# Schooling Responses to Social Pension:

## The Evidence from Thailand Old Age Allowance Program

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**Abstract:**

This paper provides the first evaluation of spillover effects of the social pension program in Thailand. We utilize five years of the nationally representative household survey data, starting from the first year in 2009, when the program was universally implemented, until 2017 that the data set is recently available. According to the results, we do not find evidence that additional income from the old age allowance (OAA) has led to an increase in the expenditure on education of a household, in comparison to non-participant households. However, the impact of the OAA on education appears to be significant when total expenditure of the household is taken into consideration. The secure source of income from the OAA is found to increase the share of total household expenditure that is contributed to education. Moreover, we also observe that the OAA promote school attendance among co-residing children. The positive impact of the OAA on the share of education and school attendance is also materialized among the poorest 40 percent families.

**Key words**: social pension, social protection, intra-household allocation, private education expenditure, school attendance, Thailand

**JEL Classification**: D13, D64, I38, J14

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# 1. Introduction

Non-contributory pensions, also known as social pensions, have become increasingly important sources of support for older adults particularly those of low socioeconomic status. Such programs have been implemented in several developing countries in Latin America, Africa and Asia. Following the growing prevalence of social pensions, a good deal of research has been conducted to evaluate their impacts on poverty and vulnerability, physical and mental health status, and decisions to retire (see e.g. Case, 2001; Case & Deaton, 1998; Chen & Tan, 2018; Cheng, Liu, Zhang, & Zhao, 2018; Galiani, Gertler, & Bando, 2016). Moreover, since income from social pensions could be pooled within the household (Barrientos & Lloyd-Sherlock, 2002), evaluation studies of social pension programs are also extended to measure the impact upon those living under the same roof such as nutritional status and school enrolment of children; migration and labor decisions of young adults; as well as wellbeing of the whole family (see e.g. Adamchak, 1995; Duflo, 2003; Kassouf & Rodrigues de Oliveira, 2012).

Among a number of potential spillover effects, the impact on household investment in education is of particular interest. Additional income from social pensions can increase household financial resources, which in turn allow households to invest more in education of their offspring. As education is one of the key factors influencing income mobility and mobility in well-being (Narayan et al., 2018), social pensions could play a role in breaking the intergenerational transmission of poverty and fostering upward intergenerational mobility. There have been some studies trying to shed light on the schooling response to social pensions. However, most studies are located in either Brazil (e.g. De Carvalho Filho, 2012; Ponczek, 2011) or South Africa (e.g. Case & Deaton, 1998; Edmonds, 2006). Since the impact of social pensions tends to be contextual (Chen & Tan, 2018), providing new evidence apart from these two countries would bring new insights into the literature of social pensions.

The old age allowance (OAA) program in Thailand is an unconditional cash transfer program for Thai senior citizens at the age of 60 or above. This social pension scheme has been established since 1993 as a mean-tested program targeting the poor before being expanded in 2009 to cover all Thai elderly persons, who are not covered by other pension programs (Sakunphanit & Suwanrada, 2011; Suwanrada, Sukontamarn, & Bangkaew, 2018). Despite being in operation for more than a decade, existing literature on the impact of the OAA remains limited (Paweenawat & Vechbanyongratana, 2015; Suwanrada & Leetrakul, 2014). Moreover, most of the studies to date have focused only on the immediate effect of the OAA on beneficiaries. There is no impact evaluation study to date, to the best of our knowledge, that examines the potential spillover effects of the OAA upon their co-residents especially the impact on household investment in education.

The objective of this study is to fill this research gap by evaluating to what extent additional resource from the OAA fosters intergenerational mobility by allowing households to invest more in education of their school-age members. We utilize 5 years of the nationally representative cross-sectional household surveys (SES), starting from the first year when the program was expanded to cover all Thai elderly in 2009 to the most recent year, in 2017, that the data set is available. As the OAA is a self-registration program, we use several empirical strategies to account for the potential endogeneity.

The paper proceeds as follows. Section two provides theoretical background that motivates and frames our study. Section three summarizes previous findings of the spillover effects of social pension programs worldwide. The subsequent section describes Thailand contexts, provides details of the OAA program and reviews existing studies on the impact of the program. Section five and six explains data and methodologies used in this study, respectively. Section seven presents the empirical results and the last section concludes and discusses the results.

# 2. Theoretical Background

Elderly people in developing countries tend to live in households consisting of more than two generations (Barrientos & Lloyd-Sherlock, 2002). This multigenerational living arrangement is found either in the form of extended or skipped-generation family. Extended family is a household structure where three or more generations live together under the same roof (Peek, Im-em, & Tangthanaseth, 2016). This household composition facilitates resource sharing and allows family members to support each other (Anderson & Allen, 1984). Moreover, as summarized in Quisumbing (1997), the extended family structure makes it possible for members to smooth consumption, share risks, maximize gains from family farms and cultivate values of old age support in their children. However, in many cases, economic circumstances may give rise to the challenge of maintaining extended family structures as young adult members may have to migrate for better job opportunities and leave their children behind with the grandparents. This living arrangement where grandparents need to live and take care of their grandchildren alone, without other working-age members in the household refers to the skipped-generation household setting, which is becoming an increasingly common phenomenon in developing economies (Peek et al., 2016).

When considering multigenerational living arrangement, an insight into how households allocate resources among family members is of importance. Broadly speaking, intra-household allocation of resources can be explained by two main distinct theories: unitary and collective model. The unitary model assumes that a household acts as one single decision-making unit maximizing one single utility function (Alderman, Chiappori, Haddad, Hoddinott, & Kanbur, 1995; Becker, 1981). Income, as well

as other resources, from each and every member will be pooled and consumption allocation within the household is going to depend merely on the amount of these pooled resources, not the preference of those who receive it (Alderman et al., 1995; Browning, Bourguignon, Chiappori, & Lechene, 1994). Therefore, the identification of the policy target group does not matter as the transfer will be shared within household no matter what.

The unitary model appears to be attractive due to its simplicity; however, it ignores personal interests, which are likely to vary, and probably compete, among family members. Unlike the unitary model, the collective model tries to aggregate different preferences through collective decision making. Under this collective approach, the ownership of resources affects the allocation of resources among household members (Alderman et al., 1995; Browning et al., 1994; Haddad, Hoddinott, & Alderman, 1997; Pezzin & Schone, 1997). In other words, the household decision to spend on different goods and services depends on the preference of the individual member who receives or owns the resources (Chiappori, 1992). According to the collective model, it is likely that pension income will be used directly in favor of the needs of elderly members receiving the pension such as healthcare and aged care services. However, there are economic theories suggesting motives why elderly may redistribute their resources to other members.

According to Becker (1974) and Becker and Tomes (1976), transfers among household members occur from altruism, which refers to selfless concerns and actions for the good of others. Therefore, in the context of social pensions, grandparents may transfer a part of their pension income to other members without expecting anything in return because of their benevolence, caring and moral obligation towards their family members. On the other hand, intra-household transfers may also be motivated by self-interests. Transfers may be made in an exchange for other services (Bernheim, Shleifer, & Summers, 1985; Cox, 1987). For example, parents may transfer to their children in exchange for their company (Cox & Rank, 1992). Likewise, family members may consider transfers as an insurance against risk (Frankenberg, Lillard, & Willis, 2002) or as a loan to other credit-constrained members (Cox, 1990). In the case of a social pension, pensioners may allocate their pension in exchange for companionship. Elderly members may also expect other members to take care of them or repay them when they earn income or acquire their own resources in the future.

Investing in education is one way by which social pensioners can redistribute their pension income to their (grand)children. According to Becker and Tomes (1979), in addition to the inheritability endowment, parents can increase the human capital of their children through an investment in education. Education has a close relationship with earning ability of individuals as well as other positive characteristics such as improved health status and greater longevity (Black & Devereux, 2010; Ferreira et al., 2012; Narayan et al., 2018). Children from poor families that under-invest in education

may not be able to acquire a higher income in the future (Checchi, 1997). Consequently, poverty and vulnerability in the current generation will be transmitted to the next generations (ibid). On the other hand, families that place a strong emphasis on educational investment are more likely to experience upward intergenerational mobility (Narayan et al., 2018). Therefore, if additional income from a pension is redistributed to education of co-residing children, either out of altruism or the exchange motive, then the social pension may have long-lasting benefits on upward mobility and poverty eradication.

# 3. Spillover Effects of Social Pensions

There is a large, and still growing, literature on the spillover effects of social pensions. Numerous studies clearly demonstrate an impact of the program on pensioners' co-residents. According to Barrientos and Lloyd-Sherlock (2002), a pension is a secure source of income, which enables households to invest in human, physical and social capital. These investments will in turn help households to break the intergenerational transmission of poverty and escape from the poverty trap. A number of empirical studies have supported this argument. For example, Duflo (2003) finds that the South-African pension program improves the anthropometric status of children, especially that of girls, living with female pensioners. Rodrigues de Oliveira, Kassouf and Aquino (2017) also observe a significant reduction in labor force participation of children living with pension recipients in Brazil.

In comparison to other spillover effects, research on schooling response to social pensions is relatively limited. The literature suggests a positive impact of social pensions on education of co-residing young members. This can be seen in the two studies of the rural pension system reform in Brazil. De Carvalho Filho (2012) analyzes 4 rounds (1989-1995) of the Brazilian household survey using triple differences and instrumental variables. He finds that a reduction in age eligibility of the rural pension program has led to an increase in school enrolment of girls co-residing with pension recipients by almost 10 percent. The impact on boys is, however, close to zero. Ponczek (2011) analyzes the same program using 6 rounds (1988-1995) of the same data set to measure the spillover effects on school achievements. He reports that the reformed pension program has a positive impact on child literacy especially for girls living with male beneficiaries.

This positive schooling response to social pension is also proved to be valid in some other countries. Edmonds (2006) evaluates the impact of the old age pension program in South Africa on school attendance of children living with eligible elderly, in comparison to those living with nearly eligible ones. He concludes that additional income from social pensions relieves household credit constraints, reduces child labor and increases school attendance. Similarly, Waildler (2016) finds that income

support from the South African Old Age Pension is spent in a way that benefits all household members particularly children. She concludes that an increase in the share of income from the Old Age Pension has led to higher household education expenditure. Martinez (2004) studies the impact of the BONOSOL program in Bolivia using regression discontinuity design with the difference in difference approach. He observes a 7-12 percentage point increase in the probability of school enrolment of children in beneficiary households. Likewise, a non-contributory pension program in India is found to correlate with an increase in household expenditure on education (Kaushal, 2014).

However, there are also some studies that observe no significant impact of social pension programs on education. Case and Deaton (1998) examine the redistributive effect of non-contributory programs in South Africa on various household expenditure categories such as food, transfers, savings and schooling. By using OLS and two-stage least squares regressions, they observe a negative but insignificant impact on household education expenditure implying that the elderly do not prefer educational investment to other household consumption categories. Kassouf & Rodrigues de Oliveira (2012) find that the BPC program, which is the social pension targeting the poor elderly in Brazil, appears to contribute to a decrease in child labor, but has no impact on school attendance of children living with the program beneficiaries.

# 4. Thailand Contexts and The Old Age Allowance Program

## 4.1 Thailand Contexts

Thailand is now undergoing the population ageing era. According to a recent report by the United Nations Population Fund, the share of the elderly population in Thailand, those at the age of 60 or older, has considerably increased from 5.5 percent in 1960 to almost 13 percent in 2010 (Peek et al., 2016). By 2040, the elderly population is projected to increase to over 32 percent of the total population (ibid). This rapid demographic change has raised great concerns about various issues such as shortage of workforce, financial sustainability of pension funds, and insufficient resources of healthcare systems (National Economics and Social Development Board [NESDB], 2017).

A study on Thai family and population reports that in 2013 almost 52 percent of the total population in Thailand live in an extended family (Peek et al., 2016). Most Thai elderly live with one or more adult children due to the longstanding norm and family solidarity (Knodel, Teerawichitchainan, Prachuabmoh, & Pothisiri, 2015). Moreover, according to the 2014 Survey of Older Persons, 43 percent of the elderly population in Thailand co-reside with at least one grandchild (Knodel et al., 2015). The elderly usually receive support and assistance from other family members and in many cases, they

also perform some services within households such as cooking and taking care of children in return (ibid).

This living arrangement, which is referred to as an extended or multigenerational family setting, has been the dominant household structure in Thailand (Peek et al., 2016). However, the number of skipped-generation families has been gradually increasing due the massive rural-urban migration in the past years. Statistics from the labor force survey show that in 2013, around 1.2 million children in Thailand live in households where parents are absent and grandparents are the only caretakers for them (Peek et al., 2016). A skipped-generation family is generally poor and lives in rural areas (ibid). Considering that the remittances from parents, who have been away for working, can be inadequate and inconsistent, this family structure may have negative effects on children's development outcomes.

With regard to Thailand's pension system, drawing on the classification of Brustad (2012), income security programs after retirement in Thailand can be broadly classified into two different systems. The first system is a pension scheme for formal employees. Government officials receive retirement benefits from the traditional civil service pension and the Government Pension Fund (GPF). The traditional service pension is a non-contributory defined benefit program financed by the government budget. The GPF is a compulsory defined contribution program under which a beneficiary and the government each contribute 3 percent of the beneficiary's monthly wage (Brustad, 2012; Suwanrada, 2009). The program covers several categories of government employees such as civil servants, teachers, police officers and military officers (Brustad, 2012). Other formal employees, especially those in private sectors, are required to subscribe to the Social Security Fund (SSF). Under the SSF, employees must contribute 3 percent of their monthly wage to the SSF's old-age benefit scheme. The contribution rate of employers and the government is 3 percent and 1 percent, respectively (ibid). The monthly wage used to calculate the contribution is capped at 15,000 THB or 375 EUR a month (Suwanrada, 2009).

In addition to the SSF, some companies, especially the large ones in the stock market of Thailand, may also establish Provident Funds (PVD) to provide additional income support for their employees after retirement. These PVD schemes are voluntary. Those who participate have to contribute 2-15 percent of their monthly wage and the employer is required to contribute an amount at least equal to the contribution of their employees (Suwanrada, 2009). Besides, there are also Retirement Mutual Funds (RMF) which are operated by several private mutual fund management companies. RMFs provide an opportunity for both government officials and employees in private sectors to invest in mutual funds and receive benefits after retirement. Although informal employees are also able to invest in RMFs, most of RMFs investors are formal employees as investing in RMFs will receive favorable tax treatment from the government (Brustad, 2012)

The second pension scheme system refers to programs for informal employees including the OAA program, the Social Security Fund for informal workers (Article 40) and the National Saving Fund (NSF) (Brustad, 2012). The OAA program, which is of this paper's particular interest, is a non-contributory pension program providing income support to all elderly at the age of 60 or above. Details of the OAA program are provided below. The Social Security Fund for informal workers under the Article 40 of the Social Security Act is an extended social security scheme provided to informal workers who are not covered by the regular Social Security Fund. The program is voluntary and informal workers deciding to join the scheme are required to contribute 100 THB (or 2.5 EUR) per month to this pension fund. The government will also contribute 50 THB (1.25 EUR) a month to each and every participant to support their income security after retirement (Chantaramas & Wiriyanupong, 2013).

The National Savings Fund (NSF) was implemented in 2015. The objective of this voluntary pension scheme is to promote saving behavior and provide income security after retirement for informal workers (National Savings Fund, 2016). All Thai citizens aged 15-60 who are not covered by other contributory pension programs are entitled to apply for the NSF. The contribution does not need not to be made on a monthly basis but participants must contribute at least 50 THB (1.25 EUR) a year and not more than 13,200 THB (330 EUR). The government will co-contribute according to participants' age range. For those aged 15-30 years, the government will grant 50 percent of the participants' contribution but not more than 600 THB (15 EUR) per year. For participants aged 30-50 years, and 50 years or above, the government will contribute 80 percent but not more than 960 THB (24 EUR), and 100 percent but not more than 1,200 THB (30 EUR) a year, respectively (ibid). The size of funds and the number of participants of the aforementioned social pension programs are provided in Table 1.

**Table 1 Number of Participants and Size of Funds as of 2017**

| | Program Features | Number of Participants | Fund Size (Million THB) |
|---|---|---|---|
| **Pension Programs for the Formal Sector** | | | |
| The Government Pension Fund | ▪ Compulsory<br>▪ Contributory | 1,028,961 | 825,135.24 |
| The Social Security Fund | ▪ Compulsory<br>▪ Contributory | 14,564,682 | 1,541,699.53 |
| The Provident Fund | ▪ Voluntary<br>▪ Contributory | 3,295,929 | 1,058,455.98 |
| The Retirement Mutual Fund | ▪ Voluntary | - | 234,023.56 |
| **Pension Programs for the Informal Sector** | | | |
| The OAA | ▪ Voluntary<br>▪ Non-contributory | 8,157,175 | 64,770.36 |

| | Program Features | Number of Participants | Fund Size (Million THB) |
|---|---|---|---|
| The Social Security Fund (Article 40) | ▪ Voluntary<br>▪ Contributory | 2,414,358 | - |
| The National Saving Fund | ▪ Voluntary<br>▪ Contributory | 529,633 | 2,723.00 |

Sources: Savings indicators report (Bureau of Savings and Investment Policy, 2018); Social and Quality of Life Database System on Income Security (National Economics and Social Development Board, 2018a)

Note: (1) Information on the traditional civil service pension is not available

(2) The size of the Social Security Fund for informal employees (Article 40) is included in the fund size of the Social Security Fund for formal employees and thus cannot be shown separately.

(3) While the number of the OAA participants refers only to the number of elderly currently receiving pension benefit from the program, the number of participants of other pension programs reported in Table 1 also includes working-age members who are contributing to the pension fund and expect to receive benefit in the future. According to the Social Security Office (2018), there were 443,875 people receiving old-age benefit from the Social Security Fund in 2017.

(4) The OAA's fund size refers to the government budget as the OAA is non-contributory pension program fully financed by the central government.

Regarding Thailand's education system, the formal basic education system in Thailand consists of 15 years of education starting from 3 years for pre-primary school (for children at the age of 3 to 5 years old), 6 years for primary education, 3 years for lower secondary education, and 3 years for upper secondary education (Wongmonta & Glewwe, 2017). Children are required to attend at least primary and lower secondary schools which form the compulsory educational level in Thailand (Ministry of Education, 2017; Wongmonta & Glewwe, 2017). As investment in education is among the top priorities for the Thai government, the 15 years of basic education are provided free of charge (Pholphirul, 2017). In public schools, the government provides support in several expenditure categories including tuition fees, uniforms, textbooks, learning materials and extra-curricular activities (Ministry of Education, 2017). Private schools are also entitled to the subsidy. However, the government will only support as much as 70 percent of what is provided to the public schools (Wongmonta & Glewwe, 2017). The private schools that are subsidized by the government will no longer be able to charge tuition fees higher than the remaining 30 percent that is not subsidized by the government (ibid).

Although most educational expenses are funded by the government, some expenses, such as meals, transportation costs and special learning/tutoring courses, remain uncovered. The transportation cost is actually burdensome in rural areas where students normally live far away from their school. Moreover, the recent study on challenging issues in Thai education (Cleesuntorn, 2016) reveals that students from the worse-off families may have to attend private schools, in which the tuition fees and other expenses are not fully funded because they cannot compete with students from the better-off families in the school entrance exam. The supply of public quality schools especially outside of the major cities is limited. Students thus need to compete for a place in their, or their parents', schools of

choice. However, poorer students, in general, may not be able compete with wealthier students and are forced to accept relatively lower quality schools. In some cases, parents may decide to send their children to private schools to ensure the quality of their children's education.

## 4.2 The Old Age Allowance Program

In 1993, the Thai government introduced the old-age allowance system to provide cash transfer assistance to their disadvantaged old-age population (Jitapunkul & Wivatvanit, 2009; Suwanrada & Wesumperuma, 2013). The targeted population at that time were senior citizens at the age of 60 or older who were unable to meet basic needs, incapable to work, or abandoned by their family (Suwanrada & Wesumperuma, 2013). The selection process was initially done by representatives of the central government and thereafter decentralized to local authorities and village committees (Sakunphanit & Suwanrada, 2011; Suwanrada, 2009).

In October 2009, due to strong political support, failure of the targeting process, and persuasive advocacies from scholars, international organizations and relevant NGOs, the OAA was expanded from a poverty-targeted program to universal coverage. With the exception of those who are already covered by other contribution-based pension schemes, such as the government pension fund and social security, or live in public nursing homes, all Thai citizens at the age of 60 or over are entitled to receive this monthly allowance with no strings attached (Suwanrada & Wesumperuma, 2012). The program is voluntary and the eligible elderly who is willing to receive the benefit only need to register with local authorities of their residence (Sakunphanit & Suwanrada, 2011). With regard to the benefit amount, it was set at 200 THB (around 50 EUR) a month per person at the beginning, before being increased to 500 THB in 2007 (Jitapunkul & Wivatvanit, 2009). The transfer size was adjusted again in October 2011, from a uniform pension rate to a multiple rate system. Such multiple rate system has been used until present. Recipients aged of 60-69 receive 600 THB per person per month and those aged 70-79, 80-89 and 90 or above, receive 700 THB, 800 THB and 1,000 THB, respectively (Chandoevwit, 2013). The allowance can be received at the local authority office or transferred directly to the elderly or the authorized representative's bank account (Sakunphanit & Suwanrada, 2011).

The size of the OAA transfer is quite modest in comparison with social pension programs in other countries (Paweenawat & Vechbanyongratana, 2015). The benefit amount is far below the national poverty line. In 2009, according to National Economic and Social Development Board (2018b), the national poverty line was defined at 2,174 THB per person per month while the allowance benefit was only 500 THB in the same year. In 2011, although the benefit amount was adjusted to around 600-1,000

THB, it was still much less than the poverty line, which was 2,415 THB. Again, in 2016, the poverty line was increased to 2,667 THB but the benefit amount remain unchanged.

Despite the small transfer size, the allowance from the OAA has been an important source of income especially among poor elderly. Paweenawat and Vechbanyongratana (2015) find that during 2007-2011, financial support from the OAA accounted for 20-24 percent of per capita household income of the poorest 40 percent. Moreover, Knodel, Prachuabmoh and Chayovan (2013, pp. 47–49), based on the 2011 national Survey of Older Persons in Thailand, suggest that 11.4 percent of the elderly population considered the OAA allowance as their main source of income. Elderly living in rural areas relied even more on the OAA allowance as the study finds that 14 percent of rural elderly reported the allowance as their main source of income support.

Figure 1 depicts the number of persons aged 60 or over, the number of the OAA pensioners and the government budget allocated to the OAA program during 2006-2017. As can be seen, the number of the OAA beneficiaries increased substantially in 2009 when the program was expanded to cover all Thai senior citizens. The budget spent on the OAA program increased gradually over time with a steep rise in 2012 since the transfer size was adjusted upward to a multiple rate system in late 2011. In 2017, around 70 percent of the population aged 60 or over in Thailand received a monthly allowance from the OAA, compared to only 17 percent in 2006, and the government allocated almost 65 billion THB to this program.

Despite being implemented for several years, the existing literature on the impact of the OAA remains scarce (Paweenawat & Vechbanyongratana, 2015; Suwanrada & Leetrakul, 2014). Almost all studies on the old-age allowance program mainly consider problems related to the administration and implementation process (Paweenawat & Vechbanyongratana, 2015). Moreover, most quantitative analyses that try to assess the OAA impacts only use descriptive statistics to infer the results but do not spell out whether the impacts are actually from the program (see e.g. Suwanrada & Leetrakul, 2014; Suwanrada & Wesumperuma, 2012). To date, there are two studies, to the best of our knowledge, that attempt to employ econometric methods to draw causal impacts of the OAA. The first study uses Thailand's Household Socioeconomic Survey (SES) during 2006-2010 with the non-parametric difference-in-differences method to estimate the change in poverty rate among elderly due to the OAA benefit. It finds that the expansion of the OAA in 2009 reduces the poverty rate of elderly recipients by 5.6 percent (Jitsuchon, Skoufias, & Wiener, 2012). Second, Paweenawat and Vechbanyongratana (2015) merge three rounds (2007, 2009 and 2011) of the SES data to evaluate the impact of the universal OAA on labor supply decisions of elderly workers. By using a probit model and propensity score matching, they report that the receipt of the OAA benefit increases the probability of retirement among low-income elderly living outside of Bangkok by 6-7 percent. However, when considering the

overall sample without taking into account the income level of the elderly recipients, the impact of the OAA is almost close to zero.

The two aforementioned studies shed some light onto the immediate impact of the OAA on program beneficiaries. However, the spillover effects of the program upon pensioners' co-residents remain unproved. There is no quantitative impact evaluation study to date that tries to figure out how the OAA benefit is redistributed to other members living in the same household. We can only find some evidence from related literature suggesting that the OAA pensioners allocate part of their pension income to other family members. For example, results from the participatory qualitative research on social pension programs conducted in four countries including Thailand, suggest that Thai elderly receiving benefit from the OAA spend part of their pension on education of their grandchildren, in addition to other expenses for household's daily necessities (Mujahid, Pannirselvam, & Doge, 2008). Evidence from the Thai National Transfer Account (NTA) also confirms this result. National Transfer Account is the System of National Account (SNA) in which age dimension is added in order to display the reallocation of resources between age groups. According to the 2013 Thai NTA, in addition to the working-age members, elderly members aged 60 to 76 are also net contributors within the household meaning that they contribute to other members more than what they receive from them (Lowhachai, 2018).

# 5. Data

The Household Socioeconomic Survey (SES) is used in this analysis. The SES is a nationally representative cross-sectional survey conducted by the National Statistical Office of Thailand (NSO). This household survey was conducted every two years from 1988 until 2006. After that, it has been carried out on an annual basis. However, while information on household expenditure is collected every year, income-related variables are only available in the odd years. For example, the 2009 SES contains both household income and expenditure but the survey in 2010 covers only expenditure information. In addition to income and expenditure, SES also offers information on several characteristics of households and household members including gender, age, location of living, education, occupation and participation in social protection programs such as the OAA and disability allowance. In each survey, around 40,000-50,000 households in all regions, both in urban and rural area, are interviewed.

In this study, we pool the SES across years in order to obtain a larger sample size. Moreover, since the OAA has been in operation for several years, drawing results merely from one specific year may mislead the real impact of the program. Accordingly, we utilize the surveys between 2009, when the

OAA is firstly expanded to cover all Thai elderly, to 2017, which is the last year for which the data is available. As household income is needed for the estimations, only the survey in the odd years will be employed. These five years of surveys (2009, 2011, 2013, 2015 and 2017) are combined to obtain the pooled data set. The number of surveyed households in 2009, 2011, 2013, 2015 and 2017 are 43,844, 42,083, 42,738, 43,400 and 43,210, respectively.

We then restrict our sample by keeping only households that consist of at least one school-age member, those at the age of 3 up to and including 18, and one elderly member whose age is 55 years or above. The reason for restricting our sample only to households that have school-age members is that our outcomes of interest are related to education. It is thus legitimate to consider only households that are likely to invest in education and are subject to educational expenses. We include children at the age of 18 into the analysis, although the upper secondary education is generally for children aged 15 to 17, to address a delay in study. According to our pooled data, before restriction, 65.6 percent of 18 years old children are studying and 84 percent of 18-years-old students are in upper secondary school.

The presence of an elderly in the household may be associated with unobservables that also influence our outcomes such as the perception of the importance of education (Edmonds, 2006; Ponczek, 2011). Therefore, we consider only households with at least one elderly member to reduce potential heterogeneity. As motivated by previous studies on social pension impacts such as Edmonds (2006) and Ponczek (2011), we also include the nearly-eligible elderly, those aged 55 to 59 years, instead of considering only those aged 60 or over, which is the age eligibility criteria for the OAA program. This is justified because households with nearly-eligible elderly members may face similar circumstances as those with eligible elderly members (Edmonds, 2006). The only factor making them different is the age of the elderly members. Therefore, the nearly-eligible households also make a good control group. Furthermore, households that receive pensions from the OAA together with the benefits from other pension programs are also excluded from the sample to avoid potential confounding effects.

**Table 2 Sample Size by Different Participant and Non-Participant Groups**

| | **Number of households from the pooled sample** |
|---|---|
| **Total sample size** | **41,500** |
| **OAA beneficiary households** | **25,258** |
| **Non-beneficiary households** | **16,242** |
| Eligible non-participant households | 4,956 |
| Non-eligible households | 1,188 |

| | |
|---|---|
| Nearly-eligible households | 10,098 |

As presented in Table 2, there are 41,500 households remaining in our sample of which 25,258 households are the OAA beneficiaries. The other 16,242 households are non-participants, a group which consists of eligible non-participant households (4,956 households), non-eligible households (1,188 households) and nearly-eligible households (10,098 households). The eligible non-participant households refer to households with elderly members who are entitled to the OAA benefit but decided not to receive the benefit or having some delays in program registration. The non-eligible households are households whose elderly members were already covered by other contributory pension schemes such as the Government Pension Fund or the Social Security Fund. Lastly, the nearly-eligible households are households whose elderly members did not receive old-age benefit from other pension program but were not old enough to be eligible to the OAA (an elderly between 55 to 59 years).

It is worth noting that all variables related to income and expenditure in this analysis are deflated by the consumer price index (CPI) with the base year of 2015 obtained from Bureau of Trade and Economic Indices, Ministry of Commerce (2018). Summary statistics of participant and non-participant households are provided in Table 4. The summary statistics suggest that households that are covered by other pension schemes (non-eligible households) and those that decide not to take the benefit from the OAA (eligible non-participant households) are socioeconomically better off than participant households. Nearly-eligible households or households whose elderly members are not old enough to qualify for the OAA appear to be the most comparable counterparts in terms of household income and expenditure on education.

# 6. Methodology

The main purpose of this study is to investigate the spillover effects of the OAA upon education of co-residing children. Since program participation is resting on self-registration, naive estimations might be subject to a problem of endogeneity. For example, the elderly from rich families may not be willing to waste their time applying for the program just to receive a small amount of money, which is likely to be the case in this study. As can be seen from Table 4, participant households, on average, are socioeconomically worse off than the eligible non-participants. Considering that rich families may have a different preference for education, in comparison to the poorer ones, it is likely that this variation in preferences is an omitted variable that leads to endogeneity. On the other hand, it might be the case that people who are well aware of their right, and thus apply for the OAA program, are more likely to invest in education. Again, this omission of personal preferences may lead to biased

results. Moreover, there might be a problem of simultaneity if households sign up for the OAA because they need to find additional income to finance education of their (grand)children. Therefore, the instrumental variables method is used to address the potential problem of endogeneity.

## 6.1 Outcome Variables

We employ two indicators to measure the impact of the OAA on education: household education expenditure and school attendance. Household education expenditure in this study is household out-of-pocket payments on tuition fees, uniform, books and other school-related supplies, transportation and special learning or tutoring courses. We include both in-cash and in-kind, converted in monetary terms, expenses but do not cover forgone opportunity costs of schooling due to data limitation. According to the data, around 7.7 percent of households in our sample report zero expenditure on education. All households with zero education expenditure do not have children attending school. We find that 47 percent of children not attending schools are at the age of 3 to 5 years, which is the school-age range for pre-primary education, and 46 percent are at the age of 15 to 18 years, which corresponds to upper-secondary education.

**Table 3 Number and percentage of school-age children not attending school by age group**

| Age | Corresponding educational stage | Number of children | Percent |
|---|---|---|---|
| 3 | Pre-primary education | 2,224 | 32.76 |
| 4 | Pre-primary education | 754 | 11.11 |
| 5 | Pre-primary education | 232 | 3.42 |
| 6-11 | Primary education (compulsory) | 98 | 1.44 |
| 12-14 | Lower secondary education (compulsory) | 367 | 5.41 |
| 15 | Upper secondary education | 437 | 6.44 |
| 16 | Upper secondary education | 635 | 9.35 |
| 17 | Upper secondary education | 836 | 12.32 |
| 18 | Upper secondary education and beyond | 1,205 | 17.75 |

We use both education expenditure per school-age child and share of education in total household expenditure to estimate households' education spending. Education expenditure per school-age child is calculated by the reported monthly expense on education of a household divided by the number of school-age members, aged 3 to 18 years, living in the household. This education spending per school-age child is then log-transformed and the natural logarithm of zero is replaced by zero. The share of education in total household expenditure refers to the proportion of household spending on education

to total household expenditure, which includes consumption expenditure, both food and non-food, and non-consumption expenditure. The share of education expenditure is coded as a fraction having a value between zero and one. Another outcome of interest is the probability of school attendance of school-age children co-residing with the old-age people. Unlike education expenditure, which is estimated at the household level, the unit of analysis for the impact on school attendance is at the individual child level. We define school attendance as a dummy variable which is equal to one if that school-age member replies that he/she is studying to the question "are you currently attending school or not?" in the SES survey, and zero otherwise.

## 6.2 Endogenous Treatment Variable

Being influenced by previous literature on the impact of social pensions (e.g. Case & Deaton, 1998; De Carvalho Filho, 2012; Kassouf & Rodrigues de Oliveira, 2012), the pension income that a household received from the OAA is used as an endogenous treatment variable in our study. This is also justified by the fact that the amount of benefit was adjusted from the uniform to the multiple rate system since October 2011. Therefore, it might be likely that the variation in the OAA benefit also contributes to the differences in household education expenditure. Unfortunately, the SES data reports all public transfer income in one single variable. There is no separate information of OAA benefit in the data set. As a result, we need to calculate the amount of benefit using the explicit rule of the benefit level of the program. In our calculation, a benefit of 500 THB per person per month is assigned to OAA pensioners in 2009. In 2011, we apply the uniform rate of 500 THB to the first nine months (January to September), use the multiple rate system to the other three months (October to December) and average it out over the year to obtain the monthly benefit per person. The OAA benefit level in 2013 to 2017 is calculated with the multiple rate system. The per capita OAA benefit is then deflated by the CPI with the base year of 2015 and added up to household level to obtain the monthly household OAA benefit.

## 6.3 Control Variables

A number of control variables are included in our estimations to help spell out the impact of the OAA. The selection of control variables are motivated by several studies on determinants of education expenditure (see e.g. Alfonso, 2002; Knodel & Wongsith, 1991; Tsang & Kidchanapanish, 1992), existing literature on the impact of social pensions, and the availability of data. First, we control for household characteristics. It has been well-studied that high income families normally invest more on education than their low-income counterparts (Tilak, 2002). Hence, deflated household income (excluding pension) is included as a control variable. In our data, 128 households out of 41,500, or 0.3 percent, report negative household income due to business loss. We address these negative income

responses by converting them to zero. Household income is then transformed to natural logarithm and the natural logarithm of zero is converted to zero. Moreover, rural households may have different spending pattern and educational preferences than urban households (Alfonso, 2002; Tsang & Kidchanapanish, 1992). Accordingly, we also include a dummy variable indicating area of residence, which is equal to one for those living in rural area and zero otherwise, into the set of control variable. In addition to the rural-urban setting, we also take into account differences in region (Bangkok and vicinities, Central, North, Northeast, South) to control for variation in level of development and cost of living.

The second set of control variables is characteristics of household heads. A number of studies conclude that women tend to spend more goods and services that benefit children, in comparison to men (see e.g. Duflo, 2003; Haddad & Hoddinott, 1994). Moreover, the level of education of the household head appears to significantly affect household investment in education (Tilak, 2002; Tsang & Kidchanapanish, 1992; Vu Quang, 2012). Furthermore, the type of occupation of the household head, blue collar or white collar, is likely to influence household educational preferences (Alfonso, 2002; Tsang & Kidchanapanish, 1992; Vu Quang, 2012). Therefore, characteristics of the household head namely gender, level of education and type of occupation are controlled for in our estimations. In this study, gender of household head is coded as a binary variable which is equal to one for female headed household. We measure head of household education level by years of schooling. Type of occupation is also defined as a dummy variable which takes the value one if head of household is blue-collar and zero for a white-collar household head.[1]

Third, variation in household structure is taken into consideration. According to Tilak (2002), the size of a household can indicate the demographic burden of the household. Likewise, Knodel and Wongsith (1991) conclude that family size is negatively associated with the prospect of school attendance among children in Thailand due to constraint of family resources. As a consequence, household size cannot be excluded from the set of control variables. As being influenced by Case and Deaton (1998) and Vu Quang (2012), the number of household members aged 3 to 5, 6 to 11, 12 to 14, and 15 to 18 which are the age group that officially corresponds to pre-primary education level, primary education level, lower secondary level, and upper secondary level[2], respectively, are also

[1] White-collar occupations in this study include legislators and government officials, corporate executives, professionals, associate professionals, technicians and clerks, while blue-collar occupations refer to service workers and sales workers, agricultural and fishery workers, craft workers, machine operators, armed forces and those working in elementary occupations such as street vendors, servants and garbage collectors.

[2] The official school age for upper secondary education is 15-17 years. However, in our sample, 84 percent of 18-years-old students are in upper secondary school. Therefore, we include children at the age of 18 in the group of upper secondary education level.

included. Moreover, differences in family types may affect intra-household allocation of resources and spending pattern. We therefore generate dummy variables for a skipped-generation household and multigeneration household and include these two dummies in our estimations. The skipped-generation dummy is equal to one for a household where working-age members (aged 19 to 59 years) are absent, making elderly (aged 60 or above) the head of the household and the main caretaker for their grandchildren (aged no older than 18 years). In contrast to the skipped-generation dummy, multigeneration dummy takes the value of one for a household where members of three generations (elderly, working-age members, and children) live in the same household.

In addition, we also include other factors which are likely to impact our outcome variables. According to the data, some households report zero education expenditure because their children do not attend school. The number of school-age children not going to school is thus generated and included in the regressions. With regard to types of schools, sending (grand)children to private schools may incur higher cost than to public ones, which is also evident in Alfonso (2002). We thus employ the number of children going to private school as one of the covariates. Finally, it is necessary to take year effects into consideration since we pool cross-sectional data across years. We thus include dummy variables for each of the years (2009, 2011, 2013, 2015 and 2017) to pick up trends and changes in one respective year that are not attributed to the OAA or other control variables.

## 6.4 Estimation Methods

This section explains estimations methods that we employ to measure the impact of the OAA on household education expenditure and school attendance. First, we conduct the following two-stage least squares (2SLS) to examine the impact on household education expenditure per school-age child.

$$T_i = \alpha_0 + \alpha_1 Z_i + \alpha_2 X_i + \mu_i \quad (1)$$

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \varepsilon_i \quad (2)$$

Education expenditure per school-age child spent by household i ($Y_i$) , in natural logarithm (ln), is a function of the amount of OAA pension that a household received from the OAA program ($T_i$) (also log-transformed). Theoretically, eligibility criteria of the program can be used to construct IV as it is highly related to program participation but is unlikely to affect outcomes of interest (Khandker, Koolwal, & Samad, 2010). Therefore, we use the number of elderly members aged 60 or above, of household i, as an instrument ($Z_i$) to predict $T_i$. $X_i$ is a vector of aforementioned control variables including characteristics of household, household heads and household structure, as well as other

factors potentially affecting household education expenditure namely the number of children not going to school, the number of children attending private schools and year dummies.

However, as discussed earlier, 7.7 percent of households in our sample reports zero education expenditure. Therefore, we also employ a tobit model with an endogenous regressor to address this problem of limited dependent variable due to a corner solution response (Wooldridge, 2009). Under the tobit model, we re-estimate equations (1) and (2) by Maximum Likelihood assuming $(\mu_i, \varepsilon_i)$ are normally distributed with mean zero, and a value of zero for education expenditure per school-age child $(Y_i)$ has a positive probability. Like in the 2SLS set up, $T_i$ refers to the amount of OAA pension received by household i which is endogenous and predicted by the instrument $Z_i$or the number of elderly member aged 60 or above living in the household. The same set of control variables $(X_i)$ used in the 2SLS model is also applied in the tobit estimations. The expected value of education expenditure per school-age child $(Y_i)$ for overall households and the marginal effect of all explanatory variables (the endogenous treatment variable $T_i$ and control variables $X_i$) on the expected value of $Y_i$ are measured by equation (3) and (4) where $\sigma$ denotes standard deviation and $\beta_k$ refers to coefficients associated with endogenous treatment variable ($T_i$ ) and control variables ($X_i$).

$$E(Y_i|T_i, X_i) = \Phi\left(\frac{\beta_1 T_i + \beta_2 X_i}{\sigma}\right)(\beta_1 T_i + \beta_2 X_i) + \sigma\phi\left(\frac{\beta_1 T_i + \beta_2 X_i}{\sigma}\right) \quad (3)$$

$$Marginal\ Effect = \beta_k \Phi\left(\frac{\beta_1 T_i + \beta_2 X_i}{\sigma}\right) \quad (4)$$

For the impact of the OAA on the fraction of household expenditure that is contributed to education, we conduct the fractional probit model with endogenous regressors to examine the results. Under this model, equation (1) and (2) are also estimated by the Maximum Likelihood Estimation method where $Y_i$ denotes the share of education in total household expenditure. $Y_i$ is coded as a fraction having a value between zero and one. The pair $(\mu_i, \varepsilon_i)$ is normally distributed with mean zero. We also employ the same set of endogenous treatment variable $(T_i)$, instrument $(Z_i)$ and control variables $(X_i)$ as in the 2SLS in this fractional probit model.

In addition to education expenditure, we also examine the impact of OAA on school attendance. The analysis is conducted at the individual child level using the bivariate probit regression to obtain the results. We re-estimate equation (1) and (2) assuming that $T_j$ and $Y_j$ are both a binary variable representing a child j co-residing with at least one OAA pensioner and school attendance of the child, respectively. The same instrument as the above 2SLS model is used so $Z_j$ denotes the number of household member aged 60 or over living with child j. It is useful to note that we change subscription from i to j to reflect the change of the level of analysis from household i to individual child j. The same

set of control variables used in 2SLS model is also applied in the bivariate probit regression but we exclude the number of children not attending school and the number of children going to private school from the analysis. Moreover, age and gender of a child are also included as control variables. $\mu_j$ and $\varepsilon_j$ follow a bivariate normal distribution with variances equal to one and correlation coefficient equal to $\varrho$.

$$\begin{pmatrix} \boldsymbol{\varepsilon_j} \\ \boldsymbol{\mu_j} \end{pmatrix} \sim \boldsymbol{BVN}\left( \begin{bmatrix} \mathbf{0} \\ \mathbf{0} \end{bmatrix}, \begin{bmatrix} \mathbf{1} & \boldsymbol{\varrho} \\ \boldsymbol{\varrho} & \mathbf{1} \end{bmatrix} \right)$$

We examine the impact of the OAA on attendance in all education levels and then zoom in to the impact of the program on each education level including pre-primary education, compulsory education and upper secondary education.

# 7. Results

This section presents the results obtained from the estimations discussed in previous section. Table 5 presents the spillover effects of the OAA on household education expenditure per school-age child, using the amount of OAA pension received by a household, which is instrumented by the number of elderly member over the age of 60, as the explanatory variable of interest. Column (1) estimates the impacts on beneficiary households, in comparison to all non-OAA participant households. According to the results, we do not find credible evidence supporting that additional income from the OAA has a statistically significant role in increasing household education expenditure. Even when we restrict the non-treatment group to the eligible non-participants (column 3), non-eligible (column 5) and nearly eligible households (column 7), the impact of the OAA remains insignificant. Since consumption pattern may vary by income level, we also estimate equation (1) and (2) with merely households in the bottom 40 percent of the income distribution, as presented in Column (2), (4), (6) and (8). In line with the impact on the full sample, additional income from the OAA does not appear to increase spending on education among the low-income families. Our 2SLS model does not have a problem of weak instrument due to the high value of F-statistics and the strong correlations between our instrument (the number of elderly members over the age of 60 in the household) and the instrumented endogenous treatment variable (amount of OAA benefit).

The impact of the OAA on household education expenditure is also analyzed through the tobit model to address the corner solution response of an education expenditure variable, of which a number of observations have zero value. As presented in Table 6, we observe results similar to those we obtained from the 2SLS model. The OAA pension does not lead to higher educational expenditure per school-age child, regardless of which control group is being estimated. With regard to the relationship between household investment in education and other control variables, we obtain similar results

with the 2SLS and the tobit model, which are also in line with previous studies on private spending on children's education (see e.g. Alfonso, 2002; Knodel & Wongsith, 1991; Tsang & Kidchanapanish, 1992). For example, household income, education of household head and white-collar headed households are found to have a positive association with household education expenditure. The numbers of school-age children in the respective age groups are also found to be positively associated with education spending but the coefficient of the variable representing the number of children aged 3-5 years appears to be smallest in magnitude. Besides, the number of children not attending school appears to have a highly negative relationship with household education expenditure as expected. The results on dummies for years also look interesting. Household education expenditure per school-age child in 2011 is found to be lower than that of 2009. The result is slightly higher in 2013 but remains negative, and only becomes positive in 2017.

While no significant impact of the of the OAA is found on household education expenditure, the beneficial role of the OAA on education is proved to be significant when the share of education in total household expenditure is used as the outcome variable. Table 7 presents the impact of the OAA on the share of education expenditure analyzing through the fractional probit model. We find credible evidence indicating that income support from the OAA contributes to the higher fraction of expenditure that is contributed to education of (grand)children. The positive and significant effects on share of education are found to materialize across all control groups. Moreover, the impact on the share of education is also realized among low-income families, with an exception of when we compare OAA beneficiaries to the non-eligible households. The association between the share of education and control variables are generally in line with what we observe from the 2SLS and the tobit model. For instance, living arrangements of a household, being skipped-generation households or multigeneration households, do not appear to significantly influence household investment in education. However, different direction of relationship are found in some variables such as household income. In addition to the fractional probit model, we also conduct a tobit model where a lower limit is set as zero and an upper limit is one, to examine the impact of the OAA on the share of education expenditure and find similar results to what we observe from the fractional probit model.[3]

Table 8 presents the results of the bivariate probit model, using all non-beneficiary households as control groups and schooling attendance as the dependent variable. The results suggest that income support from the OAA to the elderly members improves the probability of school attendance among school-age members. Children living with OAA pensioners are 4.9 percent more likely to attend school. The impact among children from the poorest 40 percent families is also positive and significant

[3] The impact of the OAA on the share of education expenditure estimated by the tobit model are not presented in this paper and will be available upon request.

at the 10 percent level. We also examine the impact heterogeneity by educational level. We find that co-residing with OAA recipients increase the likelihood of children attending pre-primary school and upper secondary education by 10.4 percent and 8.3 percent, respectively. However, income support from the OAA does not seem to promote compulsory school attendance. The impact of the OAA on school attendance among children from poorest 40 percent families also shows interesting results. In the same way as the overall households, living in beneficiary households is found to be beneficial for children of pre-primary and upper-secondary education school age (15-18 years old). The bivariate probit model also does not find the significant impact of co-residing with OAA pensioners in compulsory education implying that having OAA pensioners within a household do not help increasing the probability of sending children to compulsory school.

# 8. Conclusions and Discussion

Social pension is an important income source especially in a country where more than half of employment is operating outside of the formal social security system. Additional income from social pension could help enhance financial stability especially after retirement. A number of studies conclude that elderly people do not only spend their pension income on themselves but also redistribute it, either out of altruism or exchange motives, to other members in their family. This positive spillover effect of social pension is empirically examined in this paper.

The results from 2SLS and the tobit models suggest that an increase in the amount of OAA benefit of the household does not significantly lead to an increase in household education expenditure. However, income support from the OAA appears to play a role in household investment in education when the share of education is employed as an outcome variable. We find that OAA beneficiaries have a higher share of expenditure that is contributed to education of children. The aforementioned results are materialized across all non-participant groups. These results imply that although the additional money that OAA beneficiary households contribute to education may be trivial in comparison to the more well-off families in the respective control groups, it is quite significant when their total expenditure is taken into account. Moreover, OAA income is also found to promote school attendance. We observe that children co-residing with OAA pensioners are more likely to attend school, with an exception of the primary and lower secondary level in which school attendance is already mandatory. Even though the magnitude of the effect is modest, the results are quite impressive considering that the amount of benefit is so small.

We also examine the spillover effects of the OAA among low-income families. We find that the impact of the OAA on household spending on education, measured by the share of education expenditure in

total household expenditure, and school attendance are also positive and significant at the 5-10 percent level. The result is quite surprising as we expect that low-income families may favor other necessary expenditures over education because they have to meet basic needs before anything else. Therefore, we further examine the OAA impact on household education expenditure per school-age member in each income decile up to the fourth group, as presented in Table 9, to test if the more compelling results still exist among the poorest of the poor. We find that households in the two poorest groups (the first and second 10 percent income decile) do not spend additional income from the OAA on education, as we expect, probably because they have to save it for other relatively more necessary or urgent expenditure. However, households in the higher income decile do significantly increase their spending on education. This might probably because education is highly valued in Thailand and from the perspective of low-income families, investment in education of their offspring is among the promising ways to improve their living condition and escape from poverty.

In addition to the association between the OAA and education, the relationship between household investment in education and some other control variables also provides interesting implications. As discussed, we observe a significant impact of income from the OAA on the share of education expenditure in total household expenditure but not on the amount of education expenditure. The reverse relationship is found on income excluding pension. According to the results, we find that income excluding pension of a household has a positive and significant association with household education expenditure but negative, or statistically insignificant, with the share of education in total household expenditure. This finding possibly implies that OAA income is spent differently from other income. It might be possible that the significant part of OAA income is spent on children's schooling. However, since OAA income is so small, it does not add much to the amount of education expenditure. By contrast, a household may contribute only a small proportion of their income (excluding pension) to education. Nevertheless, as household income excluding pension is much higher, it does make a difference on the amount of expenditure spent on education. Further research is needed to expand an insight into the behavioral effects of OAA income.

The number of household members aged 3 to 5, 6 to 11, 12 to 14, and 15 to 18 are also found to be associated with household investment in schooling, both in terms of amount and share of education expenditures. However, the coefficient representing the first group, 3 to 5 years, which officially corresponds to pre-primary education level appears to be smallest in magnitude. It might be possible that the cost of pre-primary school is lowest in comparison to other education level. However, it might also be the case that households do not sufficiently invest in early-childhood education. In addition to the low awareness of early-childhood development, the presence of early-age children in a household may lead to higher expenditure on age-specific goods and services such as nutrition and healthcare.

The household have thus less money to spend on education. Nevertheless, a number of studies have verified the long-term benefit of attending preschool such as cognitive skills, physical health and social skills. A recent study in Thailand indicates that preschool attendance has improved students' mathematic, reading and sciences test scores. This positive result appears to be stronger among low-income families (Pholphirul, 2017). Therefore, this finding raises concerns about the insufficient investment in early childhood development.

Results of year dummies also provide interesting findings. According to the estimation results, year dummies are found to pick up a downward trend in household education expenditure in 2011 and 2013. When considering descriptive statistics of the SES, as depicted in the upper graph in Figure 2, we find that both expenditure per school-age member and share of education in total household expenditure declined significantly in 2011. There was a slight increase in 2013 and it is in 2017 that household education spending goes up to where it was in 2009. This interesting trend may partly be explained by the extension of free basic education policy from 12 to 15 years, which was implemented in 2009 (Pholphirul, 2017; Wongmonta & Glewwe, 2017). Households may gradually cut their education budget, in response to the policy, and slowly increase it afterwards. However, according to the statistics from the National Accounts, as presented in the lower graph in Figure 2, while government spending on education exhibits a rising trend after 2009, private consumption on education appears to be quite stable during the same period. Therefore, further analysis, which is out of the scope of this paper, is needed for more in-depth explanation of this compelling trend in household education expenditure.

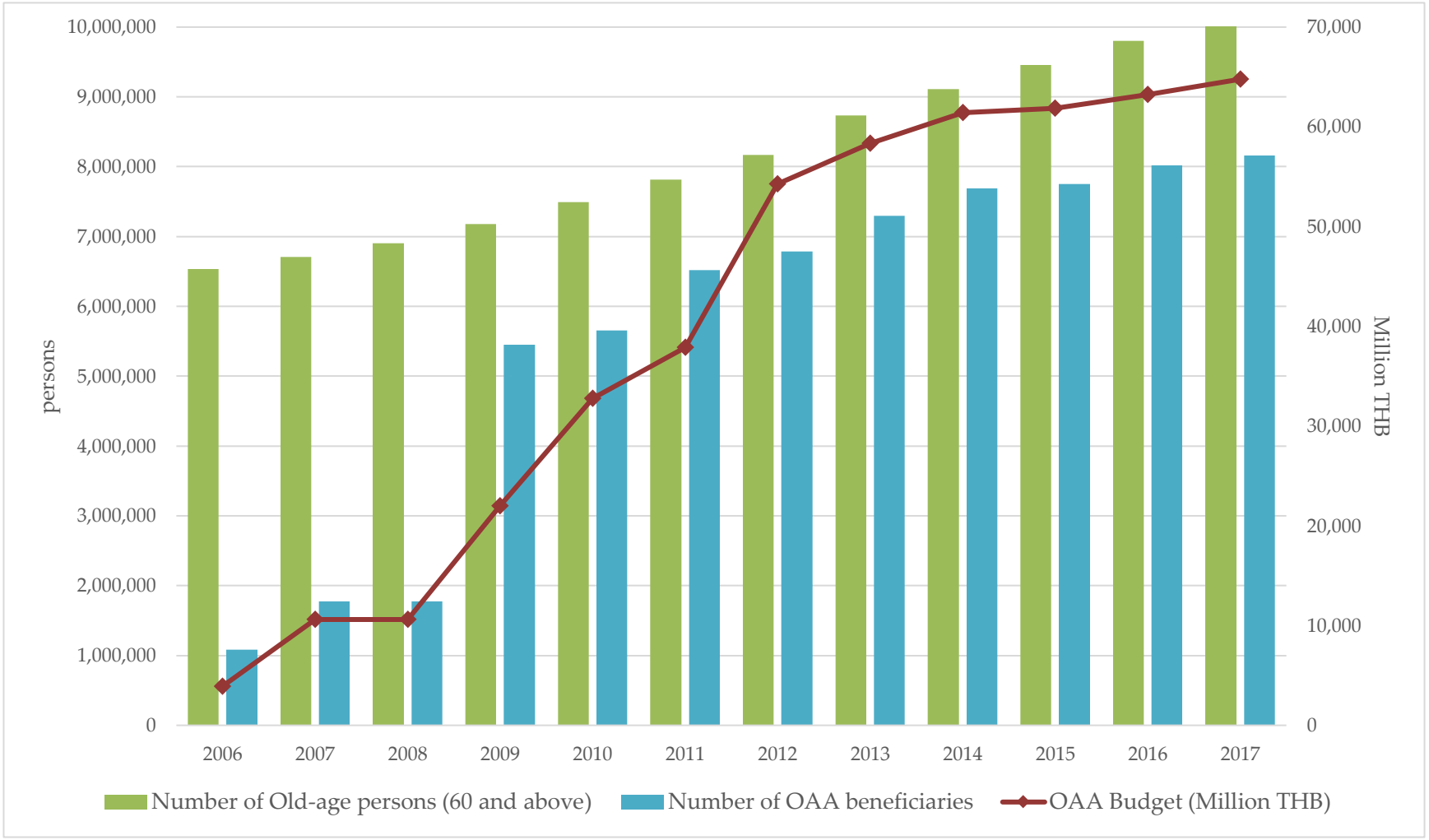
The demographic transition toward population ageing implies that the number of pension receivers, (old age people) will be substantially higher but the number of taxpayers (working-age population) who actually fund the program will be considerably lower. This projected population ageing has caused growing concern over the financial stability of the program. Therefore, the credible evidence to justify why the government needs to keep allocating the budget to this program is of importance for policy makers. Previous studies on the OAA have brought convincing evidence that additional resources from the program help reduce poverty, vulnerability and allow poor elderly to retire (see Jitsuchon et al., 2012; Paweenawat & Vechbanyongratana, 2015). Our study shed further light on the beneficial role of the OAA program. When other sources of income are sporadic, a constant and reliable cash transfer from the OAA helps increase the share of expenditure that is contributed to education and the likelihood of school attendance. Therefore, the contribution of the OAA is not only limited to poverty reduction among elderly but also the intergenerational poverty which would remain if children were not educated. Moreover, investment in human capital of children, through education, leads to a higher productivity of the future workforce. As a consequence, the positive

spillover effects of the OAA may lessen concerns about population ageing as the declining number of working-age population may be compensated by the higher productivity of prospective labor.

Although, in this study, the OAA is empirically proved to be helpful in breaking intergenerational transmission of poverty and fostering upward mobility, there is still room for improvement. The first and foremost issue is to improve the adequacy of the benefit amount. Most studies on the OAA have suggested the government to increase the benefit level to ensure that the elderly have sufficient income support for their living (see e.g. Suwanrada & Leetrakul, 2014; Suwanrada & Wesumperuma, 2012). Moreover, according to our results, the higher pension income leads to the higher share of education expenditure for co-residing children. Therefore, the amount of benefit should be augmented to further improve the effectiveness of the program. Second, in addition to the current system in which the benefit level is discriminated merely by age range, the government should attempt to allocate the amount of benefit according to the recipients' needs. Increasing the benefit amount across the board may lead to excessive financial burden. The targeting approach may thus be useful in deciding for whom and to what extent the benefit should be increased. The available data sets, such as the basic minimum needs data (BMN) and the administrative data from the welfare smart card project, which cover income information, poverty status, and the unique personal identifier, would be useful for the target identification process and the differentiation of the benefit level. Third, the government should consider providing additional non-monetary benefit together with the cash transfer such as long-term care services for elderly and quality child care services for the skipped-generation families, which could alleviate the burden of elderly as single-handed caretakers. Considering that the elderly recipients sacrifice their own benefit for co-residents, these additional in-kind benefits will reassure the adequate standard of living of the elderly which is the main objective of the OAA program.

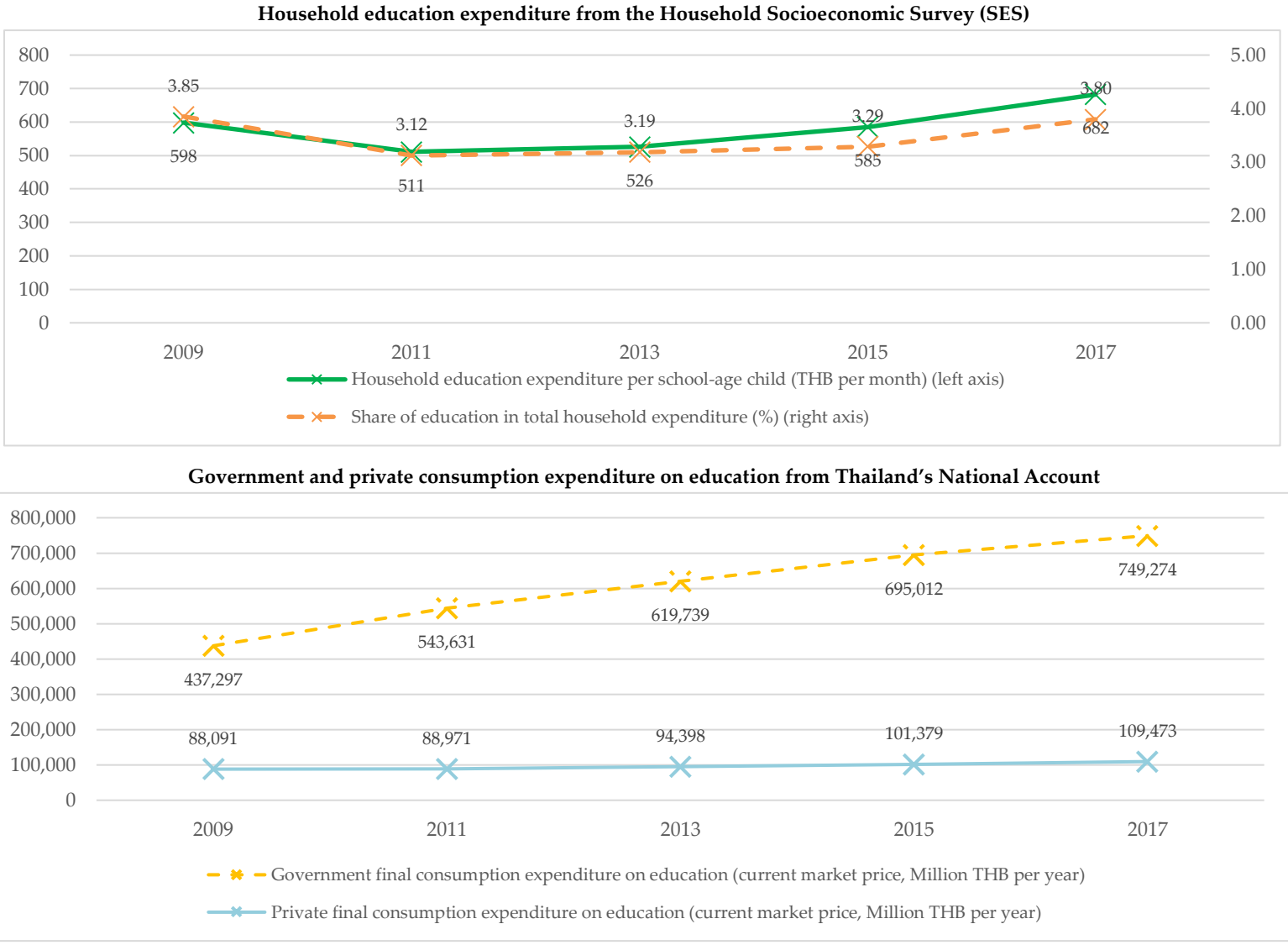
The results presented in this study are derived from justified impact evaluation methods which are appropriate for the program context and data availability. However, we do realize that our findings are subject to some limitations. First, we could only examine the spillover effects generated within the households. However, the OAA recipients may possibly allocate their pension to relatives who do not live under the same roof and the impact thus cannot be captured by our estimations. This limitation may partly explain why only a modest impact is observed in this study. Second, the positive schooling responses found in this study could be considered as a strong evidence for the impact of social pensions in fostering upward intergenerational mobility. Nevertheless, the higher spending on education and school attendance is not necessarily associated with higher schooling outcomes which also matters for upward income mobility (Narayan et al., 2018). Moreover, there are a number of factors, such as return to education, affecting the relationship between education and upward mobility (ibid). Therefore, results and interpretations in this study should be treated with cautions.

**Figure 1: Number of Old Age Population, OAA Beneficiaries and OAA Budget, 2006-2017**




Sources (1) Number of old-age population is retrieved from the Official Statistics Registration Systems, Department of Provincial Administration (2018)
(2) Number of the OAA beneficiaries and the OAA budget is retrieved from the Social and Quality of Life Database System (Income Security Data) of National Economic and Social Development Board (2018a)

## Figure 2: Education Expenditure




Source: Figure 2.1 is drawn from authors' own estimations based on the Household Socioeconomic Survey (SES) 2009, 2011, 2013, 2015 and 2017
Figure 2.2 makes use of the data from Thailand's National Account by National Economic and Social Development Board ( 2017a; 2018c)

## Table 4 Summary Statistics

| | Participants | | Non-Participants | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All non-participants | | Eligible non-participants | | Non-Eligible | | Nearly-Eligible | |
| | Means | SD | Means | SD | Means | SD | Means | SD | Means | SD |
| **Household Socioeconomic Characteristics** | | | | | | | | | | |
| Total household OAA benefit (THB per month) | 829.97 | 317.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Household income excluding pension (THB per month) | 23,767.41 | 38,573.31 | 32,797.34 | 11,0260.6 | 37,166.07 | 189,981.00 | 61,780.32 | 47,260.11 | 27,243.44 | 37,965.45 |
| Household education expenditure per school-age child (THB per month) | 536.64 | 991.10 | 679.47 | 1,524.44 | 764.16 | 1,718.34 | 1,376.83 | 2,810.30 | 555.86 | 1,133.37 |
| Share of education expenditure in total household expenditure | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.04 | 0.05 | 0.03 | 0.04 |
| Household in rural area | 0.48 | 0.50 | 0.42 | 0.49 | 0.42 | 0.49 | 0.19 | 0.40 | 0.45 | 0.50 |
| Region | | | | | | | | | | |
| Bangkok and Vicinities | 0.03 | 0.16 | 0.05 | 0.22 | 0.07 | 0.26 | 0.07 | 0.26 | 0.04 | 0.19 |
| Central | 0.25 | 0.43 | 0.26 | 0.44 | 0.27 | 0.44 | 0.29 | 0.46 | 0.26 | 0.44 |
| North | 0.24 | 0.43 | 0.24 | 0.43 | 0.23 | 0.42 | 0.22 | 0.41 | 0.25 | 0.43 |
| Northeast | 0.36 | 0.48 | 0.32 | 0.46 | 0.30 | 0.46 | 0.30 | 0.46 | 0.33 | 0.47 |
| South | 0.12 | 0.32 | 0.13 | 0.33 | 0.13 | 0.34 | 0.12 | 0.32 | 0.13 | 0.33 |
| **Household Structure** | | | | | | | | | | |
| Household size | 4.64 | 1.54 | 4.43 | 1.56 | 4.66 | 1.64 | 4.43 | 1.44 | 4.31 | 1.53 |
| Number of OAA recipients | 1.32 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Number of elderly aged 60 or above | 1.37 | 0.51 | 0.46 | 0.65 | 1.20 | 0.41 | 1.23 | 0.67 | 0.00 | 0.00 |
| Number of all school-age children (3-18 years old) | 1.50 | 0.74 | 1.46 | 0.72 | 1.51 | 0.75 | 1.39 | 0.64 | 1.44 | 0.72 |
| Number of children 3-5 years old | 0.23 | 0.45 | 0.28 | 0.49 | 0.27 | 0.49 | 0.24 | 0.45 | 0.30 | 0.50 |
| Number of children 6-11 years old | 0.57 | 0.67 | 0.57 | 0.67 | 0.58 | 0.68 | 0.57 | 0.67 | 0.56 | 0.67 |
| Number of children 12-14 years old | 0.33 | 0.52 | 0.29 | 0.50 | 0.34 | 0.53 | 0.24 | 0.46 | 0.28 | 0.49 |
| Number of children 15-18 years old | 0.37 | 0.55 | 0.32 | 0.52 | 0.33 | 0.55 | 0.33 | 0.55 | 0.32 | 0.52 |
| Number of school-age children not attending school | 0.16 | 0.40 | 0.18 | 0.42 | 0.18 | 0.43 | 0.09 | 0.30 | 0.19 | 0.43 |
| Skipped-generation household setting | 0.18 | 0.39 | 0.05 | 0.22 | 0.13 | 0.33 | 0.14 | 0.34 | 0.00 | 0.00 |
| Multigeneration household setting | 0.82 | 0.39 | 0.32 | 0.47 | 0.87 | 0.33 | 0.75 | 0.44 | 0.00 | 0.00 |
| **Household Head characteristics** | | | | | | | | | | |
| Head's age | 64.44 | 12.32 | 57.15 | 8.37 | 59.91 | 11.01 | 62.66 | 10.73 | 55.15 | 5.34 |
| Head's year of education | 4.86 | 3.34 | 6.24 | 4.36 | 5.61 | 4.11 | 12.74 | 4.11 | 5.73 | 3.86 |
| Female head of household | 0.44 | 0.50 | 0.36 | 0.48 | 0.39 | 0 .49 | 0.33 | 0.47 | 0.35 | 0.48 |
| Head's occupation (blue collar job) | 0.94 | 0.24 | 0.86 | 0.35 | 0.86 | 0.35 | 0.85 | 0.36 | 0.87 | 0.34 |
| Number of households | 25,258 | | 16,242 | | 4,956 | | 1,188 | | 10,098 | |

Source: Own estimations based on the Household Socioeconomic Survey (SES) 2009, 2011, 2013, 2015 and 2017

Notes: Participants refer to households with OAA recipients. Non-participants are households without OAA pensioners consisting of eligible non-participant households, non-eligible households and nearly eligible households. Eligible non-participants are households with elderly members who are entitled to receive the OAA but decided not to take the benefit or having some delays in program registration. Non-eligible households are households in which elderly members are already covered by other pension programs. Nearly eligible households are households that elderly members are at the age of 55 to 59 years old and have not yet qualified to receive the OAA. Summary statistics presented here are pooled from 5 rounds of the SES. We restrict sample by keeping only households that have at least one school-age member (3-18 years) and one elderly member (55 years or over). Households receiving benefits from both OAA and other pension programs are excluded. All variables related to income and expenditure in this analysis are deflated by the consumer price index with the base year of 2015.

## Table 5 Impact of the OAA on Household Education Expenditure per School-Age Child (2SLS)

| | Participants and All Non-Participants | | Participants and Eligible Non-Participants | | Participants and Non-Eligible | | Participants and Nearly Eligible | |
|---|---|---|---|---|---|---|---|---|
| | Full Sample | Bottom 40% | Full Sample | Bottom 40% | Full Sample | Bottom 40% | Full Sample | Bottom 40% |
| **Dependent variable: Household education expenditure per school-age child (ln)** | | | | | | | | |
| **Household OAA benefit (ln)** | **0.028** | **0.052** | **0.015** | **0.058** | **0.019** | **0.077** | **0.039** | **0.078** |
| | **(0.018)** | **(0.032)** | **(0.018)** | **(0.038)** | **(0.047)** | **(0.068)** | **(0.033)** | **(0.057)** |
| Household income excluding pension (ln) | 0.231*** | 0.030** | 0.227*** | 0.030** | 0.240*** | 0.024 | 0.219*** | 0.027** |
| | (0.013) | (0.013) | (0.015) | (0.015) | (0.019) | (0.016) | (0.013) | (0.013) |
| Head's year of education | 0.043*** | 0.038*** | 0.035*** | 0.036*** | 0.038*** | 0.032*** | 0.038*** | 0.035*** |
| | (0.003) | (0.005) | (0.003) | (0.006) | (0.008) | (0.006) | (0.002) | (0.005) |
| Blue-collar headed household | -0.124*** | -0.266*** | -0.156*** | -0.292** | -0.111** | -0.318** | -0.144*** | -0.288** |
| | (0.027) | (0.079) | (0.035) | (0.099) | (0.051) | (0.123) | (0.031) | (0.091) |
| Female headed household | 0.036** | 0.002 | 0.049** | 0.014 | 0.035* | 0.011 | 0.035** | 0.004 |
| | (0.014) | (0.024) | (0.017) | (0.027) | (0.018) | (0.031) | (0.016) | (0.026) |
| Household size (ln) | 0.040 | 0.006 | 0.127** | 0.018 | 0.109* | 0.041 | 0.061* | 0.017 |
| | (0.037) | (0.067) | (0.047) | (0.098) | (0.060) | (0.094) | (0.036) | (0.064) |
| Number of children 3-5 years old | 0.048** | 0.218*** | 0.012 | 0.182*** | -0.013 | 0.164** | 0.045* | 0.207*** |
| | (0.022) | (0.041) | (0.026) | (0.051) | (0.028) | (0.055) | (0.023) | (0.043) |
| Number of children 6-11 years old | 0.192*** | 0.301*** | 0.139*** | 0.262*** | 0.131*** | 0.236*** | 0.189*** | 0.287*** |
| | (0.016) | (0.032) | (0.018) | (0.041) | (0.020) | (0.042) | (0.016) | (0.033) |
| Number of children 12-14 years old | 0.503*** | 0.679*** | 0.458*** | 0.634*** | 0.453*** | 0.610*** | 0.520*** | 0.667*** |
| | (0.017) | (0.035) | (0.020) | (0.043) | (0.021) | (0.046) | (0.018) | (0.036) |
| Number of children 15-18 years old | 0.713*** | 0.921*** | 0.659*** | 0.884*** | 0.656*** | 0.875*** | 0.727*** | 0.917*** |
| | (0.018) | (0.036) | (0.021) | (0.044) | (0.022) | (0.049) | (0.019) | (0.039) |
| Number of children attending private school | 0.803*** | 0.760*** | 0.801*** | 0.768*** | 0.799*** | 0.771*** | 0.816*** | 0.761*** |
| | (0.018) | (0.067) | (0.021) | (0.085) | (0.023) | (0.096) | (0.020) | (0.074) |
| Number of school-age children not attending school | -2.862*** | -3.100*** | -2.765*** | -3.045*** | -2.780*** | -3.083*** | -2.865*** | -3.132*** |
| | (0.031) | (0.050) | (0.037) | (0.060) | (0.040) | (0.061) | (0.033) | (0.049) |
| Skipped-generation household setting | -0.073 | -0.239 | 0.527 | 0.598 | -0.012 | 0.518 | -0.187 | -0.460 |
| | (0.106) | (0.199) | (0.777) | (0.855) | (0.259) | (0.536) | (0.229) | (0.393) |
| Multigeneration household setting | -0.050 | -0.210 | 0.512 | 0.621 | -0.029 | 0.532 | -0.168 | -0.436 |
| | (0.094) | (0.172) | (0.777) | (0.855) | (0.247) | (0.525) | (0.219) | (0.373) |
| Rural | 0.048** | 0.218*** | 0.012 | 0.182*** | -0.013 | 0.164** | 0.045* | 0.207*** |
| | (0.022) | (0.041) | (0.026) | (0.051) | (0.028) | (0.055) | (0.023) | (0.043) |
| Region (Bangkok and vicinities = reference) | | | | | | | | |
| Central | -0.502*** | -0.311* | -0.524*** | -0.357* | -0.539*** | -0.044 | -0.506*** | -0.126 |
| | (0.043) | (0.171) | (0.053) | (0.213) | (0.058) | (0.245) | (0.049) | (0.196) |
| North | -0.632*** | -0.405** | -0.631*** | -0.412* | -0.660*** | -0.111 | -0.649*** | -0.230 |
| | (0.043) | (0.171) | (0.054) | (0.212) | (0.059) | (0.245) | (0.049) | (0.195) |
| Northeast | -0.958*** | -0.700*** | -0.970*** | -0.727*** | -0.996*** | -0.415* | -0.961*** | -0.512** |
| | (0.043) | (0.171) | (0.054) | (0.213) | (0.059) | (0.244) | (0.049) | (0.195) |

| | Participants and All Non-Participants | | Participants and Eligible Non-Participants | | Participants and Non-Eligible | | Participants and Nearly Eligible | |
|---|---|---|---|---|---|---|---|---|
| | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** |
| South | -0.673*** | -0.465** | -0.672*** | -0.468** | -0.692*** | -0.170 | -0.678*** | -0.293 |
| | (0.046) | (0.175) | (0.056) | (0.217) | (0.062) | (0.248) | (0.052) | (0.199) |
| Year 2011 | -0.187*** | -0.269*** | -0.198*** | -0.307*** | -0.182*** | -0.244*** | -0.147*** | -0.215*** |
| | (0.029) | (0.042) | (0.035) | (0.054) | (0.029) | (0.042) | (0.024) | (0.036) |
| Year 2013 | -0.160*** | -0.140** | -0.156*** | -0.213*** | -0.120*** | -0.117** | -0.119*** | -0.061* |
| | (0.032) | (0.043) | (0.039) | (0.057) | (0.034) | (0.044) | (0.024) | (0.037) |
| Year 2015 | -0.054* | -0.078* | -0.062 | -0.134** | -0.021 | -0.040 | -0.002 | -0.002 |
| | (0.033) | (0.046) | (0.040) | (0.062) | (0.034) | (0.044) | (0.024) | (0.037) |
| Year 2017 | 0.084** | 0.005 | 0.098** | -0.018 | 0.143*** | 0.065 | 0.132*** | 0.069* |
| | (0.032) | (0.044) | (0.039) | (0.058) | (0.034) | (0.042) | (0.023) | (0.036) |
| Constant | 3.286*** | 4.849*** | 2.834*** | 4.100*** | 3.198*** | 3.736*** | 3.373*** | 4.684*** |
| | (0.126) | (0.246) | (0.792) | (0.895) | (0.280) | (0.605) | (0.138) | (0.260) |
| F Statistics | 1,126.36 | 451.54 | 1,271.57 | 280.08 | 489.22 | 2,243.66 | 9,683.71 | 1,320.82 |
| (p-value) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| **Dependent variable: Household OAA benefit** | | | | | | | | |
| IV: Number of elderly aged 60 or over | 0.998*** | 1.061*** | 1.111*** | 1.022*** | 0.438*** | 0.597*** | 0.583*** | 0.612*** |
| | (0.030) | (0.050) | (0.031) | (0.061) | (0.020) | (0.013) | (0.006) | (0.017) |
| **Number of observations (households)** | **41,500** | **14,036** | **30,214** | **10,666** | **26,446** | **9,123** | **35,356** | **12,461** |

Note: Participants refer to households with OAA recipients. Non-participants are households without OAA pensioners consisting of eligible non-participant households, non-eligible households and nearly eligible households. Eligible non-participants are households with elderly members who are entitled to receive the OAA but decided not to take the benefit or having some delays in program registration. Non-eligible households are households in which elderly members are already covered by other pension programs. Nearly eligible households are households that elderly members are at the age of 55 to 59 years old and have not yet qualified to receive the OAA. All estimations are conducted at the household level. The results are obtained from equation (1) and (2) with the 2SLS estimation method where an endogenous treatment variable ($T_i$) is the amount of benefit that a household received from the OAA program. The first-stage regressions for the amount of OAA pension include the IV, which is the number of elderly aged 60 or over, and the control variables used in the main regressions. Household education expenditure per school-age member, household income excluding pension and household size are in natural logarithm. All variables related to income and expenditure are deflated by the consumer price index with the base year of 2015. Robust standard errors in parentheses for regression coefficients. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.001$

## Table 6 Impact of the OAA on Household Education Expenditure per School-Age Child (Tobit Model)

| | Participants and All Non-Participants | | Participants and Eligible Non-Participants | | Participants and Non-Eligible | | Participants and Nearly Eligible | |
|---|---|---|---|---|---|---|---|---|
| | Full Sample | Bottom 40% | Full Sample | Bottom 40% | Full Sample | Bottom 40% | Full Sample | Bottom 40% |
| **Household OAA benefit (ln)** | **-0.002** | **-0.000** | **0.001** | **0.002** | **-0.021** | **-0.025** | **0.045** | **-0.071** |
| | **(0.019)** | **(0.034)** | **(0.019)** | **(0.040)** | **(0.050)** | **(0.073)** | **(0.035)** | **(0.061)** |
| Household income excluding pension (ln) | 0.225*** | 0.028** | 0.226*** | 0.028* | 0.232*** | 0.023 | 0.220*** | 0.026* |
| | (0.013) | (0.013) | (0.015) | (0.015) | (0.020) | (0.016) | (0.014) | (0.014) |
| Head's year of education | 0.041*** | 0.038*** | 0.034*** | 0.036*** | 0.031*** | 0.032*** | 0.038*** | 0.035*** |
| | (0.003) | (0.005) | (0.003) | (0.006) | (0.008) | (0.007) | (0.003) | (0.006) |
| Blue-collar headed household | -0.131*** | -0.245** | -0.150*** | -0.256** | -0.143** | -0.322** | -0.145*** | -0.294** |
| | (0.028) | (0.083) | (0.036) | (0.105) | (0.054) | (0.131) | (0.032) | (0.096) |
| Female headed household | 0.041** | 0.014 | 0.052** | 0.030 | 0.031 | 0.010 | 0.031* | 0.001 |
| | (0.015) | (0.025) | (0.017) | (0.029) | (0.019) | (0.033) | (0.017) | (0.028) |
| Household size (ln) | 0.062 | 0.028 | 0.142** | 0.050 | 0.134** | 0.029 | 0.067* | 0.012 |
| | (0.039) | (0.072) | (0.050) | (0.104) | (0.063) | (0.101) | (0.038) | (0.068) |
| Number of children 3-5 years old | 0.103*** | 0.289*** | 0.063** | 0.245*** | 0.034 | 0.232*** | 0.104*** | 0.283*** |
| | (0.024) | (0.046) | (0.028) | (0.056) | (0.031) | (0.060) | (0.025) | (0.048) |
| Number of children 6-11 years old | 0.252*** | 0.377*** | 0.195*** | 0.329*** | 0.186*** | 0.317*** | 0.255*** | 0.372*** |
| | (0.017) | (0.034) | (0.020) | (0.043) | (0.022) | (0.046) | (0.018) | (0.036) |
| Number of children 12-14 years old | 0.558*** | 0.746*** | 0.508*** | 0.694*** | 0.505*** | 0.679*** | 0.578*** | 0.739*** |
| | (0.018) | (0.037) | (0.021) | (0.045) | (0.023) | (0.049) | (0.020) | (0.039) |
| Number of children 15-18 years old | 0.770*** | 0.988*** | 0.707*** | 0.945*** | 0.702*** | 0.932*** | 0.780*** | 0.982*** |
| | (0.019) | (0.040) | (0.022) | (0.047) | (0.024) | (0.052) | (0.021) | (0.042) |
| Number of children attending private school | 0.779*** | 0.732*** | 0.781*** | 0.742*** | 0.782*** | 0.751*** | 0.797*** | 0.738*** |
| | (0.018) | (0.069) | (0.022) | (0.087) | (0.024) | (0.099) | (0.021) | (0.077) |
| Number of school-age children not attending school | -3.198*** | -3.527*** | -3.076*** | -3.474*** | -3.082*** | -3.464*** | -3.188*** | -3.526*** |
| | (0.037) | (0.055) | (0.043) | (0.066) | (0.047) | (0.073) | (0.039) | (0.059) |
| Skipped-generation household setting | 0.060 | -0.004 | 0.576 | 0.668 | 0.170 | 1.011* | -0.211 | 0.405 |
| | (0.112) | (0.211) | (0.912) | (1.018) | (0.273) | (0.612) | (0.242) | (0.419) |
| Multigeneration household setting | 0.074 | 0.010 | 0.553 | 0.673 | 0.150 | 1.030* | -0.198 | 0.432 |
| | (0.099) | (0.183) | (0.912) | (1.018) | (0.261) | (0.601) | (0.231) | (0.398) |
| Rural | -0.078*** | -0.054** | -0.088*** | -0.057** | -0.090*** | -0.057** | -0.071*** | -0.053** |
| | (0.015) | (0.023) | (0.017) | (0.027) | (0.019) | (0.029) | (0.016) | (0.025) |
| Region (Bangkok and vicinities = reference) | | | | | | | | |
| Central | -0.485*** | -0.242 | -0.512*** | -0.278 | -0.545*** | 0.008 | -0.503*** | -0.096 |
| | (0.045) | (0.177) | (0.056) | (0.222) | (0.061) | (0.266) | (0.051) | (0.205) |
| North | -0.615*** | -0.336* | -0.618*** | -0.329 | -0.666*** | -0.057 | -0.647*** | -0.203 |
| | (0.045) | (0.177) | (0.057) | (0.222) | (0.061) | (0.265) | (0.052) | (0.205) |
| Northeast | -0.938*** | -0.619*** | -0.955*** | -0.632** | -1.000*** | -0.353 | -0.957*** | -0.478** |
| | (0.046) | (0.177) | (0.057) | (0.222) | (0.061) | (0.265) | (0.052) | (0.204) |
| South | -0.661*** | -0.386** | -0.664*** | -0.373* | -0.700*** | -0.110 | -0.680*** | -0.261 |

| | Participants and All Non-Participants | | Participants and Eligible Non-Participants | | Participants and Non-Eligible | | Participants and Nearly Eligible | |
|---|---|---|---|---|---|---|---|---|
| | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** |
| | (0.048) | (0.182) | (0.059) | (0.227) | (0.065) | (0.269) | (0.055) | (0.209) |
| Year 2011 | -0.152*** | -0.221*** | -0.177*** | -0.244*** | -0.174*** | -0.233*** | -0.146*** | -0.205*** |
| | (0.031) | (0.045) | (0.037) | (0.057) | (0.031) | (0.045) | (0.026) | (0.039) |
| Year 2013 | -0.123*** | -0.095** | -0.136*** | -0.152** | -0.107** | -0.100** | -0.125*** | -0.043 |
| | (0.033) | (0.046) | (0.041) | (0.060) | (0.036) | (0.047) | (0.025) | (0.039) |
| Year 2015 | -0.012 | -0.027 | -0.038 | -0.065 | -0.004 | -0.024 | -0.003 | 0.016 |
| | (0.035) | (0.049) | (0.042) | (0.065) | (0.036) | (0.047) | (0.025) | (0.039) |
| Year 2017 | 0.124*** | 0.045 | 0.120** | 0.039 | 0.158*** | 0.073 | 0.128*** | 0.076** |
| | (0.034) | (0.046) | (0.041) | (0.061) | (0.035) | (0.045) | (0.025) | (0.038) |
| **Number of observations (households)** | **41,500** | **14,036** | **30,214** | **10,666** | **26,446** | **9,123** | **35,356** | **12,461** |

Note: Participants refer to households with OAA recipients. Non-participants are households without OAA pensioners consisting of eligible non-participant households, non-eligible households and nearly eligible households. Eligible non-participants are households with elderly members who are entitled to receive the OAA but decided not to take the benefit or having some delays in program registration. Non-eligible households are households in which elderly members are already covered by other pension programs. Nearly eligible households are households that elderly members are at the age of 55 to 59 years old and have not yet qualified to receive the OAA. All estimations are conducted at the household level. The results are obtained from equation (1) and (2) using the tobit model with the Maximum Likelihood Estimation method. Marginal effects, which are obtained from equation (3) and (4), are reported. Household education expenditure per school-age member, household income excluding pension and household size are in natural logarithm. All variables related to income and expenditure are deflated by the consumer price index with the base year of 2015. Robust standard errors in parentheses for regression coefficients. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.001$

## Table 7 Impact of the OAA on the Share of Education Expenditure in Total Household Expenditure

| | Participants and All Non-Participants | | Participants and Eligible Non-Participants | | Participants and Non-Eligible | | Participants and Nearly Eligible | |
|---|---|---|---|---|---|---|---|---|
| | Full Sample | Bottom 40% | Full Sample | Bottom 40% | Full Sample | Bottom 40% | Full Sample | Bottom 40% |
| **Household OAA benefit (ln)** | **0.002*** ** | **0.002** ** | **0.001*** ** | **0.002*** | **0.003** ** | **0.003** | **0.003*** ** | **0.004** ** |
| | **(0.000)** | **(0.001)** | **(0.000)** | **(0.001)** | **(0.001)** | **(0.002)** | **(0.001)** | **(0.001)** |
| Household income excluding pension (ln) | -0.000* | 0.001** | -0.001** | 0.000 | 0.000 | 0.000 | -0.001** | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Head's year of education | 0.001*** | 0.000*** | 0.000*** | 0.000** | 0.001*** | 0.000* | 0.000*** | 0.000** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Blue-collar headed household | 0.001* | -0.003 | -0.000 | -0.003 | 0.002 | -0.004 | 0.001 | -0.004* |
| | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.003) | (0.001) | (0.002) |
| Female headed household | 0.002*** | 0.002** | 0.002*** | 0.002** | 0.002*** | 0.002** | 0.002*** | 0.002** |
| | (0.000) | (0.001) | (0.000) | (0.001) | (0.000) | (0.001) | (0.000) | (0.001) |
| Household size (ln) | -0.015*** | -0.012*** | -0.014*** | -0.009** | -0.014*** | -0.009** | -0.014*** | -0.011*** |
| | (0.001) | (0.002) | (0.001) | (0.003) | (0.002) | (0.003) | (0.001) | (0.002) |
| Number of children 3-5 years old | 0.005*** | 0.008*** | 0.005*** | 0.007*** | 0.005*** | 0.007*** | 0.005*** | 0.007*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Number of children 6-11 years old | 0.008*** | 0.009*** | 0.008*** | 0.008*** | 0.008*** | 0.007*** | 0.008*** | 0.008*** |
| | (0.000) | (0.001) | (0.000) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) |
| Number of children 12-14 years old | 0.015*** | 0.017*** | 0.014*** | 0.016*** | 0.015*** | 0.016*** | 0.015*** | 0.017*** |
| | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) |
| Number of children 15-18 years old | 0.021*** | 0.025*** | 0.021*** | 0.025*** | 0.021*** | 0.024*** | 0.021*** | 0.025*** |
| | (0.000) | (0.001) | (0.001) | (0.002) | (0.001) | (0.002) | (0.000) | (0.001) |
| Number of children attending private school | 0.019*** | 0.017*** | 0.019*** | 0.018*** | 0.019*** | 0.017*** | 0.019*** | 0.017*** |
| | (0.000) | (0.002) | (0.001) | (0.002) | (0.001) | (0.003) | (0.001) | (0.002) |
| Number of school-age children not attending school | -0.030*** | -0.036*** | -0.029*** | -0.036*** | -0.029*** | -0.036*** | -0.029*** | -0.036*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Skipped-generation household setting | -0.005** | -0.011** | -0.009 | -0.012 | -0.007 | -0.010 | -0.014** | -0.022** |
| | (0.003) | (0.005) | (0.014) | (0.015) | (0.007) | (0.013) | (0.005) | (0.010) |
| Multigeneration household setting | -0.007** | -0.012** | -0.011 | -0.015 | -0.010 | -0.012 | -0.016** | -0.023** |
| | (0.002) | (0.004) | (0.014) | (0.015) | (0.006) | (0.013) | (0.005) | (0.009) |
| Rural | -0.001** | -0.000 | -0.001** | -0.000 | -0.001** | 0.000 | -0.000 | 0.000 |
| | (0.000) | (0.001) | (0.000) | (0.001) | (0.000) | (0.001) | (0.000) | (0.001) |
| Region (Bangkok and vicinities = reference) | | | | | | | | |
| Central | -0.016*** | -0.023*** | -0.016*** | -0.026*** | -0.016*** | -0.017** | -0.016*** | -0.019** |
| | (0.001) | (0.006) | (0.002) | (0.007) | (0.002) | (0.008) | (0.001) | (0.006) |
| North | -0.016*** | -0.023*** | -0.016*** | -0.025*** | -0.016*** | -0.018** | -0.017*** | -0.018** |
| | (0.001) | (0.006) | (0.002) | (0.008) | (0.002) | (0.008) | (0.001) | (0.006) |
| Northeast | -0.026*** | -0.033*** | -0.027*** | -0.037*** | -0.026*** | -0.028*** | -0.026*** | -0.028*** |
| | (0.001) | (0.006) | (0.002) | (0.008) | (0.002) | (0.008) | (0.001) | (0.006) |
| South | -0.021*** | -0.029*** | -0.021*** | -0.032*** | -0.021*** | -0.024** | -0.022*** | -0.025*** |

| | Participants and All Non-Participants | | Participants and Eligible Non-Participants | | Participants and Non-Eligible | | Participants and Nearly Eligible | |
|---|---|---|---|---|---|---|---|---|
| | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** | **Full Sample** | **Bottom 40%** |
| | (0.001) | (0.006) | (0.002) | (0.008) | (0.002) | (0.008) | (0.001) | (0.006) |
| Year 2011 | -0.008*** | -0.011*** | -0.008*** | -0.011*** | -0.007*** | -0.008*** | -0.006*** | -0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Year 2013 | -0.007*** | -0.007*** | -0.008*** | -0.008*** | -0.006*** | -0.006*** | -0.005*** | -0.005*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Year 2015 | -0.006*** | -0.007*** | -0.007*** | -0.007*** | -0.005*** | -0.004*** | -0.004*** | -0.005*** |
| | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.001) |
| Year 2017 | -0.002** | -0.003** | -0.002* | -0.002* | 0.000 | 0.000 | 0.000 | -0.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| **Number of observations (households)** | **41,500** | **14,036** | **30,214** | **10,666** | **26,446** | **9,123** | **35,356** | **12,461** |

Note: Participants refer to households with OAA recipients. Non-participants are households without OAA pensioners consisting of eligible non-participant households, non-eligible households and nearly eligible households. Eligible non-participants are households with elderly members who are entitled to receive the OAA but decided not to take the benefit or having some delays in program registration. Non-eligible households are households in which elderly members are already covered by other pension programs. Nearly eligible households are households that elderly members are at the age of 55 to 59 years old and have not yet qualified to receive the OAA. All estimations are conducted at the household level. The results are obtained from equation (1) and (2) using the fractional probit model with the Maximum Likelihood Estimation method where $Y_i$ denotes share of education in total household expenditure and is coded as a fraction having value between zero and one. Marginal effects are reported. Household education expenditure per school-age member, household income excluding pension and household size are in natural logarithm. All variables related to income and expenditure are deflated by the consumer price index with the base year of 2015. Robust standard errors in parentheses for regression coefficients. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.001$

## Table 8 Impact of Co-residing with OAA Pensioners on School Attendance

| | Full Sample | | Bottom 40% | |
|---|---|---|---|---|
| | **Coefficient (SE)** | **Rho** | **Coefficient (SE)** | **Rho** |
| **All education level** | 0.049** | -0.120 | 0.071* | -0.141 |
| | (0.015) | (0.054) | (0.036) | (0.110) |
| Number of observations (children) | 61,726 | | 19,701 | |
| **Pre-primary education** | 0.104** | -0.166 | 0.201* | -0.288 |
| | (0.049) | (0.110) | (0.107) | (0.218) |
| Number of observations (children) | 10,434 | | 3,122 | |
| **Compulsory education** (primary to lower secondary education) | 0.004 | 0.033 | -0.003 | 0.163 |
| | (0.005) | (0.095) | (0.018) | (0.228) |
| Number of observations (children) | 36,823 | | 12,138 | |
| **After compulsory education** (upper secondary education) | 0.083*** | -0.106 | 0.185* | -0.227 |
| | (0.025) | (0.050) | (0.103) | (0.187) |
| Number of observations (children) | 14,469 | | 4,441 | |

Note: All estimations are conducted at the individual (child) level. The sample includes children from participant and all non-participant households. There are 61,726 children from 41,500 households in total. The results are obtained from equation (1) and (2) using the bivariate probit regression where $T_j$ and $Y_j$ are both binary variable representing a child j co-residing with at least one OAA pensioner and school attendance of the child, respectively. Control variables including household income excluding pension (in ln), household size, region, area of residence (rural/urban), gender of household head, education of household head, occupation of household head (blue or white collar), dummy variable for skipped-generational family, dummy variable for multigeneration family, the number of household member in each age group (3-5, 6-11, 12-14, 15-18), year dummies, age of the child, gender of the child, are included but do not shown in the table. Marginal effects are reported. All variables related to income and expenditure are deflated by the consumer price index with the base year of 2015. Robust standard errors in parentheses for regression coefficients. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.001$

## Table 9 Impact of the OAA on the Share of Education Expenditure in Total Household Expenditure by Income Decile

| | Decile 1 (Poorest) | Decile 2 | Decile 3 | Decile 4 |
|---|---|---|---|---|
| **Household OAA benefit (ln)** | **0.000** | **0.001** | **0.004*** | **0.004**** |
| | **(0.000)** | **(0.002)** | **(0.002)** | **(0.002)** |
| Household income excluding pension (ln) | 0.001 | 0.003 | 0.016 | 0.029** |
| | (0.000) | (0.003) | (0.011) | (0.009) |
| Head's year of education | 0.001** | 0.000* | 0.000* | 0.001** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Blue-collar headed household | -0.008 | -0.006 | -0.004 | 0.001 |
| | (0.006) | (0.004) | (0.004) | (0.003) |
| Female headed household | 0.002 | 0.001 | 0.001 | 0.002** |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| Household size (ln) | -0.014*** | -0.007** | -0.016*** | -0.011** |
| | (0.002) | (0.003) | (0.004) | (0.004) |
| Number of children 3-5 years old | -0.005** | 0.007*** | 0.009*** | 0.008*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Number of children 6-11 years old | 0.010*** | 0.008*** | 0.010*** | 0.008*** |
| | (0.002) | (0.001) | (0.001) | (0.002) |
| Number of children 12-14 years old | 0.018*** | 0.019*** | 0.018*** | 0.015*** |
| | (0.002) | (0.001) | (0.002) | (0.002) |
| Number of children 15-18 years old | 0.019*** | 0.026*** | 0.027*** | 0.024*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Number of children attending private school | 0.019*** | 0.016*** | 0.020*** | 0.017*** |
| | (0.003) | (0.003) | (0.002) | (0.004) |
| Number of school-age children not attending school | -0.043*** | -0.037*** | -0.035*** | -0.033*** |
| | (0.004) | (0.002) | (0.002) | (0.002) |
| Skipped-generation household setting | -0.043* | 0.000 | -0.016 | -0.014 |
| | (0.024) | (0.010) | (0.012) | (0.009) |
| Multigeneration household setting | -0.035* | -0.004 | -0.015 | -0.017** |
| | (0.020) | (0.009) | (0.010) | (0.008) |
| Rural | 0.003** | -0.001 | 0.001 | -0.002* |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Region (Bangkok and vicinities = reference) | | | | |
| Central | -0.052** | -0.003 | -0.028*** | -0.019* |
| | (0.020) | (0.011) | (0.008) | (0.011) |
| North | -0.049** | -0.003 | -0.025*** | -0.020* |
| | (0.020) | (0.011) | (0.008) | (0.011) |
| Northeast | -0.061** | -0.012 | -0.037*** | -0.031** |
| | (0.020) | (0.011) | (0.008) | (0.011) |
| South | -0.059** | -0.006 | -0.034*** | -0.027** |
| | (0.020) | (0.011) | (0.008) | (0.011) |

| | Decile 1 (Poorest) | Decile 2 | Decile 3 | Decile 4 |
|---|---|---|---|---|
| Year 2011 | -0.009*** | -0.010*** | -0.011*** | -0.011*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Year 2013 | -0.004** | -0.006** | -0.008*** | -0.008*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Year 2015 | -0.003 | -0.004** | -0.006** | -0.011*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Year 2017 | -0.003 | -0.002 | -0.002 | -0.004* |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| **Number of observations (households)** | **2148** | 3502 | 4000 | 4386 |

Note: All estimations are conducted at the household level. We use deflated value of household income to estimate income decile. For the regression analysis, we use the trimmed sample and include participant and all non-participant households. The results are obtained from equation (1) and (2) with the 2SLS estimation method where an endogenous treatment variable ($T_i$) is the amount of benefit that a household received from the OAA program. The first-stage regressions for the amount of OAA pension include the IV, which is the number of elderly aged 60 or over, and the control variables used in the main regressions. Household education expenditure per school-age member, household income excluding pension and household size are in natural logarithm. All variables related to income and expenditure are deflated by the consumer price index with the base year of 2015. Robust standard errors in parentheses for regression coefficients. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.001$

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