deteriorating numbers of health staff (Figure 2.5). This is again due the increased population in Java in the past few decades.

Figure 2.5 Number of health staff per 1000 people

1990



2008

Provincial differences in access to infrastructure, health, and educational facilities, in general, illustrate that the largest gaps are found in the Papua region, Maluku islands, Nusa Tenggara and the remote areas of Kalimantan and Sulawesi.

2.3.2. Data for the Regression Analysis

The dataset for the regression analysis in this paper was obtained from the Indonesia Life Family Survey (IFLS). The IFLS is a longitudinal socioeconomic and health survey of individuals, households, communities, and facilities. The survey was conducted in 1993, 1997, 2000, and 2007. The IFLS collects data on individuals, households, the communities in which they live, and the community's endowments, such as economic development and the infrastructure facilities they use or have access to. The IFLS is particularly suitable to examine a household's persistence and the dynamics of poverty. It is also good for exploring possible community, household, and individual characteristics contributing to the observed poverty status, since it recorded both the household panel data and the geographic/community data needed for this particular analysis.

The IFLS is a longitudinal dataset with very low attrition rates. 94% of households that were interviewed in the first wave in 1993 (7,224 households) were re-interviewed in the second wave in 1997. The re-contact rates remained high for the third and fourth waves, with 95% and 92% rates, respectively. The IFLS samples represent 83% of the Indonesian population in 1993. 13 out of 27 provinces were included in the sample. The provinces were selected to maximize the representation of the Indonesian population and capture the heterogeneity in the cultural and socioeconomic conditions. Some far eastern provinces (East Nusa Tenggara, East Timor, Maluku, and Irian Jaya) were excluded for cost-effectiveness reasons.

The IFLS randomly selected 321 enumeration areas in the 13 provinces using a 1993 Susenas (National Socio-economic Survey) sampling frame. The Susenas frame was designed by the BPS (Central Bureau of Statistics) and was based on the National Census in 1990. Using this frame, the Javanese who account for more than 50% of the total population proportionally dominated the IFLS sample.

To measure poverty, we use monthly consumption expenditures and national poverty lines, defined by the BPS as a reference line.[1] The definition of consumption used in the dataset incorporates both food and non-food components. Data on food

[1] An individual is considered poor if his/her monthly per capita expenditures are below the national poverty line. The Indonesian poverty line is determined by the BPS (Badan Pusat Statistik, Statistics Indonesia) and is based on the average of what the poor spend on different kinds of food to reach 2,100 calories per day and non-food items to cover the costs of housing, clothing, education and health care. The poverty line takes into account the variation of prices across the regions.

expenditures were recorded for 38 food items purchased during the week prior to the interview. Data on non-food expenditures were recorded during the month prior to the interview and covered household goods (e.g., electricity, water, education, health, communications & transportation). Table 2.1 illustrates the descriptive statistics of the main variables used in the regression analysis.

Table 2.1 Summary statistics

Variable	N	Mean	Std. Dev	Min	Max
Household characteristics:					
Own a farm business (binary)	10654	0.56	0.50	0	1
Own a non-farm business (binary)	10658	0.29	0.45	0	1
Number of farm business assets	10658	1.68	2.29	0	10
Number of non-farm business assets	10658	0.23	0.58	0	5
Age of household head	10656	49.25	13.60	15	105
Education of household head: Primary school completed	10658	0.20	0.40	0	1
Education of household head: High school (or higher) completed	10658	0.03	0.16	0	1
Village/Community characteristics:					
Availability of paved main road (binary)	10658	0.63	0.48	0	1
Availability of piped water (binary)	10658	0.78	0.41	0	1
Number of health care services provided in the community health center	10635	28.39	10.86	6	70
Distance to nearest terminal	10633	6.88	9.69	0	110
Distance to the provincial office	10446	145.98	111.01	0.45	900
Availability of high school (binary)	10658	0.81	0.39	0	1
Ever experienced disruptions in pipe water service in the past year (binary)	10658	0.11	0.31	0	1
Share of population in a village with access to electricity	10617	66.59	32.20	0	100
Availability of technical (non-primitive) irrigation system in the village	9694	0.37	0.48	0	1
Measure of ethnic diversity (ELF)	10658	0.07	0.14	0	0.70
Resides in Sumatera	10658	0.20	0.40	0	1
Resides in Java	10658	0.62	0.48	0	1
Resides in Kalimantan	10658	0.05	0.21	0	1
Resides in Sulawesi	10658	0.05	0.22	0	1
Resides in Nusa Tenggara	10658	0.08	0.27	0	1

Source: Own calculations using IFLS data.

We utilize household and household head characteristics (e.g., age, education). We also utilize whether the household owns a farm business (e.g., owns land for farming and has a title of ownership), non-farm business, farm business assets (e.g., hard stem plants, such as coconut, coffee, cloves, rubber), house/building used for a farm business, vehicles (e.g., motor bikes, cars, trucks, water vehicles, tractors), heavy equipment (e.g., farming machinery, generators), and non-farm business assets (e.g., land, buildings, four-wheel vehicles, other vehicles, other non-farm equipment). The descriptive statistics show that more than half of the surveyed households own a farm business. Agriculture sector still dominates in rural areas. Only 3% of household head attained high school or higher. Numbers of farm business and non-farm business assets vary with the average 1.68 and 0.23 respectively.

Furthermore, we analyze public services and community infrastructure variables: predominant type of road in the village (e.g., paved or non-paved), water source (e.g., pipe water) in the village, number of services provided by the community health center in the village (e.g., outpatient, inpatient, dental, prenatal, childbirth, health check-up), the availability of a high school in the village, disruptions in pipe water services in the past year, the share of the village population with access to electricity, and the availability of a technical (non-primitive) irrigation system. The distance from the office of the head of the village to the nearest terminal and provincial capital center, as well as a control for ethnic diversity, are also included.[2] 63% of the surveyed households reside in a village with paved main road. Only 37% of the surveyed households reside in a village with technical/non-primitive irrigation system. Number of health care services provided in the community health center varies from 6 to 70 with the average 28. Share of population in a village with access to electricity also varies from 32 to 100 with the average 66 %.

[2] We use ELF (ethno linguistic fractionalization) as a Herfindahl index to control for the ethnic diversity measure. ELF measures the fragmentation of the probability that two randomly drawn individuals from the unit of observation belong to two different groups/ethnics (Easterly and Levine, 1997).

2.4. Estimation Strategy

2.4.1. State dependence and covariates of poverty

The current state of poverty is modeled as a function of poverty in the previous period using a dynamic probit model with an unobserved effect:

$$p_{ict} = \alpha p_{ict-1} + \beta x_{ict} + \delta z_{ct} + \gamma_{ic} + \varepsilon_{ict} \quad (1)$$

where p_{ict} is the poverty status of household i , who lives in community c at time t. p_{ict} is equal to one if the household is poor or if the household's consumption is less than the poverty line. p_{ict} is equal to zero if the household is not poor. x_{it} is a vector of the household's explanatory variables. z_{ct} is the community/village characteristics and ε_{ict} is the error term. α is the parameter that is included with the aim of representing the true state dependence; it indicates that the current poverty status causes the future likelihood of being poor or a higher risk to continue living in poverty. γ_{ic} denotes the household's time invariant unobserved characteristics that may influence the likelihood of poverty. These characteristics could include the motivation, ability, or behavior of the households that are unobserved and the time invariant that influences their poverty status.

One important concern in our model is the potential endogeneity due to households choosing their community or place of residence. In the case of Indonesia, as in many other developing countries, mobility is not without any costs. Even though migration is administratively possible, it has both huge direct and opportunity costs. The direct cost is borne by Indonesia's geographic barriers that imply high transportation costs and the limited mobility of the households. The opportunity costs relate to the previous sources of income, as well as the economic returns to the business assets left in the place of origin.

Furthermore, even though Indonesia is recognized as one of the world's major sources of unskilled migrant workers to the Southeast countries (Hugo, 2005; Sukamdi and Brownlee, 1998), internal migration in Indonesia is dominated by the rural to urban migration, where the largest cities (e.g., Jakarta, Surabaya, Bandung, or province's capital city) are the main destinations (Muhidin, 2002; Lu, 2008). In addition, the migration status is usually defined at the individual level, not at the

household level. Therefore, it is not common to see all household members move from one rural area to another.

Another concern that may rise in our specification is the ethnic diversity variable, which has been known in the literature to have an effect on economic growth (Easterly and Levine, 1997; Alesina et al., 2003; Goeren, 2014) and the provision of public goods (Miguel and Gugerty, 2005; Habyarimana et al., 2007). Our preliminary investigations do not find a significant negative association between ethnic diversity and the public services/community infrastructure variables used in the analysis. We include the Ethnolinguistic Fractionalization/ELF variable as a measure of ethnic diversity to control for this. Moreover, the method used in the analysis has captured the time-invariant unobserved household heterogeneity that may influence the household's behavior, due to the effect of ethnic diversity.

Apart from the concern of endogeneity and the time invariant unobserved household's characteristics, the main problem in the dynamic poverty model, as in Equation (1), is that the household's poverty status in the initial period may be influenced by an earlier poverty history. In addition, the poverty status in the initial period may be correlated with the unobserved characteristics that contribute to poverty. The unobserved factors could be related to the motivation, abilities, parental effect, community and social network that can influence the poverty status at $t = 0$.

A random effect probit model assumes the initial condition to be exogenous. Therefore, it will result in inconsistent estimates in our model. There are several alternative methods available to tackle this problem. They include the Heckman (1981) and Woolridge (2005) methods. This study applies the latter method; this method will be explained in the following sub-section.

2.4.2. Woolridge's conditional maximum likelihood estimator

To take care of the initial condition problem in the dynamic non-linear panel data model, Woolridge (2005) proposed a model of the distribution of the unobserved conditional effect on the initial value and any exogenous explanatory variables.

Assume that:

$$\gamma_{ic}|p_{i1}, \boldsymbol{x}_i, \boldsymbol{z}_c \approx N(\partial_0 + \partial_1 p_{i1} + \partial_2 \boldsymbol{x}_i + \partial_3 \boldsymbol{z}_c, \sigma_u^2 \quad (2)$$

Therefore, if we write:

$$\gamma_{ic} = \partial_0 + \partial_1 p_{i1} + \partial_2 \boldsymbol{x}_i + \partial_3 \boldsymbol{z}_c + u_i \quad (3)$$

where $u_i|(p_{ic1}, \boldsymbol{x}_i, \boldsymbol{z}_c)$~Normal(0, σ_u^2) then p_{ict} given $(p_{ict-1}, \dots, p_{ic1}, \boldsymbol{x}_i, \boldsymbol{z}_c, \gamma_{ic})$ follows the probit model with a response probability:

$$\Phi(\beta x_{ict} + \alpha p_{ict-1} + \delta z_{ct} + \partial_0 + \partial_1 p_{i1} + \partial_2 \boldsymbol{x}_i + \partial_3 \boldsymbol{z}_c + u_i + \varepsilon_{ict}) \quad (4)$$

By plugging γ_{ic} of Equation (3) into Equation (1), we get:

$$p_{ict} = \alpha p_{ict-1} + \beta x_{itc} + \delta z_{ct} + \partial_0 + \partial_1 p_{i1} + \partial_2 \boldsymbol{x}_i + \partial_3 \boldsymbol{z}_c + u_i + \varepsilon_{ict} \quad (5)$$

With this, γ_{ic} can be integrated out from the equation and the correlation between p_{i1} and γ_{ic} is alleviated. This results is a new unobservable term u_i that is uncorrelated with the initial value of the dependent variable p_{i1}.

The density of $(p_{ic1}, \dots, p_{icT})$ given $(p_{ic1} = p_1, \boldsymbol{x}_i = \boldsymbol{x}, \boldsymbol{z}_c = \boldsymbol{z}, u_i = u)$ is:

$$\prod_{t=1}^{T} \{\Phi(\alpha p_{ct-1} + \beta x_{tc} + \delta z_{ct} + \partial_0 + \partial_1 p_1 + \partial_2 \boldsymbol{x} + \partial_3 \boldsymbol{z}_c + u)^{p_t} \times [1 - \Phi(\alpha p_{ct-1} + \beta x_{tc} + \delta z_{ct} + \partial_0 + \partial_1 p_1 + \partial_2 \boldsymbol{x} + \partial_3 \boldsymbol{z}_c + u)]^{1-p_t} \quad (6)$$

Integrating Equation (6) against the Normal (0, σ_u^2) density yields a density with the same structure as the standard random effects probit model with an explanatory variable at time t that now includes $(\boldsymbol{x}_{tct}, p_{ict-1}, p_{i1}, \boldsymbol{z}_{ct}, \boldsymbol{x}_t, \boldsymbol{z}_c)$.

2.5. Discussion of the Results

In this section, we discuss the estimation results for the model specified in the previous section. We start by employing the standard probit model without the lagged poverty to see the relationship between the likelihood of poverty and our covariates (Table 2.2, Column 1). The household and household head characteristics (e.g., owning a farm/non-farm business, having more assets, and being a household

head that is educated) are shown to have negative association with the likelihood of poverty.

Residing in a village that has access to pipe water, a non-primitive irrigation system, and a higher share of the population with access to electricity is associated with a lower probability of being poor. Disruptions of pipe water services and being a larger distance away from a provincial office are associated with a higher probability of being poor. Residing in Sumatera, Java, Bali, and Kalimantan means that a household is less likely to experience poverty than a household in Nusa Tenggara. This result is in line with the current Indonesian poverty map, where Nusa Tenggara has higher poverty rates than the other regions in Western Indonesia.

To see the relationship between the previous and current status of poverty, Table 2.2 column (2) presents the results where the lagged poverty is included in the regressors. A significant coefficient of a lagged poverty variable suggests that a previous experience of being in poverty has a statistically significant relationship with the current status of poverty. Other covariates generally illustrate consistent findings with the results in Column (1), but with a slightly different level of magnitudes.

Columns 3 and 4 present the estimation results using a standard random effect probit and a Wooldridge conditional maximum likelihood, respectively. Compared to the random effect estimator, the coefficient of the lagged poverty for the Wooldridge estimator declined from 0.83 to 0.71, but was still statistically significant at the 1% level.

Table 2.2 Determinants of poverty – Pooled probit, random effect, and Wooldridge estimator

	Pooled Probit		Random Effect	Wooldridge
	(1)	(2)	(3)	(4)
Poverty status in t = 1 (1993)				0.459***
				(0.09)
Lagged poverty		0.833***	0.832***	0.717***
		(0.05)	(0.07)	(0.07)
Own a farm business	-0.066*	-0.110**	-0.114**	-0.218***
	(0.04)	(0.04)	(0.04)	(0.06)
Own a non-farm business	-0.128***	-0.103**	-0.106**	-0.077
	(0.04)	(0.05)	(0.05)	(0.07)
Number of farm business assets	-0.054***	-0.034**	-0.033**	-0.024
	(0.01)	(0.01)	(0.01)	(0.02)
Number of non-farm business assets	-0.196***	-0.188***	-0.184***	-0.315***
	(0.04)	(0.04)	(0.04)	(0.09)
Age of household head	-0.007	-0.023**	-0.022**	-0.018
	(0.01)	(0.01)	(0.01)	(0.01)
Age of household head squared	0	0.000**	0.000**	0
	(0)	(0)	(0)	(0)
Education of household head: Primary school completed	0.093**	0.06	0.056	0.012
	(0.05)	(0.05)	(0.06)	(0.08)
Education of household head: High school (or higher) completed	-0.638***	-0.404**	-0.402**	-0.311
	(0.15)	(0.17)	(0.17)	(0.25)
Measure of ethnic diversity (ELF)	-0.879***	-0.466***	-0.461***	-0.366
	(0.15)	(0.17)	(0.18)	(0.24)
Availability of paved main road	-0.012	0.033	0.035	0.078
	(0.04)	(0.05)	(0.05)	(0.07)
Availability of piped water	-0.085*	-0.111*	-0.110*	-0.097
	(0.05)	(0.06)	(0.06)	(0.09)
Number of health care services provided in the community health center	0.004	0.005	0.005	0.005
	(0)	(0)	(0)	(0)
Distance to the provincial office	0.001***	0.000**	0.000*	0.001**
	(0)	(0)	(0)	(0)
Availability of a high school	-0.023	0.037	0.037	0.288
	(0.05)	(0.08)	(0.08)	(0.2)

Continued

Continued

	Pooled Probit		Random Effect	Wooldridge
	(1)	(2)	(3)	(4)
Ever experienced disruptions in pipe water service in the past year	0.176***	0.232***	0.226***	0.157*
	(0.06)	(0.06)	(0.06)	(0.09)
Share of population in a village with access to electricity	-0.004***	-0.003***	-0.003***	0
	(0)	(0)	(0)	(0)
Availability of a technical (non-primitive) irrigation system in the village	-0.223***	-0.134***	-0.137***	-0.187***
	(0.04)	(0.05)	(0.05)	(0.07)
Resides in Sumatera	-0.194***	-0.185**	-0.201**	-0.196*
	(0.07)	(0.08)	(0.09)	(0.11)
Resides in Java/Bali	-0.193***	-0.144*	-0.167**	-0.235**
	(0.06)	(0.07)	(0.08)	(0.11)
Resides in Kalimantan	-0.316***	-0.347***	-0.368***	-0.446***
	(0.1)	(0.12)	(0.12)	(0.17)
Resides in Sulawesi	-0.078	-0.028	-0.051	-0.667***
	(0.09)	(0.11)	(0.11)	(0.19)
Year dummies	Yes	Yes	Yes	Yes
Intercept	-0.543**	-0.645**	-0.652**	-1.398***
	(0.25)	(0.31)	(0.3)	(0.45)

*Notes: Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for the year dummy are not reported in the table.*

The Wooldridge estimation results yield a lower coefficient (and marginal effect) for the lagged dependent variable than the dynamic random effect probit model (Table 2.3). The marginal effect of the state dependence parameter declines from 0.16 to 0.11. This means that after controlling for the initial conditions problem, a household who has been poor has an 11% higher probability of being poor in the next period. The marginal effect of the initial state of poverty (in 1993) is 0.07 and statistically significant at the 1% level. Compared to the residents in Nusa Tenggara, residents in other provinces included in the analysis framework (e.g., Sumatera, Java/Bali, Kalimantan, and Sulawesi) are less likely to be in poverty.

Other significant covariates of poverty include owning a farm business, number of non-farm-business assets, disruptions of piped water services in a village, and the availability of a technical irrigation system. Our results reveal the importance of access to technical (non-primitive) irrigation systems for rural households who are

mostly working in the agricultural sectors. Residing in a village which has a proper technical irrigation system decreases the probability of being poor by about 2-3%.

Table 2.3 Coefficients and marginal effects – Random effect and Wooldridge estimator

	Random Effect		Wooldridge	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Poverty status in t = 1 (1993)			0.459***	0.071***
			(0.09)	(0.01)
Lagged poverty	0.832***	0.165***	0.717***	0.111***
	(0.07)	(0.02)	(0.07)	(0.02)
Own a farm business	-0.114**	-0.022**	-0.218***	-0.034***
	(0.04)	(0.01)	(0.06)	(0.01)
Own a non-farm business	-0.106**	-0.021**	-0.077	-0.012
	(0.05)	(0.01)	(0.07)	(0.01)
Number of farm business assets	-0.033**	-0.007**	-0.024	-0.004
	(0.01)	(0)	(0.02)	(0)
Number of non-farm business assets	-0.184***	-0.036***	-0.315***	-0.049***
	(0.04)	(0.01)	(0.09)	(0.01)
Age of household head	-0.022**	-0.004**	-0.018	-0.003
	(0.01)	(0)	(0.01)	(0)
Age of household head squared	0.000**	0.000**	0	0
	(0)	(0)	(0)	(0)
Education of household head: Primary school completed	0.056	0.011	0.012	0.002
	(0.06)	(0.01)	(0.08)	(0.01)
Education of household head: High school (or higher) completed	-0.402**	-0.080**	-0.311	-0.048
	(0.17)	(0.03)	(0.25)	(0.04)
Measure of ethnic diversity (ELF)	-0.461***	-0.091***	-0.366	-0.057
	(0.18)	(0.03)	(0.24)	(0.04)
Availability of paved main road	0.035	0.007	0.078	0.012
	(0.05)	(0.01)	(0.07)	(0.01)
Availability of piped water	-0.110*	-0.022*	-0.097	-0.015
	(0.06)	(0.01)	(0.09)	(0.01)
Number of health care services provided in the community health center	0.005	0.001	0.005	0.001
	(0)	(0)	(0)	(0)
Distance to the provincial office	0.000*	0.000*	0.001**	0.000**
	(0)	(0)	(0)	(0)
Availability of a high school	0.037	0.007	0.288	0.044
	(0.08)	(0.02)	(0.2)	(0.03)
Ever experienced disruptions in pipe water service in the past year	0.226***	0.045***	0.157*	0.024*
	(0.06)	(0.01)	(0.09)	(0.01)

(Continued)

(Continued)

	Random Effect		Wooldridge	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Share of population in a village with access to electricity	-0.003***	-0.001***	0	0
	(0)	(0)	(0)	(0)
Availability of a technical (non-primitive) irrigation system in the village	-0.137***	-0.027***	-0.187***	-0.029***
	(0.05)	(0.01)	(0.07)	(0.01)
Resides in Sumatera	-0.201**	-0.040**	-0.196*	-0.030*
	(0.09)	(0.02)	(0.11)	(0.02)
Resides in Java/Bali	-0.167**	-0.033**	-0.235**	-0.036**
	(0.08)	(0.02)	(0.11)	(0.02)
Resides in Kalimantan	-0.368***	-0.073***	-0.446***	-0.069***
	(0.12)	(0.02)	(0.17)	(0.03)
Resides in Sulawesi	-0.051	-0.01	-0.667***	-0.103***
	(0.11)	(0.02)	(0.19)	(0.03)
Year dummies	Yes	Yes	Yes	Yes
Intercept	-0.652**		-1.398***	
	(0.3)		(0.45)	

*Notes: Robust standard errors under coefficients; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for the year dummy are not reported in the table.*

The results in Table 2.3 confirm the strong evidence of the state dependence effect of poverty in rural Indonesia, as well as the role of public service and community infrastructures in the likelihood of poverty. However, one can also argue that the differences in public services and community infrastructures may cause poverty, but also that poverty itself may have the potential to drive the differences in public services and infrastructure facilities.

Consequently, we extended our analysis by using the lagged values of the public services and community infrastructures as regressors to accommodate this issue. We find that, similarly to the previous results, the likelihood of being poor is significantly associated with poverty status in the previous period (Table 2.4). The estimation results using a dynamic random effect probit model indicate that the lagged values of the availability of a paved main road in the village, share of the population with access to electricity, and the availability of technical (non-primitive) irrigation systems are negatively associated with the probability of being poor.

Furthermore, the lagged values of the distance to the nearest terminal were found to be positively related to the probability of being poor. The Wooldridge estimator

yields other significant covariates, such as the lagged values of the availability of a high school in the village and the ever-experienced disruptions in pipe water services. The marginal effect of the lagged dependent variable and the initial state of poverty are at a level that is consistent with the results in Table 2.3.

Table 2.4 Determinants of poverty using the lagged regressors

	Random Effect		Wooldridge	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Poverty status in t = 1 (1993)			0.434***	0.064***
			(0.07)	(0.01)
Lagged poverty	0.844***	0.159***	0.710***	0.105***
	(0.05)	(0.01)	(0.06)	(0.01)
Own a farm business	-0.094**	-0.018**	-0.209***	-0.031***
	(0.04)	(0.01)	(0.06)	(0.01)
Own a non-farm business	-0.135***	-0.025***	-0.096	-0.014
	(0.05)	(0.01)	(0.06)	(0.01)
Number of farm business assets	-0.017	-0.003	-0.009	-0.001
	(0.01)	(0)	(0.01)	(0)
Number of non-farm business assets	-0.208***	-0.039***	-0.371***	-0.055***
	(0.04)	(0.01)	(0.09)	(0.01)
Age of household head	-0.019**	-0.004**	-0.014	-0.002
	(0.01)	(0)	(0.01)	(0)
Age of household head squared	0.000**	0.000**	0	0
	(0)	(0)	(0)	(0)
Education of household head: Primary school completed	0.053	0.01	0.036	0.005
	(0.05)	(0.01)	(0.07)	(0.01)
Education of household head: high school (or higher) completed	-0.347**	-0.065**	-0.158	-0.023
	(0.15)	(0.03)	(0.2)	(0.03)
Measure of ethnic diversity (ELF)	-0.485***	-0.091***	-0.252	-0.037
	(0.17)	(0.03)	(0.23)	(0.03)
Lagged of :				
Availability of paved main road	-0.107***	-0.020***	-0.112*	-0.017*
	(0.04)	(0.01)	(0.06)	(0.01)
Availability of piped water	-0.058	-0.011	-0.081	-0.012
	(0.05)	(0.01)	(0.08)	(0.01)
Number of health care services provided in the community health center	0	0	0.009	0.001
	(0)	(0)	(0.01)	(0)
Distance to the nearest terminal	0.006**	0.001**	-0.004	-0.001
	(0)	(0)	(0)	(0)

(Continued)

(Continued)

	Random Effect		Wooldridge	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Distance to the provincial office	0	0	0.000*	0.000*
	(0)	(0)	(0)	(0)
Availability of high school	-0.04	-0.007	-0.261***	-0.039***
	(0.05)	(0.01)	(0.09)	(0.01)
Ever experienced disruptions in pipe water service in the past year	0.042	0.008	0.158*	0.023*
	(0.07)	(0.01)	(0.09)	(0.01)
Share of population in a village with access to electricity	-0.001*	-0.000*	-0.001	0
	(0)	(0)	(0)	(0)
Availability of technical (non-primitive) irrigation system in the village	-0.127***	-0.024***	-0.127*	-0.019*
	(0.05)	(0.01)	(0.07)	(0.01)
Resides in Sumatera	-0.285***	-0.053***	-0.296***	-0.044***
	(0.09)	(0.02)	(0.11)	(0.02)
Resides in Java/Bali	-0.297***	-0.056***	-0.371***	-0.055***
	(0.08)	(0.01)	(0.1)	(0.01)
Resides in Kalimantan	-0.483***	-0.091***	-0.530***	-0.078***
	(0.12)	(0.02)	(0.16)	(0.02)
Resides in Sulawesi	-0.281**	-0.053**	-0.847***	-0.125***
	(0.12)	(0.02)	(0.19)	(0.03)
Year dummies	Yes	Yes	Yes	Yes
Intercept	-0.515*		-0.742**	
	(0.28)		(0.38)	

*Notes: Robust standard errors under coefficients; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for the year dummy are not reported in the table.*

The results imply the importance of the state dependence effect, as well as the community characteristics in poverty prevalence. In order to check the consistency of the results in our analysis, we use the alternative poverty lines as a reference to define the household's poverty status. We use two international poverty lines - $1.25PPP and $2.5PPP a day - in addition to the national poverty line as a reference. These international poverty lines are converted to a local currency using 2005 PPP and are adjusted by the CPI in 1993, 1997, 2000, and 2007.

We find that the state dependence effects are consistently statistically significant at the 1% level, but with a slightly different magnitude. The Indonesian national poverty lines were relatively lower, especially in the first three waves (1993, 1997, and 2000), than the international poverty line ($1.25 PPP a day). Hence, it is not

surprising to find the magnitude of the state dependence effects as being higher when we use $1.25 PPP (a day) as the reference (Table 2.7). The magnitude is even higher when we use a moderate international poverty line of $2.5 PPP a day. The marginal effect of the initial poverty increases from 7% to 12% when we use the international poverty line.

Table 2.5 State dependence effects using various poverty lines

	National povline		$1.25 a day (PPP)		$2.5 a day (PPP)	
	RE	WCML	RE	WCML	RE	WCML
Lagged poverty	0.164	0.110	0.205	0.151	0.285	0.250
Initial poverty		0.071		0.116		0.162

Note: All coefficients are statistically significant at the 1% level. Robust standard errors are applied in the model. The covariates are similar to the covariates in the previous tables (Table 2.3 and Table 2.4). Coefficients for covariates are not reported in the tables.

There are not many country studies on poverty dynamics using a state dependence approach, especially for analyzing data from developing countries. This is due the requirement of the use of a large set of panel data required to perform such an analysis. One study was conducted that used data from Ethiopia (Alem, 2015). In this study, a poor urban household was found to have an 8% higher probability of being poor in the next period.

The results illustrate that the state dependence effect in poverty in rural Indonesia is slightly higher than what was found in Ethiopia. Other evidence comes from Germany, a developed country (Biewen, 2009), with 8%, and Italy, another developed country (Giraldo et al., 2002), with a zero effect. However, these two studies are not directly comparable with our results, as there is a different nature of poverty in developed countries and because they measure the poverty line differently.

2.6. Conclusions

This study investigates the dynamics and persistence of poverty in rural Indonesia during the period of 1993 – 2007. To better understand the correlates of poverty, a longitudinal panel dataset was analyzed. The IFLS recorded information for household conditions and community capital in relation to where the households live and what they have access to. We use a standard dynamic random effect model and an alternative model that takes state dependence, unobserved individual heterogeneity, and the initial conditions problem into account.

We illustrate that the true state dependence in poverty is statistically significant in rural Indonesia. This means that a household's current poverty status is a substantial element that can be used to determine the household's future state of poverty. Therefore, the poverty reduction strategy is not only providing the impact for the current poverty level, it is also providing it for the future level of poverty. This finding confirms the importance of having poverty reduction strategy aimed at lifting people out of poverty like social protection programs. Social protection programs intend to promote the poor to move out of poverty and to prevent the non-poor fall in to poverty. As explained in the previous chapter that some of social protection programs can help directly lift the poor out of poverty e.g. through direct cash transfer, in-kind transfer, etc, and some can help reducing poverty through human capital accumulation e.g. through conditional cash transfer, scholarship for the poor, etc. The government of Indonesia has implemented a range of social protection programs as part of its poverty reduction strategy. It includes conditional cash transfer, subsidized rice program, scholarship for the poor, health fee waiver for the poor, microcredit program, etc.

In addition to the relevant household (e.g., having a business and assets) and household head characteristics (e.g., education of the household head), this paper points to the importance of public services and community infrastructure that plays a role in poverty prevalence. This result suggests that the targeting method may consider including these variables to determine the potential beneficiaries of social protection programs. Social protection makes the best of its course when it reaches

the neediest people. Therefore, an effective targeting method is essential in designing a social protection system in a country. The targeting indicators that have been used to determine the potential beneficiaries of social protection programs in Indonesia have mostly involved household and housing characteristics (list of indicators are presented in the appendix Table A.1 & Table A.2). In 2008, the government started to include public services and community infrastructures into PMT variables (appendix Table A.3). This study confirms the importance of these variables in determining household's poverty status. However, up to the latest version of PMT in 2008 and 2011, one variable that is found to be one of important poverty covariates in this study has not been included: availability of technical irrigation system. The PMT variables may consider including this variable as the estimation results show that residing in a village with technical irrigation system decreases the probability of being poor in rural area by about 2 - 3%.

Chapter 3. Public Spending on Education in a Decentralized Indonesia: Do the Poor Benefit?

3.1. Background

The provision of public services is often associated with governance and institutional arrangements. Decentralization, one of the most common governance reforms, has been observed to have potential in improving efficiency in public service delivery (Oates, 1972; Ahmad and Brosio, 2009; Birner and von Braun, 2015). Indonesia implemented such a reform in 2001. Indonesia's 2001 reform turned the country from one of the most centralized systems in the world to one of the most decentralized systems (Hofman and Kaiser, 2002). Consequently, the regional share in government spending has increased significantly. The responsibilities for planning, financing, and providing public services were transferred from the central government to the local governments at the district level, with expectations that local needs and preferences will be better represented. The evidence for whether decentralization plays any role in improving public service delivery, especially the public services that matter the most for the poor, is currently inconclusive (Reinikka and Svensson, 2001; Barankay and Lockwood, 2006). As such, this paper analyzes the effectiveness of decentralized public spending allocated by the local governments at the district level in improving public service delivery.

While there is a relatively large body of literature on the effectiveness of public spending on improving outcomes (Gupta, Verhoeven, and Tiongson, 2002), most of these studies are based on a cross-country analysis. This type of analysis is prone to data measurement errors and omitted variable bias from country specific historic and institutional factors that may influence public spending decisions and outcomes. This study analyzes subnational expenditures managed within the same institution and data collection setting. Therefore, the analytical framework used in this paper is less likely to suffer from omitted variable bias. Moreover, we utilized panel data, which enables us to control for subnational time invariant unobserved heterogeneity using a fixed effects approach. Another contribution of this paper lies in combining subnational budget data and household surveys for a 10 year period and, at the same

time, capturing the year when the decentralization took place for the first time. Therefore, we have a reasonably adequate observation periods after the decentralization came into force. Decentralization is a process; this process requires time to produce benefits. As such, impacts are not expected to appear after a short period of implementation; instead, long run impacts are expected.

This paper attempts to investigate the impact of decentralized public education spending allocated by local governments on secondary school net enrolment rates, transition rates to secondary school, and the number of junior secondary schools per 1000 secondary school aged children. The reason for focusing on secondary schools is because enrolment rates in primary schools in Indonesia have been stable and above 90% since the 1990s, while the rates of enrollment in secondary schools is far lower.

In 2010, two-thirds and one-half of secondary school aged children enrolled in junior and senior secondary schools, respectively. During that time, while 90 percent of children from the richest quintile continued their education to a junior secondary school, only 45% of children of the same age from the poorest households made it through Grade 7. The poor students were left behind. As such, vertical inequality across socio-economic groups exists. Horizontal inequality across regions also exists. Women aged 15-49 in West Kalimantan have completed a median of only 6 years of primary school. In the Riau islands, women in the same age group have completed the second grade of senior secondary school (11 years of schooling), on average.

Many researchers across the globe stress the importance of the continuation of an education through the secondary school level. Barro and Lee (1994) reveal that secondary school attainment plays a significant role in economic growth. Post-primary education is also confirmed as a useful means for reducing inequality, especially among wage-earners (Knight and Sabott, 1987). In general, more educated people receive better earnings and are more productive, as compared to less educated people (Psacharopoulos, 1985; Jamison and Lau, 1982).

Instead of using student test scores as an educational measure, this paper uses net enrolment rates, school transition rates, and ratio of student per school to represent education outcomes. This is due to the limitation on reliable data of student test

scores in Indonesia. Although many researchers argue that the quality of schooling, measured using student test scores, is more important and relevant of an educational measure than the quantity of schooling (Hanushek and Kimko, 2000), the quantitative measures used in this paper, especially net enrolment rates and school transition rates, have also been used in many influential studies and interpreted as credible indicators for future success in the labor market (Behrman and Birdsall, 1983; Knight and Sabot, 1987, 1990; Barro, 2001).

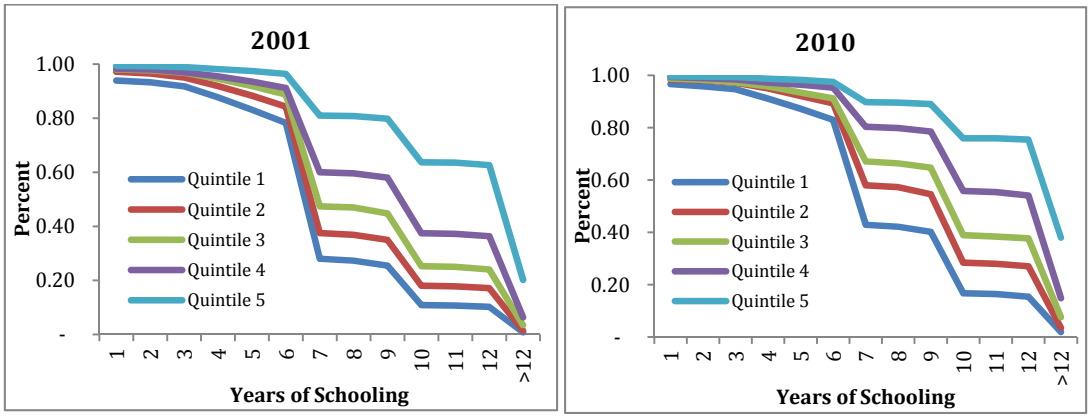
3.2 Brief Overview of the Indonesian Educational System

The government of Indonesia has committed to extend basic education for all from 6 to 9 years. This includes 6 years of primary school and 3 years of junior secondary school[3]. Students that graduate from junior secondary school can continue to regular senior secondary school or a vocational senior secondary school. Both regular and vocational senior secondary schools offer a three-year program. Regular senior secondary students who passed the national exams could continue to a tertiary education in a university for a bachelor's degree, master's degree, and/or doctoral degree. On the other hand, vocational senior secondary school prepares its graduates to enter the labor market by providing technical programs to build a specific competency unit, like engineering, technology, or business management.

Students from poor households largely drop out before finishing one educational level (Figure 3.1). The largest dropout rate occurred from the last grade in primary school (junior secondary) to the first grade in junior secondary school (senior secondary). Although we can see some improvements in educational attainment over the past decade, the gaps between the rich and the poor are increasing. In 2001, the population of people over 26 years of age who had attained at least six and nine years of education was 64% and 32%, respectively. These numbers increased to 77% and 46% in 2010. In 2001, dropout rates from Grades 9 through 10 were 55% for the poorest decile and 23% for the richest decile. In 2010, the dropout rates worsened to 57% for the poorest decile; they improved to 17% for the richest decile.

[3] National Education Law No. 2/1989.

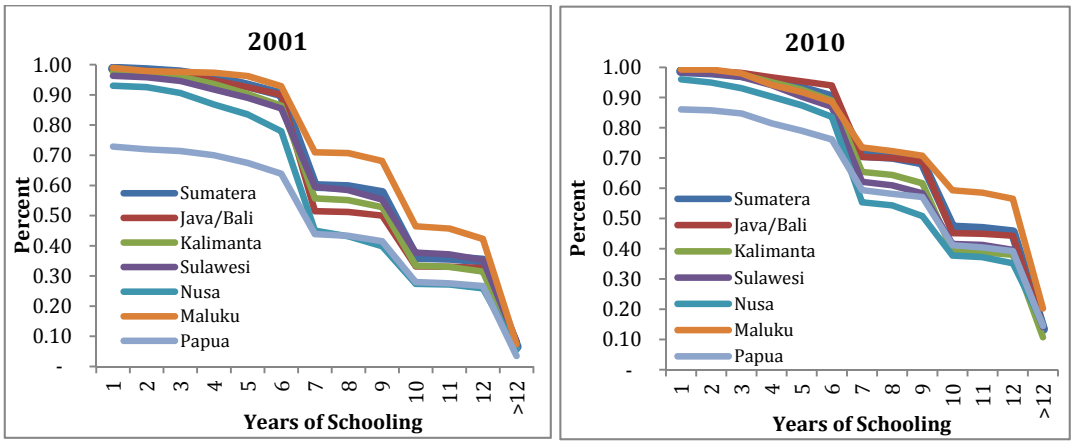
Figure 3.1 Educational attainment by quintile monthly per capita expenditures



Source: Own calculations using Susenas (Survey Sosial Ekonomi Nasional/National Socio-economic Survey), 2001 and 2010 data.

The large gap across regions in the quality and quantity of schools, and other supporting infrastructure for education, has left some regions far behind other regions in terms of educational attainment. Some improvement exists over the last decade; however, the inequality across regions in educational achievement remains high (Figure 3.2).

Figure 3.2 Educational attainment by region



Source: Own calculations using Susenas, 2001 and 2010

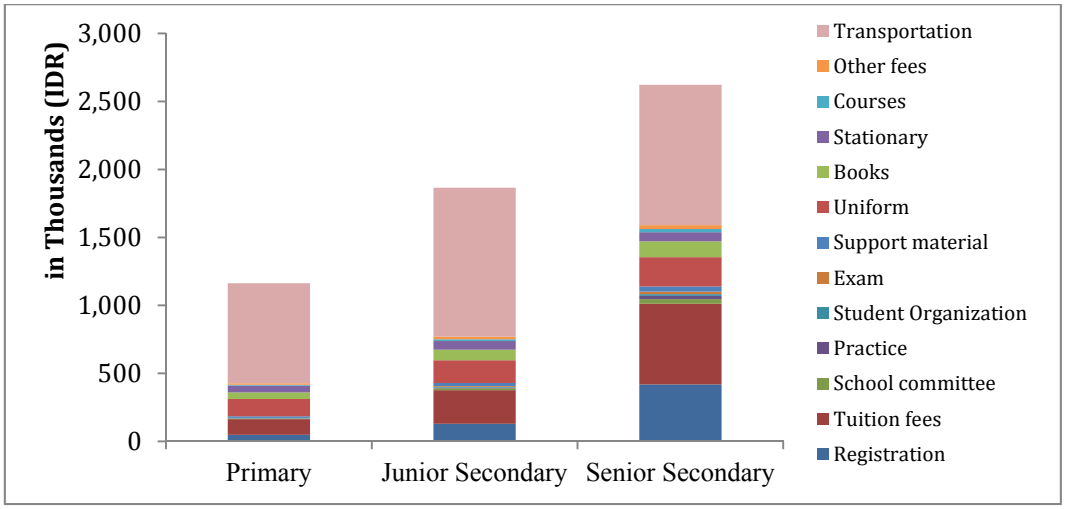
Figures 3.1 and 3.2 show that transition rates to secondary school, from Grade 6 to 7 and from Grade 9 to 10, are a serious problem in Indonesia. Therefore, in addition to the standard measure of education (e.g., net enrolment rates), we also analyze the transition rates to junior and senior secondary school as one of our dependent variables.

Although the Indonesian government has stated that compulsory basic education is free for all of its citizens, schools still charge various fees to parents. The educational module of Susenas (National Socio Economy Survey) in 2009 recorded household expenditures on education that covers fees charged by schools and other related costs in accessing an education. These out-of-pocket costs are important educational barriers for poor households.

Figure 3.3 illustrates that the average annual educational expenditures for a primary, a junior, and a senior secondary student are about IDR 1.1 million, 1.8 million, and 2.6 million, respectively. These amounts account for a significant proportion of total household expenditures. For example, educational expenditures for a junior (senior) secondary student, on average, account for a third (a half) of total household expenditures. For poor households, these amounts are simply not affordable.

Among items that are paid directly to schools, tuition and registration fees are the two biggest components, especially in junior secondary and senior secondary schools (Figure 3.3). Among all of the household expenditures on education, transportation costs to a school account for the biggest share; this value is typically much greater than the school fees.

Figure 3.3 Annual out-of-pocket costs per student



Source: Own calculations Susenas, 2009

High transportation costs to a school are possibly due to the average village distance to the school being considerably far, or not walkable, especially in the rural areas (Table 3.1). There has been little improvement in the distance from rural areas to

schools in the past decade. Rural areas have always suffered from large distances to educational facilities. The most reachable schools in rural areas are only at the primary school level. The nearest junior and senior high schools are typically not in walking distance.

Table 3.1 illustrates that the average distance to a primary school has slightly increased. This is due to the proliferation at the district down to the village level. Many new villages have been formed (Minister of Home Affairs Regulation no. 28/2006) without ensuring the sufficiency of operating educational facilities. The government has not placed any specific effort in reducing transportation costs to schools through free school busses or transportation vouchers.

Table 3.1 Average village distance to the nearest school (in km)

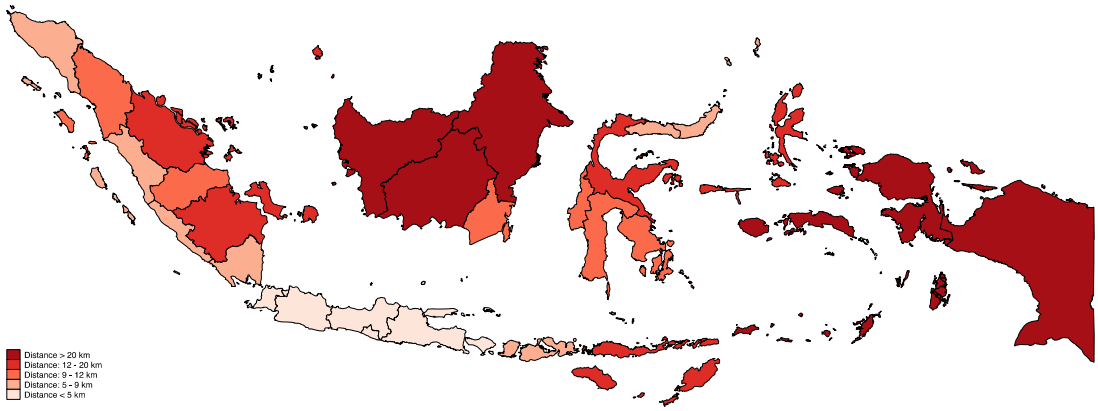
Year	Area	Kindergarten	Primary School	Junior High School	Senior High School
	Urban	0.49	0.03	0.62	1.45
2000	Rural	11.88	0.45	6.84	15.76
	Total	**10.64**	**0.40**	**6.17**	**14.21**
	Urban	0.53	0.05	0.87	1.70
2003	Rural	13.00	0.70	7.55	16.17
	Total	**10.83**	**0.58**	**6.39**	**13.65**
	Urban	0.39	0.06	0.77	3.51
2005	Rural	11.17	0.77	7.21	16.53
	Total	**9.28**	**0.64**	**6.07**	**14.24**
	Urban	0.25	0.06	0.78	2.90
2008	Rural	8.95	0.82	5.71	13.87
	Total	**7.50**	**0.69**	**4.88**	**12.04**

Source: Own calculations using Podes (Village Potential Survey), various years. Note: Distance is measured from the village to the nearest school. When the nearest school is located in a village, the distance calculated will be zero.

In a multi-developing countries study, Huisman and Smits (2009) show that the distance to a school is one of the main variables in parental decisions regarding a child's education. Therefore, it is not surprising to find that children from poor households who live far away from a school are more likely to drop-out of school (Colclough et al., 2000; Glick and Sahn, 2006).

Discrepancies between districts or provinces are similarly large (Figure 3.4). Most villages in Java have educational facilities from primary to senior secondary school. However, in the eastern part of Indonesia, children have to travel over 20 km to access a senior secondary education. In this way, a lack of accessible roads and affordable transportation can become a serious issues in terms of attending a school. More specifically, only about 60% of villages have a paved main road. The other 40% have either soil or a hardened road as their main road.[4]

Figure 3.4 Average distance to the nearest senior secondary school



Source: Own calculations using Podes, 2008

The Indonesian government has attempted to help the poor access educational facilities. There was a large school construction program from 1974-1978, during which time the government built over 61,000 primary schools. This program increased school enrolments and the participation of its graduates in the labor force (Duflo, 2004). However, there was no continuation of this program to build more junior and senior high schools. Therefore, many rural children must go to neighboring subdistricts or district capitals to access high schools. At the end of the 1990s, the government introduced a School Grants initiative that intended to cover school fees for households affected by the Asian Financial Crisis. In the early 2000s, the government reduced the fuel subsidy and shifted the budget allocation towards financial assistance for poor students through the BKM (Bantuan Khusus Murid or Special Assistance for Students) program.

[4] Own calculations using Podes (Village Potential Census) 2008.

In 2005, the government launched a new school grants program: BOS (Bantuan Operasi Sekolah or School Operational funds). In 2008-2009, the government introduced the BSM (Bantuan Siswa Miskin or Assistance for Poor Students) to help poor students overcome financial difficulties in accessing schools. Nevertheless, in recent years, poor households remain left behind in educational achievement.

The trend of public education spending has been increasing in the past decade, both as a percentage of total national expenditures and a percentage of GDP. Compared to other middle-income countries, Indonesia still spends less on education. However, compared to its neighboring countries, Indonesia spends more than Cambodia, the Philippines, Lao, or Singapore (World Bank, 2013). Despite the amount of public spending on education, according to the PISA scores by the OECD, Indonesian students perform the worst in the region and rank 64 out of 65 participating countries in terms of student performance in mathematics, reading, and science.

As in many other developing countries, the Indonesian government has implemented several reforms to improve educational outcomes. These reforms include increasing the amount of public spending on education, as well as a decentralizing provision of educational services to the local government. The amendment of the Indonesian Constitution, passed in 2002, obliges the government to prioritize a minimum of 20% of both the national and local government's budget for the education sector. The consequences of this amendment, also known as the 20 percent rule, create a large amount of additional resources to spend by local governments (World Bank, 2013).

Without proper monitoring from the central government or an independent party, these extra resources could lead to an inefficiency utilization of public spending by local governments. Ensuring sufficient budgets of public expenditures on education is one important key in improving educational outcomes. However, it has to be accompanied by improving the educational quality, as low-quality schooling disproportionately hurts the poor and limits their future earning opportunities (Thomas et al., 2000).

Therefore, it is crucially important to measure the effectiveness of this spending in the first place, before providing policy recommendations to improve its effectiveness. This paper attempts to shed some light on this issue by analyzing the relationship between decentralized public spending on education with educational outcomes at the secondary school level.

3.3. Brief overview of decentralization in Indonesia

Decentralization in Indonesia was originally driven by issues related to an inadequate sharing of natural resources that caused some regions to be left behind other regions (Agustina et al., 2012). Hence, the ultimate goal of decentralization in Indonesia is to ensure that all regions can enjoy the fruits of development and meet public service standards.

Decentralization in Indonesia came into force in 2001. It began when a law concerning local administration and a law concerning fiscal balance were approved by the Parliament[5] [6]. Under these laws, a strictly hierarchical relationship between the central government, provinces, and districts was abolished. In its place, a government financing system was established to ensure inter-regional equity in a fiscal capacity. Since then, the implementation and daily operations of activities in the various sectors, including education, have been reassigned from the central government to the local government at the district level.

Fiscal decentralization can be viewed as two different kinds of autonomy; autonomy from the revenue side (e.g., authority in collecting taxes or revenue from other sources) and autonomy from the expenditure side (e.g., allocating a budget for expenditures in each sector or activity). In the case of Indonesia, the level of authority for local governments to generate revenue and managing expenditures are significantly different. In generating revenue, the local government has only been given a limited authority to collect local taxes. The sources of applicable local taxes mostly come from hotel taxes, restaurant taxes, and motor vehicle taxes. The tax ratio (out of GRDP/Gross Regional Domestic Product) varies across district governments. The lowest ratio in 2003 was 0.4% for West Papua and the highest

[5] Law 22/1999
[6] Law 25/1999

ratio was 9.4% for DKI Jakarta. The average tax ratio is only 2.1% (Ministry of Finance (MoF), 2013). The major sources of tax revenue are still managed by the central government. The central government then provides financing to the local governments through various transfer mechanisms; DAU (Dana Alokasi Umum or General Allocation Funds), DAK (Dana Alokasi Khusus or Special Allocation Funds), DBH (Dana Bagi Hasil or Revenue Sharing Funds) and Special Autonomy Funds, which, on average, account for about two-thirds of the local governments total revenue (MoF, 2013). Therefore, with the current government regulations, the level of dependency of the local government on the central government in terms of receiving revenue is still high.

On the other hand, local governments have full authority in deciding on budget allocations. The central government no longer has the power to influence local governments in planning and managing their budgets. This creates complexities in establishing accountability relationships between the source of the revenue, which mostly comes from the central government, and public spending purposes, which are decided upon locally. Hence, under decentralization, there is a missing link between the revenue and the expenditures at the district level, especially because the monitoring and review of budget execution and activities conducted by the local governments are currently not yet in place. This accountability problem has created an opinion that decentralization in Indonesia is much more of an administrative decentralization, rather than a fiscal decentralization (Green, 2005). This condition has even become more complicated, as most Indonesian districts are found to spend more on administrative purposes, not on public services (Sjahrir et al., 2014).

The government has issued government regulations concerning the formation, merging, and liquidation of local governments[7]. This regulation stated that regions are entitled to propose their separation from their original regions, as long as they meet all technical, administrative, and physical requirements for bringing greater prosperity to their citizens. This regulation could encourage local governments to separate and create a new local government to reap the additional benefits of central government transfers (Green, 2005). Consequently, the total number of subnational

[7] PP (Peraturan Pemerintah / Government Regulation)129/2000

governments increased from 30 provinces and 338 municipalities in 2000 to 33 provinces and 497 municipalities in 2012.

3.4. Decentralization and Public Service Delivery

The differences in governance structures (e.g., centralized, decentralized) could lead to variations in the performance of public services. As one of the most common governance reforms, decentralization has the potential to improve efficiency in public service delivery by better representing the heterogeneity of local needs and knowledge (Oates, 1972).

Birner and von Braun (2015) argue that decentralization could improve the provision of public services that is significantly important for the poor through two linkages: (1) demand-side linkages, by strengthening the ability of the poor to demand better services and hold service providers accountable, and (2) supply-side linkages, by strengthening the incentives and the capacity of public agencies to improve the efficiency of public service delivery to the poor.

There are several reasons why decentralization is expected to improve public service delivery. First, aggregate spending by the central government allocated for public services have not had a significant impact (Filmer and Pritchet, 1999). Ahmad et al. (2006) examine the nexus between decentralization and improved service delivery and argue that the attempts to bolster aggregate spending on public services to the central level have not had a significant impact. This is partly due to the central government being unable to ensure that the funding actually reaches the target group.

Reinikka and Svensson (2001) show that in Uganda, money from government spending did not often reach the frontline service provider. Hence, intermediate institutions should better distribute and manage resources from the central government to the end users. Decentralization could accommodate this issue by giving responsibility to the local government as the intermediate institution.

Second, most public services can be more efficiently improved under decentralization because most public services are consumed and provided locally. By being given more authority and responsibility, local governments might be more responsive to local needs and preferences (Wallis and Oates, 1998; Shah, 1999).

However, there are also many criticisms against decentralization, especially for implementation in developing countries. Local governments in developing countries may lack the capacity to provide public services and efficiently meet local demands (Prud'homme, 1995, Tanzi et al., 1996; Bardhan and Mookherjee, 2006). Furthermore, benefits from decentralization often do not go to the poor. They go to the better-off and are often captured by the local elite (Galasso and Ravallion, 2000; Mansuri and Rao, 2004; Soto et al., 2012).

The majority of previous studies have examined impact decentralization on macroeconomic performance (Zhang and Zou, 1998; Iimi, 2005; Rodiriguez-Pose and Kroijer; 2009). A few authors address the impact of decentralization on the real outcomes of service delivery in the health and educational sector. The results seem promising in the developed countries (Barankay and Lockwood, 2006; Salinas and Sole-Olle, 2008). However, these positive outcomes might be different in the case of developing countries, especially where the capacity of local governments varies widely.

Barankay and Lockwood (2006) examine the relationship between decentralization and educational outcomes in Switzerland using a fixed effects and instrumental variable method. They show that decentralization was positively associated with educational outcomes. Jimenez and Smith (2005) use panel data from ten provinces in Canada to examine the impact of health care decentralization on the population's health. They apply a fixed effects method and Instrumental Variable (IV) techniques to tackle unobservable omitted variable bias and endogenous regressors, respectively. Their analysis reveal that decentralization reduces infant mortality. Salinas and Sole-Olle (2009) apply the difference-in-differences method to estimate the effect of decentralization in Spain on educational outcomes. Decentralization in Spain took place in the regions at different points in time. Therefore, they were able to use the non-decentralized autonomous regions as the comparison group to estimate the effect of decentralization on educational survival rates: the proportion of students enrolled in the last course of compulsory educational that continue to the next grade. They also find a positive effect of decentralization.

Few authors have examined the impact of decentralization in developing countries. The evidence that has been found is rather mixed. Habibi et al. (2003) apply the

fixed effects model to a large set of panel data for Argentina and found that decentralization had a positive, significant impact on secondary enrollment ratios. Using a random-effects method and IV technique using the lagged of a suspected endogenous regressor, Faguet and Sánchez (2006) show that decentralization improved public school enrollment. Galiani et al. (2008) apply the difference-in-difference method to a panel dataset from 1994-1999 at the school level to measure the impact of transferring authority for a school from the central to the provincial government in Argentina. Their analysis reveal that even though the student test scores improved, decentralization degraded the service provision in poor communities. Kalirajan and Otsuka (2012) analyze the effect of decentralization on agricultural development using a fixed effects regression model on panel data from 25 states covering 2001-2003. They show that transfers made to the lowest level of local government (Panchayati Raj) had a positive and statistically significant impact on agricultural development. Nevertheless, the magnitude of the impact was almost negligible.

Inconsistent impacts found from developing countries are not surprising, because the success of decentralization very much depends on institutional conditions and management capacities (von Braun and Grote, 2002), which vary significantly in a less mature economy.

Several studies have discussed decentralization in Indonesia, both in the context of its process/implementation, as well as its outcomes. Kristiansen and Pratikno (2006) descriptively assess educational sector performance in the decentralization era through both a quantitative and qualitative analysis. They find that there is no transparency and accountability in the administration of educational services, that household expenditures on education are high and increasing, and that social and geographical disparities remain large.

Chowdury et al. (2009) examine the impact of a decentralization policy on the local infrastructure provision in Indonesia. They use village-level panel surveys to compare two periods of time: 1996-2000 and 2000-2006to capture the pre- and post-decentralization, respectively. By applying an ordered probit model, they estimate the change (deterioration, no change, or improvement) in local public goods (roads, schools, and health facilities) on local income (proportion of households living in

poverty). Their analysis reveal that, despite the transfer from the central to the local government following the decentralization, local public goods still depended on local resources. Hence, poorer villages had fewer public goods than richer villages.

Kruse et al. (2012) use Indonesian panel data at the district level from 2001-2004 and apply a marginal benefit incidence analysis that incorporated behavioral responses to changes in public health spending. They find that the increased public health spending at district level increased the utilization of outpatient care in the public health facilities for the poorest two quartiles. However, these behavioral changes are relatively small, when compared to the initial utilization shares.

The previous empirical studies limited their analysis to short panel data that may not yet capture the real effect of decentralization (Kalirajan and Otsuka, 2012; Chowdury et al., 2009; Kruse et al., 2012). Some studies did not empirically test the hypothesis and address the issue of the possibility of endogeneity (Kristiansen and Pratikno, 2006; Habibit et al., 2003). Consequently, this study aims to contribute to the limited research devoted to the impacts of decentralization on public service delivery in developing countries, especially in Indonesia. This is accomplished by utilizing a large set of panel data capturing a decade of data after the decentralization reform took place. This study also looks at the distributional issues by examining these impacts on educational outcomes for the poor.

3.5. Data and Descriptive Statistics

This paper uses two data sources: regional budget data and household survey data. The first set of data was obtained from the Ministry of Finance. The latter set of data was obtained from the Indonesian Bureau of Statistics (BPS).

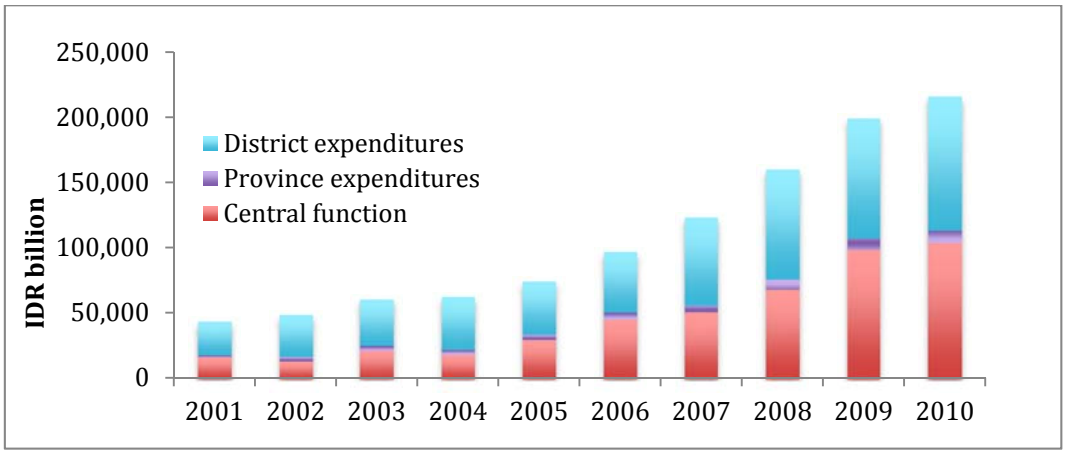
Regional budget data was collected from the Regional Financial Information System (Sistem Informasi Keuangan Daerah/SIKD) of the Ministry of Finance. This data contains details on Local Government Revenues and Expenditures (APBD) (e.g., General Allocation Fund (DAU), Special Allocation Fund (DAK), revenue sharing fund, local government own revenue) and a classification of expenditures by function (e.g., health, education, social protection).

The revenue data was available from 1994 through 2012. However, the function classification of the expenditure data was only available from 2001 to 2009. It would have been very useful if we could include the expenditure data before the decentralization period (2001), when the fiscal authority was fully managed by the central government. Unfortunately, the regional budget data does not have comparable classifications and disaggregation levels for the classification of expenditures between before- and after- the decentralization.

Instead of comparing the before- and after- decentralization data, this paper utilizes data from the beginning of the decentralization up to the latest available regional budget data. To make use of this data, we map and match different budget rules that were inconsistent across the fiscal years. To accomplish this task, we followed the mapping procedure developed by the World Bank (2009). Furthermore, as the decentralization resulted in district proliferation (from 313 in 2001 to 497 in 2012), we used district code links (crosswalk) to match the district ID across the various years to make panel data at the district level.

In the era of decentralization, district expenditures on education accounts for about half of the total national expenditures on education (Figure 3.5). The regional budget dataset used in this paper accounts for 90% of the district expenditures. The missing 10% of the data on district expenditures are due to unreported expenditures from local governments to the Ministry of Finance. Although this means that the analysis from this study may not represent all local governments in Indonesia, the results still hold for most Indonesian districts.

Figure 3.5 Composition of educational expenditures



Source: Ministry of Finance

Susenas is a nationally representative survey conducted by the BPS annually, biannually, or quarterly (depending on the survey year) at the household and individual level. The survey is representative of each of Indonesia's provinces or districts (depending on the survey year). The Susenas has a core module which covers various aspects of socio-economic and consumption modules, which record details of household food and non-food expenditures.

This study used Susenas data from 2001-2012. Since our main objective is to analyze the effectiveness of public education spending on educational outcomes at the district level, we aggregate the household survey data up to the district level before matching it to the regional budget data. The main variables from Susenas include the child status of school enrolment, which is translated into our dependent variables: secondary school net enrolment rates, transition rates to secondary school, and other demographic variables (e.g., share of urban population, share of the poor, share of female population, share of school aged children, average age and household size, and average educational attainment that is calculated by years of schooling).

Table 3.2 provides the summary statistics for all variables used in the estimation. We analyze educational outcomes for the poor and non-poor population.[8] The outcomes for the poor are much lower than those for the non-poor, while the outcomes of the non-poor are higher than the average of the total population. This applies to both main outcomes (e.g., net enrolment rates and the transition rates to secondary school). This confirms the background information in the previous section in that the poor are left behind in terms of educational performance. Each local government spends a varied amount on education. Public expenditures on education per school aged child vary from less than USD 1 to USD 1,153 (1 USD = 13,000 IDR) annually.

[8] An individual is considered poor if his/her monthly per capita expenditures are below the national poverty line. The Indonesian poverty line is determined by the BPS (Badan Pusat Statistik, Statistics Indonesia). It is based on the average of what the poor spend on different kinds of food to reach 2,100 calories per day and non-food items to cover the costs of housing, clothing, education and health care. The poverty line takes into account the variation of prices across regions.

Table 3.2 Summary Statistics

	Mean	Std Dev	Min.	Max
Net enrolment rates at the secondary school level	0.54	0.12	0.07	0.88
Net enrolment rates of the non-poor at the secondary school level	0.57	0.12	0.07	0.91
Net enrolment rates of the poor at the secondary school level	0.41	0.16	0.00	0.96
Transition rates to high school	0.58	0.12	0.21	0.86
Transition rates to high school of the non-poor	0.60	0.12	0.21	0.87
Transition rates to high school of the poor	0.40	0.14	0.00	0.88
Natural logarithm of local government's public education spending per school aged child	13.92	0.84	6.33	16.47
Share of local government's educational expenditures out of total expenditures	0.33	0.12	0.00	0.70
Share of local government's own revenue out of total revenue	0.07	0.06	0.00	0.69
Natural logarithm of real Gross Regional Domestic Product	15.43	0.73	12.68	19.42
Share of urban population	0.37	0.32	0.00	1.00
Share of poor population	0.17	0.09	0.00	0.83
Share of female population	0.50	0.02	0.36	0.64
Share of school aged children	0.27	0.04	0.14	0.44
Average age	28.00	2.77	21.01	37.76
Average household size	4.10	0.44	2.68	6.62
Average Educational attainment	6.07	1.11	1.48	10.08
Number of junior secondary school per 1000 junior-secondary aged children	3.30	1.88	0.00	27.08
Share of villages with flatland topography	0.65	0.27	0.00	1.00
Share of villages that ever experienced natural disaster	0.30	0.24	0.00	1.00
Share of villages with access to proper main road	0.65	0.27	0.00	1.00

Source: Own calculations

In order to obtain a comprehensive picture of the education sector in Indonesia, we also analyze the supply-side factors of education with the number of junior secondary schools per 1000 junior-secondary aged children. The information about school availability is taken from Podes (Village Potential Census). Podes is a village census carried out by the BPS. It collects information about village characteristics and facilities from the village head or other designated village representative. Podes is conducted every three years.

For this particular analysis, we combine the three datasets (i.e., regional budget data, Susenas, and Podes) for the years of 2003, 2006, 2008, and 2011 (following the year when Podes data became available). We similarly aggregate the information at the household level from Susenas and the village level from Podes up to the district level to match it with the regional budget data. We include additional covariates on the village characteristics from Podes, such as the village's topography, experience with natural disasters in the last 3 years that causes losses/damage, and access to proper main roads (asphalt-type roads and roads accessible by four-wheeled vehicles throughout the year).

3.6. Estimation Strategy

The econometric specification used to analyze the relationship between public spending on education and educational outcomes is:

$$Y_{it} = \alpha + \beta E_{it-j} + \gamma D_{it} + \delta_t + u_{it} \qquad (1)$$

where Y represents educational outcomes with the subscript i representing the district and subscript t representing time. The outcomes examined using Equation (1) are high school net enrolment rates (junior and senior high school) and transition rates to high schools (from primary to junior high and from junior high to senior high school). E is the natural logarithm of the per capita district public educational expenditures.

We use the outcome in t and the educational spending in t-j to take into account the possible lags in the effect of public spending on education. We use $j=0,1,2$ to perform the sensitivity analysis. The lagged regressor is also intended to overcome the reverse causality concern, since it has been argued that while educational spending may contribute to better educational outcomes, educational outcomes may also influence the level of public expenditures allocated by the local governments.

D is a set of variables used to control the district characteristics. They include the average age of the population, share of school aged children, average household size, average educational attainment, share of the population living in an urban area, share of female population, natural logarithm of regional GDP per capita, and share of the poor population. δ is a year dummy used to pick up aggregate time shocks; u_{it} is the residual. In the second specification, we include region dummies[9].

In our analysis of the supply-side factor on education, we estimate the relationship of public spending with the school supply using:

$$Y_{it} = \alpha + \beta E_{it-j} + \gamma D_{it} + \partial V_{it} + \theta R_i + \delta_t + u_{it} \qquad (2)$$

As explained in the previous section, data on school supply (number of junior secondary schools per 1000 junior-secondary aged children) are taken from the village census. Therefore, in Equation (2), we are able to include an additional regressors, V_{it}- village geographical characteristics (e.g., village topography, natural disaster experience, and access to proper main road). This information was recorded in the census.

The econometric models were estimated using: (1) an OLS (Ordinary Least Squares) regression as a baseline comparison, (2) an FE (fixed effects) model, and (3) an IV (instrumental variable) method. In the OLS model, we use cluster-robust standard errors that were clustered at the district as our observational unit. To tackle possible bias that may result from time invariant unobserved district specific effects, we include district fixed effects in the second model. Since the regressor of interest varies by district-year, we cannot include the district-year dummies to control for the district specific shocks. However, in the educational sector context, district-specific shocks rarely directly impact the educational outcomes used in our analysis[10].

[9] Regions are defined as 7 main islands/archipelagos: Sumatera, Java/Bali, Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Papua.

[10] In the health sector, district-specific health shocks (e.g., floods or droughts) may directly impact health outcomes, such as infant mortality or children/adult health status.

Another concern in our model specification is that public spending on education could be endogenously determined. It can be jointly determined with our independent variables (e.g., educational outcomes). To address the endogeneity problem, we apply the IV (Instrumental Variable) method by using the lagged value(s) of public education spending and the population size as instruments and compare the results with the first two methods. Public spending in one sector is usually correlated with a budget allocated for the sector that is usually determined by the amount of the previous year's spending. Furthermore, population size is one of the adjustment factors used by governments in allocating their resources. Both instruments have a high correlation with our endogenous regressor, but are not correlated with the dependent variable. We also perform several tests for instrument validity; these results are discussed in the next section.

3.7. Discussion of the Results

Our estimation results were first derived from the pooled OLS model (as a baseline comparison) using three different specifications (Table 3.3). The pooled OLS estimates indicate that the effect of district public spending on enrolment rates is not significant when the region dummies are not included in the regressors (column 1). The coefficient of district public spending on education becomes positive and statistically significant, but nonetheless very small, when the region dummies are included (column 2). More specifically, the results illustrate that for a 10 percent increase in the district per capita public spending on education, we expect a 0.1% increase in secondary school net enrolment rates. The coefficients become lower when we use the lagged value of public spending, instead of the current value of public education spending (Table 3.3, Column 3).

Table 3.3 Net enrolment of secondary schools – Pooled OLS

Dependent variable: Net enrolment of secondary schools			
	(1)	(2)	(3)
Ln (real GRDP per capita)	0.0206***	0.0250***	0.0283***
	(0.0048)	(0.0048)	(0.0050)
Ln (district's educational spending per school aged child)	0.00401	0.0113***	
	(0.0035)	(0.0033)	
Lagged of Ln (district's educational spending per school aged child)			0.00977***
			(0.0034)
Share of urban population	-0.0159	-0.0247	-0.0221
	(0.0144)	(0.0173)	(0.0176)
Share of poor population	0.0946**	0.0496	0.0719*
	(0.0398)	(0.0354)	(0.0417)
Share of female population	-0.244	-0.212	-0.258
	(0.1550)	(0.1420)	(0.1690)
Average age of population	0.0239***	0.0212***	0.0212***
	(0.0018)	(0.0020)	(0.0021)
Average household size	0.0274***	0.0185*	0.0128
	(0.0099)	(0.0105)	(0.0104)
Share of school aged children in the population	1.015***	0.965***	0.982***
	(0.1370)	(0.1400)	(0.1450)
Average years of schooling	0.0926***	0.0880***	0.0854***
	(0.0048)	(0.0052)	(0.0051)
Year dummies	Yes	Yes	Yes
Region dummies	No	Yes	Yes
Constant	-1.333***	-1.340***	-1.337***
	(0.1340)	(0.1290)	(0.1360)
Observations	2,787	2,787	2,452
R-squared	0.676	0.698	0.68

*Notes: Clustered standard errors are in brackets; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for the year dummy are not reported in the table.*

Table 3.4 shows the fixed effects estimates, when we control for the time invariant unobserved district specific effect. The results confirm that the effect of the districts public education spending is not significantly different from zero (Column 1). We also modify the model using the lagged value of public education spending, instead of its current value. The coefficient still appears to be insignificant (Column 2). We use both lag (1) and lag (2) for a robustness check (Column 2 and 3). In Columns 4 and 5, both the current and lagged value of public education spending are included in the model. We again do not find a significant effect on the outcomes measured – the net enrolment rates of secondary school.

Table 3.4 Net enrolment of secondary schools – Fixed effects

Dependent variable: Net enrolment of secondary school					
	(1)	(2)	(3)	(4)	(5)
Ln (real GRDP per capita)	0.0161*	0.00964	-0.00129	0.0163	0.00377
	(0.0093)	(0.0095)	(0.0100)	(0.0104)	(0.0120)
Ln (district's educational spending per school aged child)	0.00166			-0.000978	-0.00313
	(0.0024)			(0.0031)	(0.0043)
Lag (1) of Ln (district's educational spending per school aged child)		0.00143		0.000861	0.0026
		(0.0025)		(0.0026)	(0.0044)
Lag (2) of Ln (district's educational spending per school aged child)			0.000502		0.000603
			(0.0024)		(0.0033)
Share of urban population	-0.00876	0.00416	-0.0014	-0.0175	-0.016
	(0.0289)	(0.0361)	(0.0330)	(0.0298)	(0.0403)
Share of poor population	-0.121***	-0.185**	-0.176**	-0.221**	-0.250***
	(0.0354)	(0.0791)	(0.0705)	(0.0863)	(0.0881)
Share of female population	-0.0524	-0.129	-0.269**	-0.127	-0.146
	(0.0895)	(0.1080)	(0.1090)	(0.1160)	(0.1260)
Average age of population	0.000174	0.000341	0.00309	0.000399	0.00186
	(0.0024)	(0.0029)	(0.0030)	(0.0030)	(0.0034)
Average household size	0.0191**	0.00899	0.0211***	0.0132	0.0229**
	(0.0077)	(0.0084)	(0.0072)	(0.0098)	(0.0095)
Share of school aged children in the population	0.397***	0.481***	0.451***	0.372***	0.211
	(0.1170)	(0.1320)	(0.1360)	(0.1420)	(0.1460)
Average years of schooling	0.0700***	0.0646***	0.0578***	0.0680***	0.0634***
	(0.0063)	(0.0067)	(0.0067)	(0.0072)	(0.0078)
Constant	-0.293*	-0.133	0.0813	-0.207	0.00352
	(0.1710)	(0.1890)	(0.2110)	(0.2010)	(0.2480)
Observations	2787	2452	2110	2167	1648
R-squared	0.8724	0.8709	0.8691	0.8777	0.8797
Number of id_m	414	401	383	395	351

*Notes: Clustered standard errors are in brackets; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for the year dummy are not reported in the table.*

Table 3.5 illustrates the estimation results using three different methods for the first educational outcomes, secondary school net enrolment rates, for both the poor and non-poor population. The OLS and FE estimates illustrate consistent results (i.e., insignificant relationship between the district's public education spending and district's educational outcomes for both the poor and non-poor). On the other hand, when the public education spending is treated as an endogenous regressor, our IV estimates show that the coefficient of interest is small, positive, and significant for the non-poor, but insignificant for the poor. The instruments used are the lags of the suspected endogenous variables and the natural logarithm of the district's population.

We perform an Anderson test (under-identification test) that examines whether our instruments identify the equations, while the Cragg-Donald test (weak identification test) analyzes whether our instruments suffer from a weak instrument problem. The Anderson and Cragg-Donald tests illustrate that our instruments identify the second-stage equation and that our instruments are reasonably strong (Chi-sq (2) = 21.45 and Wald F stat = 10.755). The IV results illustrate that for a 10 percent increase in the district per capita public spending on education, we expect a 1.5% increase in secondary school net enrolment rates of the non-poor. The estimated impact is much lower when the lagged values of district public spending used instead of its current value. The estimation results are presented in appendix (Table A.4 and Table A.6). By including the first lagged values of district's public spending on education, we expect 0.3% increase in the secondary school net enrolment rates of the non-poor for a 10% increase in the education public spending. While including the second lagged of district's public spending on education results 0.2% increase in the secondary school net enrolment rates of the non-poor. The magnitude of the coefficients is small. Fixed effects estimates even show no significant impact. Hence, we do not find strong evidence that the district's public spending on education has any impact on secondary school enrolment rates.

Table 3.5 Net enrolment rates for the poor and non-poor – OLS, FE, IV

	OLS		Fixed effects		IV	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Natural logarithm of the real GRDP per capita	0.0372***	0.0225***	0.0121	0.0144	0.0165	-0.0526**
	(0.0057)	(0.00523)	(0.013)	(0.011)	(0.0302)	(0.0229)
Natural logarithm of the district's educational spending per school aged child	0.0135**	0.0106***	-8.79E-05	0.000996	-0.0217	0.159***
	(0.00522)	(0.00336)	(0.0046)	(0.00258)	(0.061)	(0.0461)
Share of urban population	-0.111***	-0.00631	-0.0591	0.0186	-0.1	0.0797
	(0.0233)	(0.017)	(0.0537)	(0.0325)	(0.071)	(0.0537)
Share of poor population	0.396***	0.176***	0.219***	0.015	0.101	-0.173**
	(0.0448)	(0.036)	(0.0634)	(0.0394)	(0.109)	(0.0821)
Share of female population	-0.0428	-0.273*	0.04	-0.0605	0.0643	-0.285
	(0.196)	(0.141)	(0.214)	(0.0926)	(0.245)	(0.186)
Average age population	0.0174***	0.0213***	0.000749	-0.00126	0.00576	7.65E-05
	(0.00277)	(0.00196)	(0.00432)	(0.00262)	(0.0052)	(0.00394)
Average household size	-0.013	0.0195*	-0.0135	0.0212**	0.0062	0.00688
	(0.0133)	(0.0103)	(0.0145)	(0.00942)	(0.0172)	(0.013)
Share of school aged children	1.147***	0.923***	0.437**	0.370***	0.166	0.909***
	(0.201)	(0.136)	(0.182)	(0.124)	(0.304)	(0.23)
Average educational attainment	0.115***	0.0815***	0.0794***	0.0674***	0.0742***	0.0571***
	(0.00638)	(0.00519)	(0.0103)	(0.00654)	(0.0123)	(0.00927)
Constant	-1.776***	-1.223***	-0.371	-0.204		
	(0.184)	(0.136)	(0.303)	(0.211)		
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes				
Observations	2,786	2,787	2,786	2,787	2,136	2,136
R-squared	0.475	0.652	0.667	0.838		
Number of district			414	414	364	364

*Notes: Clustered standard errors are in brackets; *** p<0.01, ** p<0.05, * p<0.1*

We similarly estimate the coefficients for the second dependent variable: transition rates to secondary school (Table 3.6). The OLS estimates show that the effect of a district's public spending is insignificant for the non-poor and positive and significant for the poor, but in small magnitude. While the fixed effects and the IV estimates show that the coefficients of district's public spending on education are not significantly different from zero. We find no difference between the impact of a district's public education spending on the poor and the non-poor. Although the coefficients are higher when we look at regression on educational outcomes for the poor, they are not significant. Therefore, the absence of the positive impact of the district's public education spending on educational outcomes is consistent across income distributions.

Furthermore, we perform an estimation using the first and second lagged value of the district's public education spending, instead of on its current value. The results are similarly consistent with our previous results, when we use the current value of the district's public education spending. We found that the coefficient of the district's public education spending is positive and significant, but only for the non-poor when we apply the IV method. Nonetheless, the magnitude of the coefficient is very small. The estimation results can be found in the appendix (Tables A.5 & Table A.7).

Table 3.6 Transition rates for the poor and non-poor – OLS, Fixed effects, IV

	OLS		Fixed effects		IV	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Ln (real GRDP per capita)	0.00745	0.00376	-0.00298	0.00511	-0.0316	-0.00851
	(0.00515)	(0.00456)	(0.0114)	(0.0055)	(0.0224)	(0.00976)
Ln (district's educational spending per school aged child)	0.0126***	0.0052	0.00202	-0.000195	0.049	0.0236
	(0.00387)	(0.00327)	(0.00302)	(0.00173)	(0.0452)	(0.0197)
Share of urban population	0.0127	0.115***	0.0213	0.121***	0.0734	0.125***
	(0.0208)	(0.0165)	(0.0486)	(0.0225)	(0.0526)	(0.0229)
Share of poor population	0.162***	0.0818**	0.213***	0.0692***	0.074	0.00106
	(0.0462)	(0.041)	(0.0462)	(0.0223)	(0.0805)	(0.035)
Share of female population	0.186	0.506***	0.165	0.147**	0.405**	0.174**
	(0.164)	(0.124)	(0.15)	(0.0681)	(0.182)	(0.0792)
Average age of population	0.00662***	0.00111	-0.00219	-0.0115***	0.00163	-0.0112***
	(0.00246)	(0.00185)	(0.00324)	(0.00165)	(0.00386)	(0.00168)
Average household size	0.0509***	0.0547***	0.0148	0.0204***	0.000513	0.0127**
	(0.0133)	(0.011)	(0.0108)	(0.00537)	(0.0127)	(0.00554)
Share of school aged children	-0.0128	-0.182	-0.579***	-0.362***	-0.378*	-0.274***
	(0.197)	(0.146)	(0.155)	(0.0621)	(0.225)	(0.0981)

Average Educational attainment	0.0845***	0.0622***	0.0602***	0.0660***	0.0582***	0.0660***
	(0.00641)	(0.00502)	(0.0106)	(0.00427)	(0.00909)	(0.00396)
	-0.849***	-0.403***	0.0897	0.347***		
	(0.159)	(0.132)	(0.208)	(0.113)		
Year dummies	Yes		Yes		Yes	
Region dummies	Yes					
Observations	2,786	2,787	2,786	2,787	2,136	2,136
R-squared	0.56	0.75	0.77	0.94		
Number of district			414	414	364	364

*Notes: Clustered standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1.*

Table 3.7 shows the estimation results for the school supply analysis. We run the regression on the subsample for years 2003, 2006, 2008, and 2011, when the school supply data at the village level is available. In this particular analysis, several village characteristics are included in the regressors. The village level data from Podes are then aggregated up to district level and merged with the regional budget data and the socio-economic data from Susenas. As in the previous analysis, the current value of district's public spending, its first, and second lagged values are examined for robustness check. From the three methods used in the regression (OLS, fixed effects, and IV), only OLS that shows positive and significant impact of the district's public education spending on the number of junior secondary school. On the other hand, the estimation results from fixed effects and IV do not show significant coefficient. Hence, we do not find convincing results that district public spending has a role in improving schools.

Table 3.7 Number of junior secondary schools – OLS, Fixed effects, and IV

Dependent variable: Number of junior secondary schools per 1000 junior-secondary aged children	OLS		Fixed effects		IV	
Ln (real GRDP per capita)	0.270***	0.339***	0.724***	0.693***	0.845**	1.808***
	(0.0737)	(0.0774)	(0.237)	(0.208)	(0.374)	(0.335)
Lagged (1) Ln (district's educational spending per school aged child)	0.273***		0.0939		-0.459	
	(0.0992)		(0.0947)		(0.501)	
Lagged (2) Ln (district's educational spending per school aged child)		0.186***		-0.0121		0.684
		(0.0682)		(0.0576)		(0.558)
Share of urban population	-0.785**	-0.935***	-0.459	-1.503*	0.589	1.617*
	(0.305)	(0.33)	(0.921)	(0.804)	(1.229)	(0.924)
Share of poor population	0.616	0.647	1.091	2.506*	0.819	0.703
	(0.697)	(0.739)	(1.721)	(1.517)	(1.174)	(0.982)
Share of female population	1.531	2.183	2.584	1.871	6.736	0.294
	(2.547)	(2.634)	(3.002)	(2.439)	(4.955)	(4.234)
Average age of population	-0.0296	-0.0558	-0.00462	-0.0687	-0.171**	-0.131*
	(0.0386)	(0.0388)	(0.0703)	(0.0577)	(0.0855)	(0.0673)
Average household size	-0.279	-0.345*	0.325	0.657*		
	(0.174)	(0.18)	(0.449)	(0.358)		
Share of school aged children	-9.437***	-10.92***	-15.24***	-16.71***	-20.57***	-17.44***
	(2.431)	(2.593)	(3.525)	(3.17)	(3.963)	(3.451)
Average Educational attainment	0.128	0.106	-0.127	-0.117	0.34	0.21
	(0.0793)	(0.0809)	(0.159)	(0.146)	(0.211)	(0.169)
Share of villages with flat topography	0.197	-0.0472	0.125	-0.193	1.341***	0.865**
	(0.199)	(0.204)	(0.327)	(0.309)	(0.458)	(0.407)
Share of villages with proper and accessible main road	-0.747***	-0.566**	-0.434	-0.454	1.470*	1.196
	(0.245)	(0.252)	(0.483)	(0.479)	(0.8)	(0.78)
Share of villages experienced disaster	0.263	0.295	0.276	0.277	0.497	0.972***
	(0.203)	(0.208)	(0.234)	(0.191)	(0.345)	(0.326)

(Continued)

(Continued)

Intercept	-1.347	0.199	-7.813*	-4.111		
	(2.423)	(2.52)	(4.697)	(3.905)		
Year dummies		Yes		Yes		Yes
Region dummies		Yes				
Observations	877	913	877	913	503	766
R-squared	0.36	0.33	0.80	0.83		
Number of district			366	368	201	302

*Notes: Clustered standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1.*

3.8. Conclusions

This paper provides evidence about the impact of public spending on the educational sector under the decentralization era in Indonesia. One of the main expected outcomes from the decentralization reform is improved public service delivery, including education. As the literature suggests, this could be accomplished through more effective public spending that is allocated and managed by local governments.

This paper analyzes the extent to which decentralized public spending in Indonesia is translated into outcomes in the educational sector. The analysis illustrates that after a decade of implementation of decentralization in Indonesia, decentralized public education spending has no significant impact on educational outcomes, especially for the poor. For the non-poor, the impacts are positive and statistically significant, but in small magnitudes. In other specifications, the results for the non-poor are not even statistically significantly different from zero. Hence, the results cannot derive strong conclusions that decentralized public spending has any impact on educational outcomes. These results hold for three educational outcomes measured in the analysis: net enrolment rates for secondary school, transition rates to secondary school, and number of junior high school per 1000 junior-secondary aged children.

The results suggest that improving the quality of spending is necessary. As mentioned in the previous section, there is currently no review or monitoring system of the local government's actual expenditures and activities. This unfavorable condition is partly due to the weak link between the source of revenue and the purpose of expenditures at the district level (Green, 2005). Therefore, the absence of a monitoring system may become a big threat of budget accountability and the transparency mechanism.

Chapter 4. Cash Transfer, In-Kind, or Both?Assessing the Food and Nutrition Security Impacts of Social Protection Programs in Indonesia

4.1. Background

Despite the tremendous progress in decreasing poverty rates in the past decades, 17% of people in the developing world lives at or below the international poverty line of $1.25 a day. The governments of many developing countries have implemented a range of social protection programs as part of their broader poverty reduction strategies to help poor and vulnerable households confront the risk to their livelihood and maintain 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 in question. Some programs are crucial for the poor, but others may be redundant of other programs. Many researchers have studied the impact of a social protection programs (Ahmed et al., 2002; Schultz, 2004); however, to the best of my 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/health insurance for the poor (Jamkesmas/*Jaminan Kesehatan Masyarakat*, previously *Askeskin/Asuransi Kesehatan Masyarakat Miskin*), and scholarships in the form of cash transfers for poor students (BSM/*Beasiswa Siswa Miskin*). The eligibility criteria are often similar from one program to another. Consequently, these programs may have overlapping or joint effects if they are delivered to the same household and implemented at the same time. This paper attempts to evaluate the synergy impacts between CCT and Raskin.

Several motivations explain why this paper focuses on these two programs and not on the other two. First, CCT and Raskin have a similar main objective – improving household access to food by either delivering cash or subsidizing the price of main staple foods to increase buying power. However, they have different mechanisms. CCT delivers cash transfers to its recipients, who are obliged to fulfill specific health and education conditions (e.g., routine checkups for pregnant women and infants, school attendance for school-aged children). On the other hand, Raskin provides rice (an Indonesian staple food) at highly subsidized prices. Note that CCT has other important goals in the health and education sectors, while Raskin focuses on improving food security. The other two programs – scholarship and health fee waiver – have different and specific objectives on education and health, respectively. The scholarship program intends to help the poor overcome high education expenditures by providing cash transfers for eligible primary and high school students. The health fee waiver program aims to provide health insurance for the poor in the form of a fee waiver for preventive and curative health care services.

The second motivation for focusing on CCT and Raskin is their unique characteristics. The heterogeneity characteristics of these programs make analysis of their synergy interesting. CCT has the smallest coverage as well as the smallest government budget among all the major social protection programs. CCT was launched in 2007 as a pilot program and benefited about 400,000 households. An impact evaluation design has been incorporated into the program. Participation in the program has been randomized at the sub-district level. Although the program's coverage is still small and program implementation is far from perfect (Febriany et al., 2011), CCT has had a positive impact on households' welfare and health outcomes (World Bank, 2011). On the other hand, Raskin is the oldest social protection program in Indonesia. It was originally launched in 1998 in response to the Asian financial crisis. Raskin is also the largest of these programs as it covers about half the population and accounts for more than half of the total government budget for social programs (Ministry of Finance, 2013). However, Raskin is associated with numerous implementation issues, which has made it ineffective in addressing the problems of poor households (Hastuti et al., 2008).

Addressing the consumption risk of the poor is a main objective of both CCT and Raskin. Poor Indonesians, like 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. In turn, a reduction in food and nutrition intake can have both short- and long-term effects (Block et al., 2004). Food and nutrition security (FNS) has long been a main concern in the international development agenda. The World Food Summit of 1996 highlighted 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 is reflected in the four pillars of food security: availability, accessibility, utilization, and stability. The FNS indicator examined in this paper is the diet diversity score (DDS; Ruel, 2003), which represents the performance of food utilization. Indonesia has high risk in the indicator of diet diversification. Its score is only half the average score of all countries analyzed in the Global Food Security Index 2015 (Economist Intelligence Unit, 2015). This is mostly because of rice dominating households' calorie intake (Ariani, 2004; Suryana, 2014). The government of Indonesia is aware of this problem and has implemented several programs to address the issue. For example, the Ministry of Agriculture has led a national campaign of 'One Day No Rice' with the objective of promoting food diversification and helping to change people's mind-set to reduce rice consumption by 1.5% annually.[11] Social protection programs that aim to address food insecurity are also part of the strategy. Therefore, it is important to understand the effectiveness of social protection programs in improving food and nutrition security indicators such as the DDS.

This paper attempts to evaluate the impacts of CCT and Raskin in improving the DDS as one of the food and nutrition security outcomes. Apart from its important contribution to the limited literature on food diversification in Indonesia, this paper attempts to understand the extent to which social protection programs, specifically

[11] Source: http://jakartaglobe.beritasatu.com/archive/one-day-no-rice-to-become-national-program/ accessed in August 2015. The 'One Day No Rice' campaign was originally proposed by the local government of Depok (Mayor's Decree No. 010/27-um in February 2012). Other local governments such as the provinces of South Sulawesi, North Sumatera, Bali, Samarinda, and Jayapura followed in implementing this campaign. Finally, in June 2012, the 'One Day No Rice' became a national campaign.

CCT and Raskin, help to increase households' food security, especially in the food utilization aspect. The next two sections present a general review of the literature related to CCT and in-kind transfer. Section 4.4 describes the data used in the analysis and provides descriptive statistics of the main variables. Section 4.5 discusses the methods used to perform the joint evaluation of multiple treatments of social protection programs. Section 4.5 presents estimation results and the last section concludes the chapter.

4.2. Conditional Cash Transfer

CCTs have become popular in developing countries over the last decade, and they have been studied across the globe in low- and middle-income countries. The CCT is a safety net program that transfers cash to poor households with several conditions on education- and health-promoting behavior. These conditions may include periodic check-ups for pregnant women, growth monitoring and vaccinations for infants, enrollment and school attendance for school-aged children, and demonstration of educational performance, such as through standardized test scores.

CCTs aim to reduce poverty and break the intergenerational cycle of poverty through development of human capital. The cash component from a CCT is expected to raise households' consumption level and therefore lift up their life from poverty. Furthermore, the education- and health-promoting behaviors resulting from CCT may have long-term impacts on participants' employment and earning prospects (Fiszbein and Schady, 2009).

The pioneer of CCTs is Brazil's Bolsa Familia program and Mexico's Opportunidades program. Both 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 and Schady, 2009). Various reports and journal articles have been produced analyzing the impact of these programs. Generally, CCT programs have a positive impact, including increased consumption levels among the poor (Fiszbein and Schady, 2009), increased school enrollment (see Khandker et. al. (2003) for Bangladesh, Maluccio and Flores (2005) for Nicaragua, Galasso (2006) for Chile, and Chaudhury and

Parajuli (2008) for Pakistan), increased utilization rates of health care providers (see Morris et al. (2004) for Honduras, Attanasio (2005) for Colombia, and Levy and Ohls (2007) for Jamaica), and improvement in children's health and nutrition outcomes (Duflo, 2003; Attanasio et al., 2005; Paxson and Schady, 2008). However, the evidence is mixed on the final outcomes in health and education, such as educational achievement through standardized cognitive test scores (Paxson and Schady, 2008; Macours et al., 2008) or child height and/or weight for age (IFPRI, 2003; Behrman and Hodinott, 2005; Attanasio et al., 2005).

Many have debated whether "to condition or not to condition" the cash transfer program. De Brauw and Hodinott (2011) show that some beneficiaries did not receive the form needed to monitor the attendance of their children at school. They use several methods, including nearest neighbor matching and household fixed effect regressions, and show that the absence of this form reduces the likelihood of children attending school. The likelihood is even more severely reduced when children make the transition to lower secondary school. Their findings are consistent with the broader argument of De Janvry and Sadoulet (2006) that CCTs can achieve considerable efficiency gains through a more careful design by, for example, 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.

Most CCTs deliver the cash directly to the mother, including CCTs 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 and Haddad, 1995; Duflo, 2003; Doss, 2006; Schady and Rosero, 2008). Contradictory evidence from Indonesia reveals that the increase in 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 use of most of this money remains in the corridor of routine household needs that have traditionally been the responsibility of women (Arif et al., 2011). Another qualitative study reports that CCTs' contribution to the improvement in service utilization was observed only in one of two provinces; improvements were indicated by the increase in mothers' attendance at *posyandu* (integrated health service posts) and students' attendance in class (Febriany et al., 2011).

CCT in the Indonesian context was launched in 2007 as a pilot program. As in other countries, this program aims to improve the economy of the poor, increase access and utilization of health services for pregnant women, infants, and toddlers, and increase enrollment and attendance rates for school-aged children. In its inaugural year, the program delivered cash transfers of varying amounts depending on household characteristics (see Table 4.1) to more than 432,000 households in seven provinces. The program expanded its coverage to more than 1.4 million households in 2012. The eligibility criteria to receive the cash transfer are being a very poor household[12] with children aged 15 or younger and/or lactating and/or pregnant women.

Table 4.1 CCT benefit (in IDR, per year)

Fixed amount	200,000
Cash amount for household with:	
Pregnant or lactating mother	800,000
Infant/child age younger 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.

CCT program implementation was conjugated with an impact evaluation design through randomization at the sub-district level. This allowed the impact evaluation of CCT by comparing the outcomes of sub-districts in the treatment group and control group. The baseline and follow-up surveys were conducted in 2007 and 2009, respectively. CCT was implemented immediately after the baseline survey as a government pilot program in seven provinces: West Java, East Java, North Sulawesi, Gorontalo, East Nusa Tenggara, West Sumatra, and Jakarta. These 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

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

districts were ranked based on district poverty rates, incidence of malnutrition, and transition rates from primary to secondary schooling. The richest 20% of districts was excluded (World Bank, 2011). CCT-eligible districts were then taken from the remaining pool of districts implementing the community empowerment program. Sub-districts that have sufficient health and education facilities were eligible to participate in the CCT pilot program. From a total of 588 eligible sub-districts, 259 were randomly selected to CCT treatment groups. The remaining 329 sub-districts were kept as control groups.

After having treatment and control sub-districts, CCT targeted beneficiaries were identified using a list of poor and extremely poor households that were surveyed by Statistics Indonesia in 2005. This survey was originally intended to screen eligible beneficiaries for the unconditional cash transfer program that was implemented in 2005 as an emergency response to the fuel subsidy reduction. From this list with an additional group of eligible households that were excluded, Statistics Indonesia used health and education survey data to demographically identify eligible households that met CCT 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 CCT-eligible households was then reviewed by the implementing agency, the Ministry of Social Affairs. Ultimately, approximately 430,000 beneficiary households were identified through this selection process.

The World Bank (2011) has utilized the baseline and follow-up survey data to evaluate the impacts of CCT and found that Indonesian CCT recipients experienced a 10% 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 (e.g., enrollment and drop-out rates) is not significantly different from zero.

4.3. In-kind transfer

In-kind transfer programs provide additional resources to households by making resources in the form of food, school-related resources (e.g., uniforms, books), or health-related resources (e.g., medicines, medical equipment) available when needed the most. The usual in-kind transfer is a food transfer in the form of food rations, school feeding program, and supplementary or emergency food distribution.

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

In-kind transfer in Indonesia is also known as a food subsidy program called Raskin (Rice for the Poor). This program was originally launched to strengthen food security of poor households in response to the Asian financial crisis in 1998. However, since 2002, the objective has been to expand not only as an emergency response but also as one of the social protection programs. Raskin provides rice at a subsidized price. In 2010, the subsidized price was IDR 1,600/kg, around 18% of the average market price of rice in the same year. General guidelines for the Raskin program state that each eligible household is entitled to purchase 14 kg/month of Raskin rice. This makes the value of the annual benefit per household about IDR 1.2 million. However, many implementation issues have caused the de facto average of Raskin rice purchased by each household to be only 4 kg/month (World Bank, 2012b).

The Raskin program encounters many problems in the distribution of rice from the primary distribution point to the beneficiaries. The program lacks socialization and

targeting accuracy (Hastuti et al., 2008). Apart from the rice distribution issue, Raskin rice is often of low quality and/or unacceptable quality (Isdijoso et al., 2011). In some areas, Raskin rice is divided equally among recipients to avoid conflicts and social jealousy (Tabor and Sawit, 2011). Despite the various implementation issues, Raskin had a positive impact on expenditures for higher nutrient food (i.e., meat, fish, and dairy products). The impact on adult goods expenditures was higher than for expenditures of higher nutrient food (Pangaribowo, 2012).

4.4. Data and Descriptive Statistics

This study use panel data from a baseline survey that was fielded in June-August 2007 (before CCT implementation) and a follow-up survey in 2009 (approximately 26-30 months after CCT implementation). 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-districts, eight villages were randomly selected to be surveyed. Within villages, two households were randomly selected from eligible households with a pregnant/lactating mother and three from eligible households with children 0-15 years old.[13] The follow-up survey was conducted with the same households and individuals in the baseline, with an attrition rate of approximately 2.5% (World Bank, 2011).

Both baseline and follow-up surveys collected household information on socioeconomic and demographic characteristics as well as schooling, health, and nutrition outcomes for mothers and infants/children. Questions regarding recipient status for each social protection program, including CCT and Raskin, were also asked in the surveys. Furthermore, a question regarding the last time a household received Raskin was also recorded in both baseline and follow-up surveys. This information helps us categorize which households received both Raskin and CCT at about the same time – between the baseline and follow-up surveys – that is relevant for our analysis.

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

The impact of the CCT and Raskin programs measured in this paper is one aspect of the FNS indicators that can be analyzed at the household level – the DDS – that represents food utilization. DDS is defined as the number of different foods or food groups consumed by the household over the past month. A list of food groups for DDS measures is shown in Appendix Table A.8.

In this study, we perform two sets of multiple-treatment analyses. The first set looks at the impacts of programs for households that had not received Raskin before the baseline (hereafter period 1). In other words, the analysis shows the impacts for households that did not receive aid from any program (CCT or Raskin) in period 1 because CCT was implemented only after the baseline (hereafter period 2). We create a categorical variable of four types of household (see Table 4.2) with the following:

- Group 0: Consists of households that did not receive benefits from any program (CCT or Raskin) in period 2
- Group 1: Consists of households that received only CCT in period 2
- Group 2: Consists of households that received only Raskin in period 2
- Group 3: Consists of households that received both CCT and Raskin in period 2

Table 4.2 Treatment category for non-Raskin recipient in period 1

Treatment Category	Period 1	Period 2
Group 0	Raskin: x CCT: x	Raskin: x CCT: x
Group 1		Raskin: x CCT: √
Group 2		Raskin: √ CCT: x
Group 3		Raskin: √ CCT: √

In this analysis, the control group is group 0, the households that never received any program benefits (CCT or Raskin) in period 1 and period 2. The impact on group 1 and group 2 estimate the impact of receiving CCT and Raskin, respectively, while the impact on group 3 is the estimated impact of receiving both CCT and Raskin at the same time (in period 2).

The second set of analyses looks at households that had received Raskin in period 1 (existing Raskin recipients). As explained in the previous section, Raskin was implemented in 1998, long before CCT was launched. About 50% of population had been receiving Raskin before the baseline survey was conducted. Therefore, it is important to look at this group of households separately. We create a categorical variable for this analysis, as follows (Table 4.3):

- Group 4: Consists of households that did not receive any program benefits in period 2
- Group 5: Consists of households that received only CCT in period 2
- Group 6: Consists of households that received only Raskin in period 2
- Group 7: Consists of households that received both CCT and Raskin in period 2

Table 4.3 Treatment category for Raskin recipients in period 1

Treatment Category	Period 1	Period 2
Group 4	Raskin: √ CCT: x	Raskin: x CCT: x
Group 5		Raskin: x CCT: √
Group 6		Raskin: √ CCT: x
Group 7		Raskin: √ CCT: √

With the treatment category shown in Table 4.3, we could estimate the incremental benefit of CCT on the existing Raskin recipients. This incremental benefit of CCT can be divided into two types: (1) incremental benefit of CCT on existing Raskin recipients who continued to receive Raskin in period 2 (estimated using treatment group 7) and (2) incremental benefit of CCT on existing Raskin recipients who no longer received Raskin in period 2 (estimated using treatment group 5). Treatment group 6 is used to estimate the impact of Raskin on households that previously received Raskin. In other words, treatment group 6 would estimate the impact of continuing to receive Raskin, while treatment 4 serves as the control group.

Table 4.4 shows the means of selected household characteristics for each treatment group. As mentioned earlier, the baseline and follow-up surveys were designed to include a random sample of CCT-eligible households. This means that all respondents came from very poor households and satisfied CCT eligibility criteria which can be seen in Table 4.4.

Table 4.4 Summary statistics of each treatment group

	Analysis 1 to the non-recipients				Analysis 2 to the existing Raskin recipients			
Treatment group	0	1	2	3	4	5	6	7
Household size	5.208	5.281	5.180	5.103	5.139	5.213	5.191	5.201
Age of household head	39.833	38.306	40.631	40.511	40.320	41.541	41.967	42.338
Female-headed household	0.030	0.035	0.069	0.075	0.103	0.070	0.094	0.080
Household head works in agriculture	0.525	0.667	0.597	0.701	0.660	0.591	0.691	0.656
Education of household head	2.424	2.000	2.090	2.019	1.820	2.095	1.842	1.922
SLT/BLT recipient	0.750	0.842	0.812	0.897	0.974	0.903	0.956	0.939
Askeskin recipient	0.203	0.368	0.326	0.318	0.474	0.386	0.532	0.497
Access to electricity	0.915	0.895	0.887	0.813	0.799	0.900	0.799	0.853
Access to a proper toilet	0.551	0.386	0.470	0.364	0.423	0.483	0.357	0.437
Access to clean water	0.788	0.912	0.800	0.757	0.778	0.832	0.739	0.784
Total number of assets	3.271	2.193	2.919	2.000	2.330	2.938	2.584	2.974
House is private/own property	0.720	0.596	0.791	0.757	0.804	0.812	0.880	0.888
Mother is pregnant	0.047	0.088	0.056	0.084	0.041	0.063	0.059	0.062
Proper roof	0.881	0.842	0.889	0.766	0.840	0.900	0.870	0.910
Proper floor	0.818	0.737	0.800	0.673	0.603	0.739	0.579	0.668
Proper sanitation	0.449	0.316	0.334	0.178	0.211	0.358	0.181	0.272
Proper walls	0.445	0.263	0.522	0.262	0.309	0.474	0.315	0.459
Main fuel of cooking is firewood	0.373	0.158	0.282	0.159	0.165	0.278	0.151	0.207
Per capita expenditure 2007	249,143	216,789	228,317	191,071	192,081	234,438	182,317	196,198
Per capita expenditure 2009	312,421	244,398	257,283	240,735	253,770	275,732	234,625	243,872
Per capita food expenditure 2007	164,701	155,036	140,916	137,977	130,991	145,062	125,419	131,790
Per capita food expenditure 2009	184,211	174,825	167,011	162,564	166,916	166,946	152,041	154,407
Number of observations	236	57	521	107	601	194	8,834	2,774

Note: All figures are means of characteristics for each treatment group. BLT : Bantuan Langsung Tunai or Unconditional Cash Transfer. Askeskin is original name of the health fee waiver program for the poor. BLT and Askeskin are social protection programs that are also targeted to very poor and poor households.

Before calculating the impact of each treatment, we present the mean-comparison test (t-test) of the difference of food and nutrition security outcomes between the treatment and control groups, capturing the period before and after intervention. Table 4.5 shows that treatments 2 and 3 had a significant different in DDS compared to the control group of non-Raskin recipients in period 1.

Table 4.5 Difference in difference in DDS for non-Raskin recipients in period 1

Treatment group	DID in DDS
1 vs 0	0.079
	(0.193)
2 vs 0	0.458***
	(0.095)
3 vs 0	0.661***
	0.103

Author calculation based on the baseline and follow-up survey data
*Notes: *** p<0.01, ** p<0.05, * p<0.1*

For Raskin recipients in period 1, all treatment groups had a significant different in DDS before and after the intervention (Table 4.6).

Table 4.6 Difference in difference in DDS for Raskin recipients in period 1

Treatment group	DID in DDS
5 vs 4	0.502***
	(0.193)
6 vs 4	0.215***
	(0.095)
7 vs 4	0.367***
	0.103

Author calculation based on the baseline and follow-up survey data
*Notes: *** p<0.01, ** p<0.05, * p<0.1*

4.5. Estimation Strategy

In estimating the impacts of a treatment, the main questions are whether an intervention has any impact (on measured outcomes) and how large the impact is given the resources

spent on the program. It is not easy to measure the real impact of a program because it is impossible to measure the counterfactual outcome, that is, what would have happened to the beneficiaries in the absence of a program. The impact 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). Although there is less work in the multiple treatment literature, Imbens (2000) derives a generalization of propensity score and shows that the results by Rosenbaum and Rubin (1983) still hold for multiple treatments. After creating four different treatment groups for each set of analysis, as explained in the previous section, we employ the inverse probability weighting (IPW) method (Hirano et al., 2003) to study the 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) the overlap assumption that ensures that each individual's probability of receiving any treatment level is greater than zero, and (3) the independent and identically distributed sampling assumption that ensures that the treatment status of each individual is independent of the potential outcomes and treatment statuses of other individuals in the population. To ensure that the assumption of conditional-independence holds, the dataset used should provide as many relevant variables as possible so that none of confounders of the treatment and outcome variable is left out. Our dataset records not only standard variables like family background and demographic characteristics, but also the proxy-mean-test variables that were used to identify eligible households. Thus, it is not too naïve to assume that this condition is not violated. Furthermore, the estimated densities have most of their masses in the same regions in which they overlap each other. This means that the overlap assumption holds. The plot of estimated densities of the probability of getting each treatment level is presented in Appendix Figure A.1.

The empirical strategy of this chapter follows the basic setup based on Imbens (2000) and Lechner (2001). In the case of multiple treatments, the treatment of interest, T_i, takes integer values between 0 and *J*. The potential outcome for household *i* receiving

treatment t is denoted by Y_{it}. X_i denotes the vector of household characteristics for household i. $D_{it}(T_i)$ is the indicator of receiving treatment t for household i:

$$D_{it}(T_i) = \begin{cases} 1, & if \quad T_i = t \\ 0, & otherwise \end{cases}$$

Imbens (2000) defines the generalized propensity score as the conditional probability of receiving a treatment given the pre-treatment variables:

$$r(t,x) \equiv \Pr[T_i = t | X_i = x] = \mathrm{E}[D_{it}(T_i) | X_i = x]$$

In the binary treatment case, the unconditional means of the potential outcomes can be identified by weighting:

$$E\left[\frac{Y_i D_{it}(T_i)}{r(t, X_i)}\right] = E[Y_{it}]$$

Based on this identification results and assuming the conditional-independence and overlap assumptions are satisfied as in the binary treatment case, one can expand the treatment effect estimator for a multiple treatment case as follows:

- the average effect of treatment *m* relative to treatment *l*:

$$\hat{\rho}_{ml} = \frac{1}{N}\sum_{i=1}^{N} \frac{Y_i D_{im}(T_i)}{\hat{r}(m, X_i)} - \frac{1}{N}\sum_{i=1}^{N} \frac{Y_i D_{il}(T_i)}{\hat{r}(l, X_i)}$$

-the average effect of treatment *m* relative to treatment *l* for an individual randomly drawn from the population of households receiving treatment *m*:

$$\hat{\sigma}_{ml|m} = \frac{1}{N_m}\sum_{i=1}^{N} Y_i D_{im}(T_i) - \frac{1}{N_m}\sum_{i=1}^{N} D_{il}(T_i)\, Y_i \frac{\hat{r}(m, X_i)}{\hat{r}(l, X_i)}$$

Intuitively, IPW uses weighted means instead of simple unweighted means to disentangle the treatment effect and other covariates. The weights come from the inverse of the treatment group's probability of being observed, which leads to an efficient estimate of the treatment effect (Hirano, Imbens, & Ridder, 2003). These probabilities

are obtained by fitting a model of treatment status on the subject's characteristics using a multinomial logit (MNL) model.

4.6. Discussion of the Results

As mentioned earlier, eligibility criteria were generally similar among the social protection programs, including CCT and Raskin. However, it is important to note that CCT has a smaller target group since it only targets extremely poor households with pregnant mothers and/or infants and/or school-aged children. The multinomial logit was used to estimate the treatment status. Covariates involved in the analysis were mostly based on the relevant variables used in determining eligible households through the proxy-mean-test prepared by Statistics Indonesia. This included household welfare conditions and household head characteristics. The coefficients from the model used to predict each treatment status are presented in appendix Table A.9 & A.10. Both the average treatment effect (ATE) and the average treatment effect on the treated (ATT) are estimated using the IPW method.

4.6.1. The impacts of CCT and Raskin

4.6.1.1 Treatment effects for non-Raskin recipients in period 1

For the first set of analyses, we look at the group of households that did not receive any program aid in period 1. In each case, the control groups are the households that did not receive any program aid in the two periods (see Table 4.2 in the previous section). Table 4.7 shows the estimate of ATE and ATT of CCT (treatment 1 – (1) vs (0)) are not significantly different from zero. Similarly, Raskin (treatment 2 – (2) vs (0)) is shown to have no significant impact on the DDS. Group of households in treatment category 3 that received both CCT and Raskin in period 2 – labeled (3) vs (0) – do not have significant impact either. The results show no statistically significant impact (ATE or ATT) of any treatment category on the selected outcome. CCT, Raskin, or both show no impact on the entire population or on those who were treated.

Table 4.7 ATE and ATT in the DDS – non Raskin recipients in period 1

	ATE	ATT
1 vs 0	-0.09	-0.57
	(0.386)	(0.42)
2 vs 0	0.25	-0.041
	(0.201)	(0.34)
3 vs 0	0.12	-0.079
	(0.286)	-0.44

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

We also look at the relative effects between single treatment and multiple treatments. Single treatment means receiving benefit only from one program (CCT only or Raskin only). While multiple treatment means receiving benefit from both CCT and Raskin. The relative effect estimates (Table 4.8) reveal that the impacts of going from treatment 1 (receiving CCT only) to treatment 3 – (3) vs (1) are not significantly different from zero. Similarly, the impacts of going from treatment 2 (receiving Raskin only) to treatment 3 (receiving both CCT and Raskin) are not significantly different from zero.

Table 4.8 Relative effects in the DDS - non-Raskin recipient in period 1

	ATE	ATT
3 vs 1	0.21	0.12
	(0.41)	(0.43)
3 vs 2	0.12	-0.32
	(0.25)	(0.26)

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

We can see several possible reasons that may explain the results in Table 4.7 and Table 4.8 above. First, the duration of evaluation (between the baseline survey in 2007 and the follow-up survey in 2009) may be too short to capture the possible impacts of CCT and/or Raskin on DDS with respect to the group of households that had not received any of these programs before the baseline survey. Two years may not be sufficient to change people's mind-set to diversify their food consumption, especially for Indonesians who mostly eat rice at every meal as described in the beginning of this chapter. Second, more sufficient socialization may be needed before the program is implemented. Socialization

regarding the objective of the program and implementation, including how the funds or additional income from the program should and should not be used, may need to be an integrated activity in the program implementation. Many social protection programs are implemented with a lack of socialization on the program's objective, targeted beneficiaries, benefit levels, and delivery mechanism (Grosh et al., 2008). This is also the case in Indonesia whose main social programs suffer from unreliable socialization and monitoring activities (Hastuti et al., 2008; Sumarto and Widyanti, 2008; Rosfadhila et al., 2009). Poor socialization could lead to communities receiving inconsistent information and affect program performance and acceptance (World Bank, 2012a). For example, evidence suggests the misuse of funds due to lack of socialization and monitoring on how the funds should or should not be used (Widjaja, 2013; Syukri et al., 2010). Furthermore, the absence of monitoring how households use the funds from the program may also explain the results found in this study.

Not many empirical studies have been conducted on the impact evaluation of social protection programs in Indonesia, especially for CCT and Raskin, that can be compared to the results of this study. The World Bank (2011) examined the impact of CCT and found that CCT increased the share of food expenditure on high-protein foods (meat, fish, eggs, dairy) by nearly three quarters of a percentage point. Pangaribowo (2012) similarly showed that Raskin enabled the poor to increase expenditures on nutritious food and health care. However, none of the previous studies has analyzed the impact of the programs on food diversification.

4.6.1.2. Treatment effects for existing Raskin recipients

In the second set of analyses, we look at the group of households that received Raskin in period 1. The control group (treatment 4) is the group of households that received Raskin in period 1 and did not receive any program aid in period 2. The results of (5 vs 4) estimate the impact of CCT for households that previously received Raskin (and stopped receiving it in period 2), while (6 vs 4) estimates the impact of receiving Raskin in both periods. Also, the results of (7 vs 4) estimate the impact of receiving both CCT

and Raskin in the second period for households that were Raskin recipients in period 1 (see Table 4.3 in the previous section).

The estimated difference in DDS before and after the baseline (between period 1 and 2) for the control group is 0.38 (statistically significant at the 1% level). Thus, the results in Table 4.9 - (5 vs 4) - show that receiving CCT in the second period increased the difference by an average of 0.36 (ATE) versus an average of 0.38 for households that do not receive any program aid in the second period. For those who were treated, receiving CCT in the second period increased the difference in DDS by an average of 0.38 (ATT) or about 81% from the average of 0.47 for households that were not treated.

Table 4.9 ATE and ATT in the DDS – existing Raskin recipients in period 1

	ATE	ATT
5 vs 4	0.36*	0.38**
	(0.208)	(0.197)
6 vs 4	0.187*	0.13
	(0.109)	(0.127)
7 vs 4	0.25**	0.22*
	(0.11)	(0.134)

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

While the estimated ATE for receiving Raskin in both period (6 vs 4) is 0.18 or about half of the estimated ATE for receiving CCT. For those who treated with treatment 6, the program effect is not significantly different from zero. On the other hand, the estimated ATE of treatment 7 – receiving both CCT and Raskin in the second period – is 0.25 and statistically significant at the 5% level. This impact is lower than the estimated results for treatment 5 (0.36). Compared to similar households that received Raskin in the first period, receiving only CCT in the second period had a more significant impact on the households than receiving both CCT and Raskin. One possible explanation is that households that received Raskin would assume that most of their calorie needs were fulfilled by consuming Raskin rice and therefore have less incentive to buy other kinds of foods. This is possible as Indonesians have a high dependency on rice; it is the main

staple food, accounting for more than two-thirds of their total cereal calorie intake.[14] In Indonesia, most people eat rice three times a day, for breakfast, lunch, and dinner. The popular local saying goes 'if you have not had rice, then you have not eaten.'

This second part of the analysis also looks at the relative effects of ATE and ATT between single and multiple treatments (Table 4.10). The estimates reveal that the ATE and ATT of going from treatment 5 (receiving CCT only) to treatment 7 (receiving both CCT and Raskin) are not significantly different from zero (7 vs 5). On the other hand, the estimated ATE of going from treatment 6 (receiving Raskin only) to treatment 7 (receiving both CCT and Raskin) is not significant (7 vs 6). While for those who are treated, the estimated difference in DDS increased by 0.1.

Table 4.10 Relative effects in the DDS - existing Raskin recipients in period 1

	ATE	ATT
7 vs 5	-0.1	-0.25
	(0.18)	(0.20)
7 vs 6	0.06	0.1*
	(0.05)	(0.06)

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

When we look specifically at households that received aid from both programs, we have two types of households. First is the group of households that started receiving CCT and Raskin at about the same time (in period 2). This group previously had not received any program aid and suddenly received aid from two programs (labelled treatment 3 in the first set of analysis). They have an insignificant impact on the measured outcome. A lack of socialization, as explained in the previous sub-section, is one possible explanation. This condition would be even worse for households that receive first-time benefits from more than one program simultaneously (as in the case of treatment 3).

[14] Own estimation based on data from FAOSTAT.

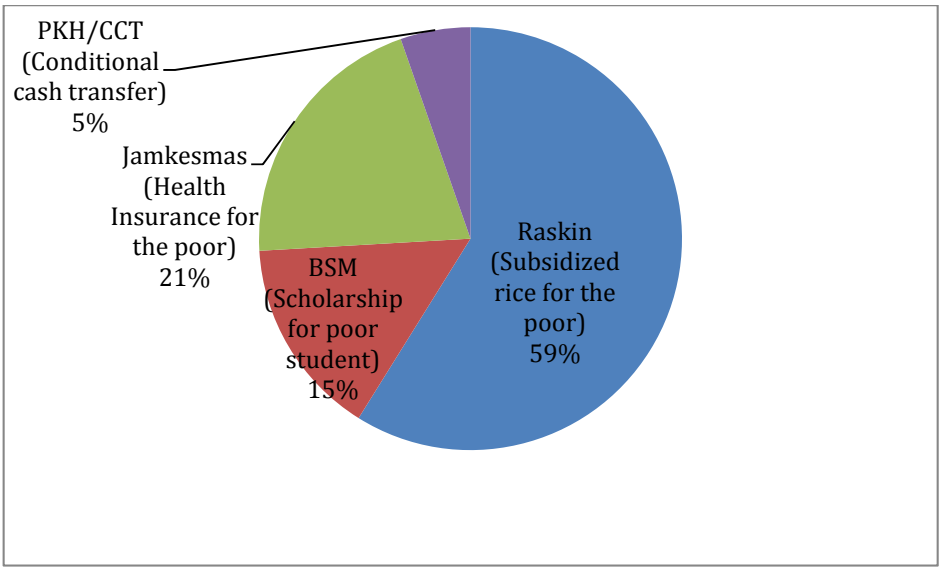
Second, the group of households that received Raskin in period 1 and both Raskin and CCT in period 2 felt a positive and significant impact (labelled treatment 7 in the second set of analysis). This group of households may have enjoyed the benefit from Raskin before receiving CCT. The experience of becoming Raskin recipients may help households understand how the social protection works in improving their lives.

These results suggest that it is important in policy evaluation to investigate the interaction between policies to determine whether the complementarities between CCT and Raskin are worth implementing or it is better to re-formulate these two overlapping policies.

4.6.2. Cost-effectiveness of programs

To see which program is more cost-effective, this study explored the government expenditures on each program. Figure 4.1 shows that in 2012 Raskin accounted for nearly two-thirds of the total budget for all social protection programs, while CCT had about a 5% share.

Figure 4.1 Central government 2012 budget



Source: Financial Note and Indonesian Budget Fiscal Year 2013, Ministry of Finance.

One of the World Bank's collections of public expenditure review estimates the public spending on CCT and Raskin in Indonesia (2012). The spending items include the amount of transfer and administration costs which mainly involve goods and services, including socialization, monitoring, and evaluation. We utilize these estimates and compare them to the impact of each program analyzed in this study (see Table 4.11).

Table 4.11 Costs and Impacts of CCT and Raskin

	CCT	In-kind (Raskin)
Public expenditure (US $)[1]	132,000,000	1,749,000,000
Number of recipients (households)[1]	778,000	18,500,000
Public expenditure per recipient (US $)	169.67	94.54
Impact on DDS for non-Raskin recipients[2]	0	0
Impact on DDS for existing Raskin recipients in period 1[2]	81%	0

1) *World Bank,2012,* 2)*Table 4.9 and Table 4.7*

Table 4.11 illustrates that, for existing Raskin recipients, it is more cost-effective to implement CCT than continue giving Raskin. Per US $100 spent on CCT, the estimated impacts on food utilization indicators increased by 48% for existing Raskin recipients. The same amount of money is estimated to have an insignificant impact if it is spent on Raskin. Note that CCT may have impacts on education and health outcomes as the program conditionality requires households to invest their resources and time in health and education. This study, however, does not provide a full cost/benefit analysis of CCT as it is beyond the scope of this paper.

However, since no significant impact was found for households that did not receive Raskin in period 1, we cannot conclude which program is more cost-effective for this particular group. This would be of interest for further research when the required data with longer duration of assessment are available. This study's analyses were performed using a baseline survey in 2007 and a follow-up survey in 2009. Two years may not be sufficient to capture the impact of the programs on food utilization indicators, especially because this requires changing people's mind-set and behavior with respect to their food consumption.

4.8. Conclusions

This study reports the results of the impact evaluations of CCT and Raskin on food and nutrition security outcomes. Two separate empirical models have been analyzed to understand the synergy impact between CCT and Raskin on food and nutrition security outcomes. The first analysis looks at households that had not received Raskin or CCT in period 1 (before the baseline survey was conducted) while the second set of analyses looks specifically at households that had received Raskin in period 1. In the first analysis, we find no significant impact of any treatment, while the results of the second analysis show a positive and significant average treatment effect on the treated, especially for households that received only CCT and households that received both CCT and Raskin in period 2. These results suggest that households that previously received Raskin may have become more familiar with the implementation of social protection programs and therefore may be better able to manage the additional resource of income provided by the program. The results also suggest that more sufficient socialization regarding the objective of the program, including how the funds or additional income from the program should and should not be used, may be needed. Program socialization may help households in understanding how the programs work to achieve the program's objective and finally help them improve their live.

On the other hand, the second set of analyses shows that the estimated impact of receiving only CCT was higher than for receiving both CCT and Raskin. These results suggest that providing both CCT and Raskin may not always yield better outcomes than providing only CCT. From the institutional perspective, it would be more effective to introduce one program with sufficient socialization, monitoring, and evaluation activities than to introduce two programs at the same time. Likewise, from the beneficiaries' perspective, it would be easier for households to gradually manage the additional resource of income that comes from one program rather than face a rapid change in their financial situation due to receiving benefits from two programs at the same time.

This study points to the importance of further research to examine the impact of the programs on food and nutrition security indicators for households that did not receive benefits from any program (Raskin or CCT) in the first period since this study does not find convincing results using two years of data. In addition, although this study does not provide a complete cost/benefit analysis of social protection programs in Indonesia, it suggests to consider the importance of reformulating these overlapping policies, especially because Raskin consumes more than half of the social protection budget.

Chapter 5. General Conclusions

Poverty has been one of the greatest problems that concern the world for decades. Although poverty is scattered across the globe, the related issues are more critical in developing countries. Indonesia is not an exception. Despite of being the world's 10th largest economy in terms of purchasing power parity, 28.6 million Indonesians still live in poverty. As in many other developing countries, the government of Indonesia has stated poverty reduction strategies in its main National Agenda. Great amount of resources have been spent on reforms and programs aimed at reducing poverty. This dissertation discusses two strategies that are commonly used to tackle poverty, including in Indonesia: (1) provision of basic services and infrastructures and (2) social protection programs.

This dissertation starts by analyzing the persistence of poverty in rural Indonesia, this study finds that the true state dependence of poverty is significant for the case of Indonesia. This means that a household's current poverty status is a substantial element that can be used to determine the household's future state of poverty. Therefore, the results suggest the importance of having the effective poverty reduction strategy, as it will help not only to reduce the current poverty rates but also to boost long-term growth. This study also reveals other correlates of poverty that are related to public services and community infrastructures in rural areas. Resides in a village with access to a paved main road, high school, and proper non-primitive irrigation system would be less likely to be in poverty. While residing in a village that has interruptions in pipe water services are positively associated with probability of being poor. The results suggest that poverty reduction strategy may consider public services and community infrastructures variables above, especially for the targeting method in determining eligible beneficiaries for social protection programs. The effective targeting method is essential in designing social protection system in a country. Therefore, in addition to the household characteristics that have been used in the current targeting method, it may also be beneficial to include

public services and community infrastructures variables that are found to play a role in determining household's poverty status.

In exploring the effectiveness of decentralized education public spending on education outcomes at secondary level, this research reveals that after a decade implementation of an important institutional reform - decentralization - in Indonesia, education public spending has very little impact on education outcomes. These negligible impacts are robust using different specifications and across income distribution. The results suggest the importance of improving quality of spending. The absence of review and monitoring system of local government actual expenditures and activities may be threatening transparency and budget accountability.

On the other hand, some of micro interventions are found to have positive impacts for the poor. Social protection programs that are targeted to the poor, helps household in maintaining their food and nutrition security. These results suggest that households that previously received Raskin may have become more familiar with the implementation of social protection programs and therefore may be better able to manage the additional resource of income provided by the program. We found that providing both CCT and Raskin may not always yield better outcomes than providing only CCT. From the institutional perspective, it would be more effective to introduce one program with sufficient socialization, monitoring, and evaluation activities than to introduce two programs at the same time. Likewise, from the beneficiaries' perspective, it would be easier for households to gradually manage the additional resource of income that comes from one program rather than face a rapid change in their financial situation due to receiving benefits from two programs at the same time.

The findings of this study reaffirm the importance of public services and infrastructures as well as social protection programs in tackling poverty. The results also suggest that performing evaluation on the effectiveness of public spending and the implementation of social protection programs are necessary in order to ensure the public funds are being used efficiently that in ways that are consistent with the government's strategic poverty reduction goals.

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Table A.1 Variables used in the PMT in 2005

No.	Variable
1	Floor area
2	Floor type
3	Wall type
4	Toilet facility
5	Drinking water source
6	Source of lighting
7	Fuel
8	Frequency of buying beef/meat/milk in one week
9	Frequency of eating in one day
10	Frequency of buying new clothes in one year
11	Ability to go to the doctor
12	Sector of work of household head
13	Highest education of household head
14	Assets owned by the households

Table A.2 Household characteristics in the PMT 2008

No.	Variable
1	Type of place (1=Urban, 0=Others)
2	Percapita floor
3	Type of floor (1=Not earth, 0=Others)
4	Type of wall (1=Brick/Cement, 0=Others)
5	Toilet facility (1=Private, 0=Others)
6	Drinking water source (1=Clean, 0=Other)
7	Electricity (1=PLN, 0=Others)
8	Type of roof (1=Concrete/Corrugated, 0=Others)
9	Fuel for cooking (1=Not Firewood, 0=Other)
10	Ownership of house (1=Private, 0=Others)
11	Having micro credit
12	Household size
13	Household size square
14	Age of the head of household
15	Age of the head of household Square
16	Head of household (1=male, 0=female)
17	Head of household is married
18	Head of household is male*married
19	Working sector of household head is agriculture

20	Working sector of household head is industry
21	Working sector of household head is service
22	Working sector of household head is in formal sector
23	Working sector of household head is in informal sector
24	Education attaintment of household head is elementary school
25	Education attaintment of household head is junior high school
26	Education attaintment of household head is senior high school or higher
27	Number of children 0-4
28	Number of children in elementary school
29	Number of children in junior high school
30	Number of children in senior high school
31	Maximum education attaintment within household is elementary school
32	Maximum education attaintment within household is junior high school
33	Maximum education attaintment within household is senior high school or higher
34	Dependency ratio
35	Affordable to have health care if sick
36	Have saving
37	Have valuable goods
38	Have land agriculture
39	Have motocycle

Table A.3 Village characteristics in the PMT 2008

No.	Variable
1	Population density
2	Distance to district
3	Existing of elementary school (1=exist, 0=not exist)
4	Existing of junior high school (1=exist, 0=not exist)
5	Existing of community health care center (1=exist, 0=not exist)
6	Existing of Polindes (1=exist, 0=not exist)
7	Existing of Posyandu (1=exist, 0=not exist)
8	Avaibility of doctor (1=available, 0=not available)
9	Avaibility of midwife (1=available, 0=not available)
10	Road type (1=asphalt, 0=others)
11	Existing of semi permanen market place (1=exist, 0=not exist)
12	Existing of credit facility (1=exist, 0=not exist)

Table A.4 Net enrolment rates using lag (1) of public spending – OLS, FE, IV

	OLS		Fixed effect		IV	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Ln (real GRDP per capita)	0.0378***	0.0256***	0.00151	0.00903	-0.00984	-0.0114
	(0.00601)	(0.00526)	(0.0158)	(0.0105)	(0.0181)	(0.00921)
Lagged (1) Ln (district's education spending per school-aged child)	0.0119**	0.00994***	0.00218	0.00134	-0.0167	0.0327**
	(0.00513)	(0.00342)	(0.005)	(0.00279)	(0.0272)	(0.0138)
Share of urban population	-0.105***	-0.00673	-0.0446	0.022	-0.125*	0.0266
	(0.0237)	(0.0173)	(0.0683)	(0.0373)	(0.0736)	(0.0375)
Share of poor population	0.432***	0.196***	0.164	-0.0685	0.139	-0.0718
	(0.0542)	(0.0412)	(0.113)	(0.0856)	(0.118)	(0.0602)
Share of female population	-0.096	-0.292*	-0.0446	-0.127	-0.209	-0.188
	(0.208)	(0.169)	(0.187)	(0.122)	(0.251)	(0.128)
Average age of population	0.0172***	0.0209***	0.00517	-0.00154	0.0110*	0.000949
	(0.00293)	(0.0021)	(0.00504)	(0.00299)	(0.00577)	(0.00294)
Average household size	-0.00744	0.0122	0.00336	0.00974	0.0213	0.0145
	(0.0137)	(0.0101)	(0.0181)	(0.0102)	(0.0182)	(0.00927)
Share of school-aged children	1.053***	0.948***	0.412**	0.479***	0.587**	0.386***
	(0.203)	(0.143)	(0.2)	(0.142)	(0.249)	(0.127)
Average education attainment	0.113***	0.0794***	0.0679***	0.0628***	0.0733***	0.0598***
	(0.00648)	(0.00506)	(0.0113)	(0.00717)	(0.0131)	(0.00666)
Constant	-1.744***	-1.224***	-0.347	-0.059		
	(0.182)	(0.139)	(0.34)	(0.211)		
Year dummies	Yes		Yes		Yes	
Region dummies	Yes					
Observations	2,452	2,452	2,452	2,452	1,857	1,857
R-squared	0.46	0.64	0.66	0.84		
Number of district			401	401	353	353

*Notes: Clustered standard errors in bracket; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for year dummy are not reported in the table.*

Table A.5 Transition rates using lag (1) of public spending – OLS, FE, IV

	OLS		Fixed effect		IV	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Ln (real GRDP per capita)	0.0131**	0.00658	-0.00587	0.00512	-0.00599	0.000954
	(0.00571)	(0.00475)	(0.0104)	(0.00641)	(0.0133)	(0.00591)
Lagged (1) Ln (district's education spending per school-aged child)	0.00949**	0.00576*	0.00068	0.000387	0.0173	0.0269***
	(0.00424)	(0.00325)	(0.00393)	(0.00171)	(0.0199)	(0.00887)
Share of urban population	0.0122	0.106***	0.0425	0.123***	0.114**	0.137***
	(0.022)	(0.0159)	(0.0463)	(0.0228)	(0.054)	(0.024)
Share of poor population	0.194***	0.0712	0.120**	0.0128	0.170**	0.0134
	(0.053)	(0.0455)	(0.0576)	(0.0382)	(0.0868)	(0.0386)
Share of female population	0.403**	0.567***	0.433***	0.185**	0.577***	0.296***
	(0.192)	(0.144)	(0.15)	(0.0739)	(0.184)	(0.0818)
Average age of population	0.00681**	0.00142	0.00131	-0.0113***	0.00241	-0.00986***
	(0.0027)	(0.0019)	(0.00335)	(0.00169)	(0.00424)	(0.00188)
Average household size	0.0463***	0.0520***	0.00939	0.0150**	0.00272	0.0119**
	(0.0135)	(0.0112)	(0.0109)	(0.00606)	(0.0134)	(0.00594)
Share of school-aged children	-0.0122	-0.136	-0.597***	-0.362***	-0.543***	-0.323***
	(0.217)	(0.152)	(0.15)	(0.0722)	(0.183)	(0.0813)
Average education attainment	0.0862***	0.0649***	0.0670***	0.0693***	0.0554***	0.0648***
	(0.00678)	(0.00505)	(0.0103)	(0.00447)	(0.0096)	(0.00427)
	-1.035***	-0.524***	-0.103	0.294**		
	(0.178)	(0.14)	(0.218)	(0.129)		
Year dummies	Yes		Yes		Yes	
Region dummies	Yes					
Observations	2,452	2,452	2,452	2,452	1,857	1,857
R-squared	0.58	0.77	0.78	0.94		
Number of district			401	401	353	353

*Notes: Clustered standard errors in bracket; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for year dummy are not reported in the table.*

Table A.6 Net enrolment rates using lag (2) of public spending – OLS, FE, IV

	OLS		Fixed effect		IV	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Ln (real GRDP per capita)	0.0389***	0.0288***	-0.0177	-0.00103	-0.0185	-0.0102
	(0.00694)	(0.00533)	(0.016)	(0.0114)	(0.0216)	(0.0106)
Lagged (2) Ln (district's education spending per school-aged child)	0.0106*	0.00890**	0.000143	0.00204	-0.0347	0.0278*
	(0.00577)	(0.00353)	(0.00665)	(0.00269)	(0.0297)	(0.0146)
Share of urban population	-0.106***	-0.00308	-0.0705	0.0257	-0.0682	0.0138
	(0.0256)	(0.0176)	(0.0743)	(0.0363)	(0.0822)	(0.0403)
Share of poor population	0.451***	0.218***	0.19	-0.0398	0.206	-0.033
	(0.0587)	(0.0426)	(0.125)	(0.0734)	(0.133)	(0.065)
Share of female population	-0.0517	-0.308*	-0.233	-0.250**	-0.0235	0.0331
	(0.231)	(0.172)	(0.214)	(0.119)	(0.372)	(0.182)
Average age of population	0.0170***	0.0206***	0.0130**	0.00126	0.0142**	0.00155
	(0.00343)	(0.00216)	(0.00557)	(0.00316)	(0.00653)	(0.0032)
Average household size	-0.00526	0.0154	0.0145	0.0219***	0.0204	0.0194**
	(0.0148)	(0.0101)	(0.017)	(0.00752)	(0.0189)	(0.00925)
Share of school-aged children	0.989***	0.844***	0.807***	0.383***	1.083***	0.353**
	(0.23)	(0.15)	(0.231)	(0.145)	(0.291)	(0.143)
Average education attainment	0.111***	0.0758***	0.0683***	0.0540***	0.0672***	0.0479***
	(0.00735)	(0.00511)	(0.0121)	(0.00716)	(0.0141)	(0.00694)
Constant	-1.720***	-1.181***	-0.256	0.13		
	(0.194)	(0.137)	(0.354)	(0.237)		
Year dummies	Yes		Yes		Yes	
Region dummies	Yes					
Observations	2,110	2,110	2,110	2,110	1,592	1,592
R-squared	0.45	0.63	0.68	0.84		
Number of district			383	383	334	334

*Notes: Clustered standard errors in bracket; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for year dummy are not reported in the table.*

Table A.7 Transition rates using lag (2) of public spending – OLS, FE, IV

	OLS		Fixed effect		IV	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Ln (real GRDP per capita)	0.0158**	0.00905*	-0.00401	0.00651	-0.00807	-0.00149
	(0.00627)	(0.00503)	(0.0131)	(0.00881)	(0.0158)	(0.00661)
Lagged (2) Ln (district's education spending per school-aged child)	0.0135***	0.00780**	0.00453	0.00164	0.00654	0.0243***
	(0.00453)	(0.00345)	(0.00463)	(0.00195)	(0.0218)	(0.0091)
Share of urban population	0.0164	0.0987***	0.0503	0.119***	0.045	0.106***
	(0.0225)	(0.0159)	(0.054)	(0.0223)	(0.0602)	(0.0251)
Share of poor population	0.199***	0.0782	0.195***	0.009	0.299***	0.0108
	(0.0555)	(0.0476)	(0.0732)	(0.0492)	(0.0971)	(0.0406)
Share of female population	0.297	0.562***	0.518***	0.268***	0.613**	0.199*
	(0.194)	(0.148)	(0.177)	(0.0785)	(0.272)	(0.114)
Average age of population	0.00776***	0.000931	0.0005	-0.0106***	0.00164	-0.00727***
	(0.0026)	(0.00196)	(0.00353)	(0.00191)	(0.00478)	(0.002)
Average household size	0.0448***	0.0515***	-0.00871	0.0129**	-0.00651	0.00724
	(0.0142)	(0.0115)	(0.0121)	(0.00569)	(0.0138)	(0.00577)
Share of school-aged children	0.0516	-0.136	-0.462**	-0.328***	-0.357*	-0.298***
	(0.212)	(0.154)	(0.191)	(0.0856)	(0.213)	(0.0891)
Average education attainment	0.0841***	0.0659***	0.0659***	0.0667***	0.0654***	0.0628***
	(0.00699)	(0.00509)	(0.0114)	(0.00466)	(0.0104)	(0.00433)
Constant	-1.083***	-0.560***	-0.17	0.239		
	(0.177)	(0.141)	(0.286)	(0.163)		
Year dummies	Yes		Yes		Yes	
Region dummies	Yes					
Observations	2,110	2,110	2,110	2,110	1,592	1,592
R-squared	0.57	0.77	0.78	0.94		
Number of district			383	383	334	334

*Notes: Clustered standard errors in bracket; *** p<0.01, ** p<0.05, * p<0.1. Coefficients for year dummy are not reported in the table.*

Table A.8 Food groups used in the DDS measures

DDS
1. Grains (rice, corn, wheat, rice flour, corn flour, etc.).
2. Tubers (sweet potato / cassava, sweet potatoes / yams, potatoes, cassava, taro, sago, etc.
3. Fish (fresh, preserved fish / salted, shrimp, etc.).
4. Meat (beef/lamb/pork/ chickens, etc)
5. Eggs and dairy products (eggs, fresh milk, condensed milk, milk powder, etc.)
6. Vegetables (spinach, kale, cucumber, carrots, beans, chickpeas, onions, peppers, tomatoes, etc.)
7. 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.)
9. 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 A.9 Multinomial logit – base outcome: treatment 0

	Treatment 1	Treatment 2	Treatment 3
Dummy of living in a house with proper roof	0.254	0.469*	0.123
	(0.49)	(0.28)	(0.35)
Dummy of living in a house with proper floor	-0.185	0.106	-0.398
	(0.36)	(0.22)	(0.3)
Dummy of having access to proper sanitation system (septic tank)	-0.084	-0.309*	-0.823**
	(0.37)	(0.19)	(0.33)
Dummy of having a private toilet	-0.111	-0.005	-0.023
	(0.34)	(0.19)	(0.29)
Dummy of having access to clean water	1.102**	0.099	-0.067
	(0.52)	(0.21)	(0.29)
Dummy of having access to electricity	0.089	-0.301	-0.192
	(0.55)	(0.31)	(0.38)
Dummy of having main fuel for cooking is firewood	-1.055***	-0.327*	-0.732**
	(0.41)	(0.18)	(0.32)
Dummy of housing is own property	-0.48	0.393**	0.394
	(0.33)	(0.2)	(0.3)
Total number of asset	-0.211**	-0.057	-0.271***
	(0.1)	(0.04)	(0.07)
Dummy of BLT recipient	-0.137	0.113	0.422
	(0.41)	(0.2)	(0.38)
Dummy of Askeskin/Jamkesmas recipient	0.692**	0.548***	0.337
	(0.33)	(0.19)	(0.29)
Dummy of having a pregnant mother in the household	0.708	0.226	0.810*
	(0.62)	(0.39)	(0.49)
Dummy of household head never attended school	0.636	0.31	0.055
	(0.43)	(0.22)	(0.35)
Dummy of education attainment of household head is primary school	0.728*	0.499**	0.529*
	(0.4)	(0.2)	(0.3)
Dummy of living in urban areas	-0.095	-0.341	-0.486
	(0.42)	(0.21)	(0.33)
Constant	-1.819*	0.341	0.13
	(0.96)	(0.49)	(0.7)

*Notes: Robust standard errors in bracket; *** p<0.01, ** p<0.05, * p<0.1.*

Table A.10 Multinomial logit – base outcome: treatment 4

	Treatment 1	Treatment 2	Treatment 3
Dummy of living in a house with proper roof	0.125	0.388**	0.485***
	(0.3)	(0.18)	(0.17)
Dummy of living in a house with proper floor	-0.365**	-0.438***	-0.185*
	(0.19)	(0.1)	(0.1)
Dummy of having access to proper sanitation system (septic tank)	-0.428**	-0.496***	-0.205**
	(0.22)	(0.11)	(0.1)
Dummy of having a private toilet	0.057	-0.281***	-0.082
	(0.19)	(0.1)	(0.1)
Dummy of having access to clean water	-0.064	-0.356***	-0.239**
	(0.23)	(0.13)	(0.12)
Dummy of having access to electricity	-0.459	-0.540***	-0.420**
	(0.29)	(0.18)	(0.17)
Dummy of having main fuel for cooking is firewood	-0.324	-0.400***	-0.199**
	(0.22)	(0.11)	(0.1)
Dummy of housing is own property	-0.079	0.403***	0.469***
	(0.22)	(0.13)	(0.12)
Total number of asset	-0.166***	-0.075**	0.029
	(0.06)	(0.03)	(0.03)
Dummy of BLT recipient	1.129**	0.553***	0.363**
	(0.48)	(0.17)	(0.15)
Dummy of Askeskin/Jamkesmas recipient	0.255	0.504***	0.409***
	(0.17)	(0.09)	(0.09)
Dummy of having a pregnant mother in the household	-0.398	-0.048	-0.018
	(0.4)	(0.19)	(0.18)
Dummy of household head never attended school	0.600**	0.524***	0.392***
	(0.24)	(0.13)	(0.12)
Dummy of education attainment of household head is primary school	0.265	0.407***	0.311***
	(0.23)	(0.12)	(0.11)
Dummy of living in urban areas	-0.032	-0.157	-0.112
	(0.21)	(0.11)	(0.1)
Constant	-1.339**	1.421***	1.908***
	(0.63)	(0.31)	(0.29)

*Notes: Robust standard errors in bracket; *** p<0.01, ** p<0.05, * p<0.1.*

Figure A.1 Estimated densities for non-Raskin recipients in period 1

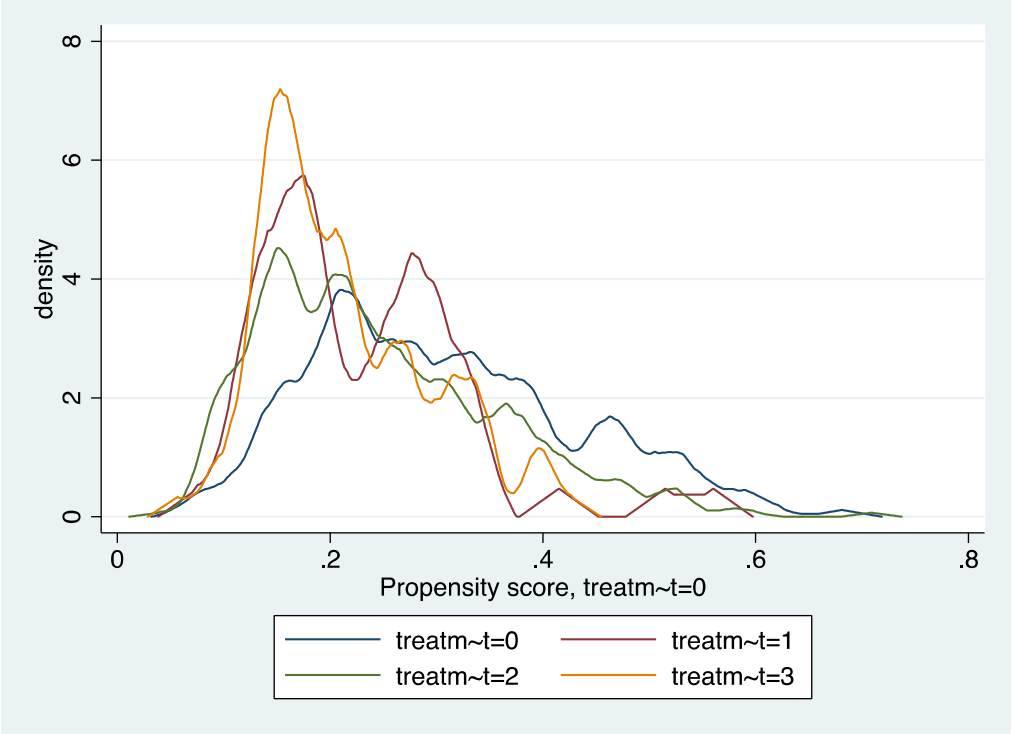

Figure A.2 Estimated densities for existing Raskin recipients in period 1