THE IMPACT OF REMITTANCES ON HUMAN CAPITAL INVESTMENT IN THAI HOUSEHOLDS

BY

PHETAUMA MANICH

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
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FACULTY OF ECONOMICS
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ENTITLED

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was approved as partial fulfillment of the requirements for
the degree of Master Degree of Economics

on July 18, 2023

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Thesis Title	THE IMPACT OF REMITTANCES ON HUMAN CAPITAL INVESTMENT IN THAI HOUSEHOLDS
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Degree	Master of Economics
Major Field	Economics
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Academic Year	2022

ABSTRACT

This paper investigates the impact of remittance income on a continuation to study in upper-secondary education in Thailand using data from the Household Socio-Economic Survey from 2015 to 2021. This paper employs an instrumental variable Probit to take into account the endogeneity problem that arises from remittance income. The result shows that maternal education, total household expenditure and total household assets are key determinants of a continuation to study in upper-secondary education. Furthermore, remittance income lowers the probability of a child enrolling in upper-secondary education. The total household assets could provide access to other means of financial support. This paper also studies the relationship between remittance income and education expenditure in Thai households. Engel curves are estimated using the Tobit model with left-censoring data to account for the ordinary least squares estimation bias. The results show that remittance positively influences the likelihood that households spend on education. Remittance-receiving households consider education as a necessity commodity and the elasticity varies across income quintiles. Finally, the results also show a gender bias toward female students. Policymakers are advised to lower the costs of transition to upper-secondary education, provide an asset-building scheme to all households, and ensure sufficient support for low-asset households.

Keywords: Remittance, Upper-secondary attainment, Engel curve, Elasticity, Education expenditure

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my advisor, Assoc. Prof. Dr. Sasiwimon Warunsiri Paweenawat for her tremendous support and assistance in my thesis. Thank you for your guidance, feedback and consultation to ensure the quality of this paper. I also could not have undertaken this journey without my thesis committees: Assoc. Prof. Dr. Kaewkwan Tangtipongkul and Asst. Prof. Dr. Voraprapa Nakavachara. I am extremely grateful for their constructive feedback and advice to make sure that my thesis is carefully done.

My deepest appreciation goes to Mitsubishi UFJ Foundation for the generous support during my two years at Thammasat University. I am also thankful to the National Statistical Office of Thailand for granting me access to all data employed in this paper.

I am grateful to my managers for writing me recommendation letters for my application to this degree. I am also thankful to my managers and colleagues for their kind support and willingness to help and share their experiences.

Finally, I could not have undertaken this journey without support from my dear mother and my family. Thank you for your love and encouragement. Thank you my beloved father in heaven for your unconditional love. I also would like to thank all my friends for their support during this process. Thank you for your time, motivation and emotional support.

Phetauma Manich

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CHAPTER 1
INTRODUCTION

1.1 Statement of the Problem

Outward migration in Thailand both internally and internationally has been a common phenomenon. This movement is a major ingredient of the development process both socially and economically. The migration however reflects the inequality among original areas and destinations. The benefit of greater employment opportunities, higher wages and salaries, and better transportation has driven some locals to migrate (Pholphirul, 2012; Amare et al., 2012).

Overview of Internal Migration in Thailand in 2018 reports that long-term migration is mainly urban-rural and predominantly from the northern and the northeastern parts of Thailand towards Bangkok and the Central region (UNESCO et al., 2018). It also reveals that nearly all internal migrants remit to their original households. Remittance income constitutes a significant proportion of their household income. Women migrants are more likely to remit and they remit more than men.

The 2021 Migration Survey by NSO reports that internal migration is more common among young adults (15-24 years old) and working-age adults (25-59 years old). The main driving force is employment (28.1% in 2021): the majority of migrants report seeking job opportunities (NSO, 2022). The internal migration in 2021 supplied labour mostly for manufacturing, agriculture, trading and construction. On the remittance-receiving end, migrants are more likely to remit to their parents, children and spouses, respectively. The recipients report allocating remittances toward daily expenses, education spending, debt repayments and, marginally, business investment.

Amare et al. (2012) observe that households with higher-educated members are more likely to engage in migration and have a higher chance for better quality employment. They also highlight the dominant effects of pull factors in urban areas, particularly the prospect of better health care services. Meanwhile, internal migration in younger family members is pushed by limited access to social and physical infrastructure in local areas. However, they argue that internal migration induces rural-

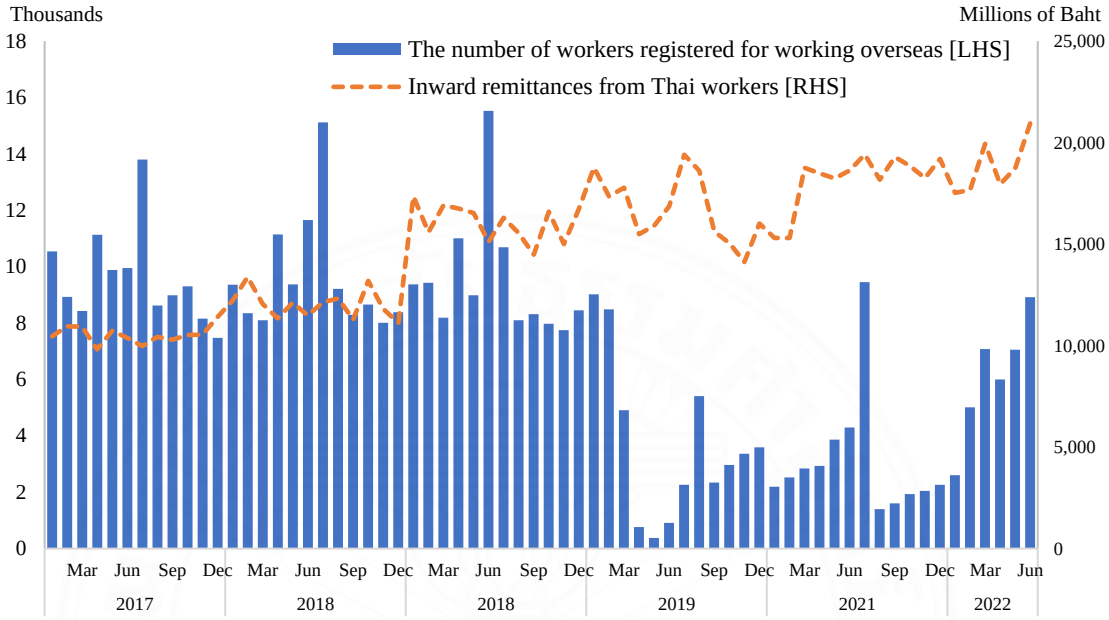
rural inequality because of (1) a higher growth of household income from more successful migrants, and (2) labour loss of an active household member. The latter rationale is also supported by Pholphirul (2012). Jampaklay (2020) observes that the net results of migration are clustered. The net gains are reported in Bangkok metropolitan areas, the Gulf of Thailand and some provinces in Southern Thailand. Meanwhile, the net losses are highest in Northeastern Thailand. In contrast to Amare et al. (2012), Jampaklay (2020) suggests that internal remittances improve the welfare of their original households and benefits are evenly distributed, hence reducing inequality.

However, containment measures during the COVID-19 outbreak in Thailand have affected the ability to remit among internal migrants. Therefore, remittances from internal migrants are expected to decline recently. A recent study by OECD (2021) records that 81% of respondents whose households experience a job loss report that they are somewhat or very concerned about their household's overall financial, social and economic well-being in the next two years. This finding highlights the important role of remittances in supporting family welfare.

At the same time, Thailand is also a labour-suppling country in the global market. There are approximately 120 thousand Thai people, who are currently working overseas. Their employment, for instance, involves general farm workers, fruit pickers and manual labourers; only a few workers are registered in skilled jobs such as engineers, technicians and managers (OEAD, 2022). Figure 1.1 shows that, despite the economic downturn due to the COVID-19 pandemic, the amount of internationally remitted incomes exhibits an upward trend. The inversely increasing amount of international remittance as compared to internal remittances suggests that international migrants are more capable of supporting their families. This also supports the evidence found by Techasunthornwat (2013) that remittances grow when there are negative shocks to the household and all remitters in the household help each other to support their family. Pholphirul (2012) also observes a similar pattern in 1997 when overseas Thai workers transfer more money during economic hardship at home. He highlights that remittances in Thai economy exhibit a counter-cyclical effect. Figure 1.1 also reveals the increasing number of overseas Thai workers. This indicates the potential flow of future inward remittances to compensate for uncertain economic outcomes at home.

Figure 1.1

The number of workers registering as working overseas and the volume of inward remittance in Thailand



Note. From *Employment Indicators* by Bank of Thailand, 2022, (https://www.bot.or.th/App/BTWS_STAT/statistics/BOTWEBSTAT.aspx?reportID=111&language=ENG)

Under the 1999 National Education Act, Thailand provides both basic and higher education in formal, non-formal and informal education for all students. Unlike many developed countries, it mandates nine years of basic education, which includes six years of primary education and three years of lower-secondary education. Students who complete compulsory education are eligible to pursue upper-secondary education with either general or vocational tracks. Although the Thai education system has provided 15-year free basic education since 2009, the number of students dropping out is still large, as shown in Table 1.1. In 2021, 26.5% of dropout students report that they have to support their families while the other 1.7% report poverty as the major concern. Despite financial difficulties among dropout students, Thailand's education budget in the last nine years has declined from 20.5% of the national budget and 4.2% of GDP in 2014 to 14.7% of the national budget and only 2.6% of GDP in 2022, as shown in Table 1.2.

Table 1.1

The number of dropout students under the Office of the Basic Education Commission

	2014	2015	2016	2017	2018	2019	2020	2021
Total	8,814	5,567	5,377	4,038	9,671	1,466	798	801
Primary education	1,760	1,313	1,247	930	1,756	121	359	166
Lower-secondary education	4,290	2,837	2,788	2,063	3,607	681	409	233
Upper-secondary education	2,764	1,417	1,342	1,045	4,308	664	30	402

Note. From *Educational Statistics* [in Thai] by NESDC, 2023, (https://www.nesdc.go.th/ewt_dl_link.php?nid=3508&filename=PageSocial)

Table 1.2

Thailand's education budget as percentages of the national budget and of GDP

Fiscal year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Education budget (Millions of Baht)	518,519	531,045	549,708	536,732	523,569	510,427	493,823	482,765	456,240
A percentage of national budget (%)	20.5	20.6	20.2	18.4	17.2	17.0	15.4	14.7	14.7
A percentage of GDP (%)	4.2	3.9	3.8	3.5	3.2	3.0	3.1	2.9	2.6

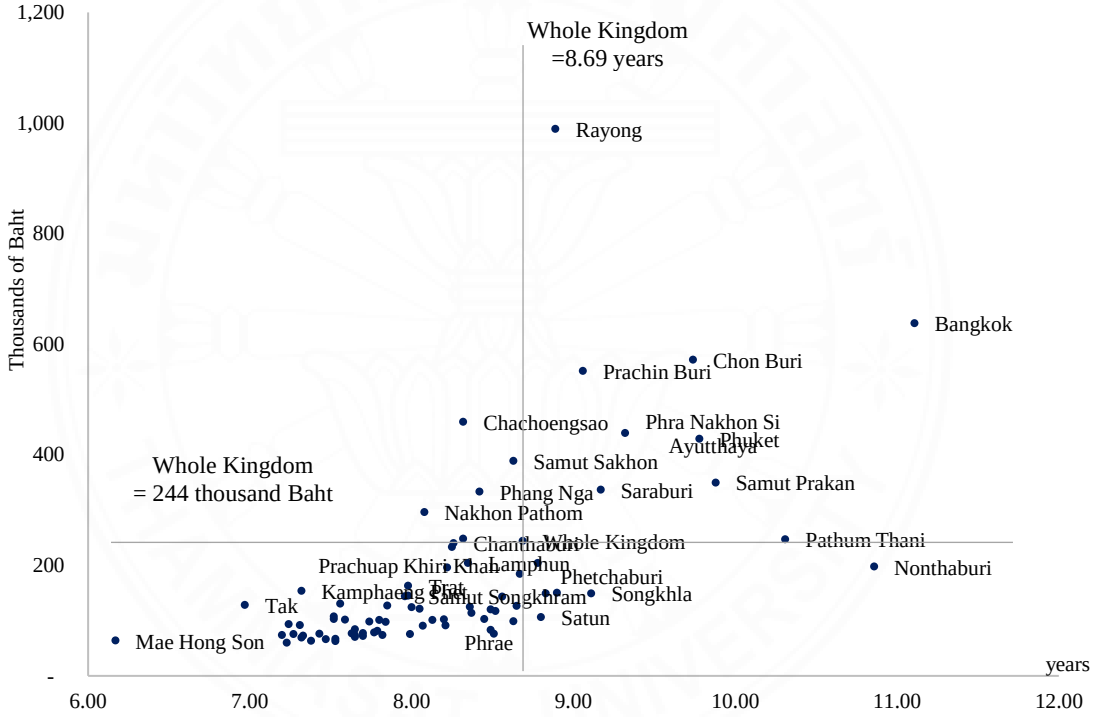
Note. From *Educational Statistics* [in Thai] by NESDC, 2023, (https://www.nesdc.go.th/ewt_dl_link.php?nid=3508&filename=PageSocial)

Figure 1.2 reveals a positive relationship between years in school and annual average income per capita. The higher annual income is associated with a longer duration in school. Most provinces however are clustered in a quadrant with lower annual income per capita and shorter durations in school. This implies the importance of financial support in pursuing higher education. Even though additional assistance has been introduced to reduce financial burdens in pursuing further education, for example, scholarships, conditional cash transfer programmes (CCT), vouchers and student loans, it does not guarantee a higher probability of pursuing higher education.

Vechbanyongratana and Paweenawat (2015) observe that receiving scholarships can reduce the costs of entering universities but it does not always increase the probability of pursuing higher education in Thailand. The main determinants also involve good academic outcomes. Hence, households with greater financial support are more capable of supporting their children through higher education.

Figure 1.2

The number of years in school for the population of age 15 and older, and the annual average income per capita in 2019



Note. From *Human Achievement Index Statistics* [in Thai] by NESDC, 2023, (https://www.nesdc.go.th/ewt_dl_link.php?nid=9789&filename=PageSocial)

Unlike other financial schemes, remittances go directly to households in need (Pholphirul, 2012; Jampaklay, 2020). This extra assistance is committed to contractual agreements among stakeholders, which tends to smooth and stabilize the economic status of recipient households (Pholphirul, 2012). Parent migrants transfer to help feed their children while some young adults transfer as repayments for their

education (Pholphirul, 2012; Lucas and Stark, 1985). The remittance recipients also report allocating some remittances toward education spending (NSO, 2022).

Due to the falling education budget, education spending inevitably falls into the household's responsibility. Also, as shown above, the duration in school is associated with the annual income. Therefore, receiving remittances poses the question of whether this extra income could help increase the duration in school (or a continuation to study in upper-secondary education), and increase education spending in Thai households. This study thus aims to analyse the impact of remittance on human capital development in Thai households.

1.2 Education Policy in Thailand

In Thailand, the Ministry of Education (MOE) is the main authority for providing education for all levels. The 1999 National Education Act (NEA) mandates compulsory education for nine years. This includes six years of primary education and three years of lower secondary education (Figure 1.3). Students in a transition to upper-secondary levels are eligible to choose between the general track and the vocational track. The basic education was later extended to 15 years of schooling in 2009.

The Thai education system has provided 15-year free basic education, providing education from three years of pre-primary education up to the completion of upper secondary education. Both Thai and non-Thai students are eligible for subsidies as well as public and private schools. The 15-year free basic education scheme is carried out by Thailand's Office of Basic Education Commission (OBEC). The subsidy is on a per-student basis and it covers tuition fees, textbooks, uniforms, school supplies and educational activities. The amount varies by education level and by choices of upper-secondary education: vocational students receive greater financial support. In addition, all students enrolling in small schools and those from poor households are eligible to receive extra funds.

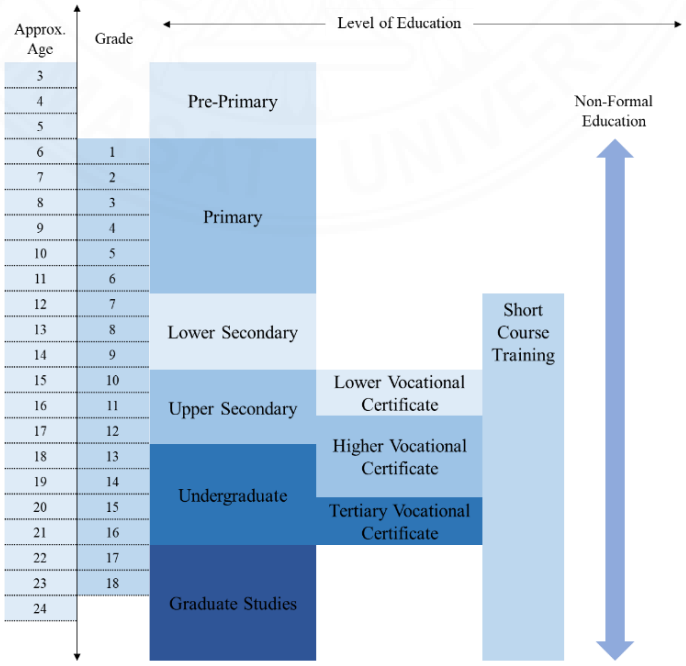
During the outbreak of COVID-19, the objective of the scheme is refined to suit the new instructional system. The subsidy on school supplies can now be spent on Internet packages for online learning. The subsidy on educational activities is

allowed for travel expenses on student home visits, and instructional materials and technology used in teaching (Sukabot, 2021).

Moreover, additional financial programmes are implemented to assist children from low-income households. For example, the conditional cash transfer programme under the scheme called 'Equitable Education Fund (EEF)': this scheme aims to widen education opportunities for students from poverty provided that their school attendance is greater than 85% and the development of their weight and height does not deviate from the average. The EEF also provides funds for vocational students from low-income households who study in core-country development fields and labour market priority areas such as science, technologies and digital technologies (STEM) (EEF, 2023; EEF, 2023). A student loan is offered to students from the upper-secondary level until the graduate level in a particular discipline. The loan covers tuition fees and education-related costs, while monthly expense is limited to students from low-income households. There are four eligible groups of students in the student loan: students from low-income households, students in demanded fields, students in core country development fields, and students with good performance (Student Loan Fund, 2023).

Figure 1.3

The Thai education system



Note. Author's compilation From *Towards a Learning Society in Thailand: An Introduction to Education in Thailand* by Bureau of International Cooperation, 2008, (https://www.bic.moe.go.th/images/stories/book/ed-eng-series/intro-ed08.pdf) and From *Thai Education in Brief: Education as a Spearhead to Break through the Middle-Income Trap* by Bureau of International Cooperation, 2017, (https://www.bic.moe.go.th/images/stories/pdf/thai_education_in_brief_2017.pdf)

1.3 The Objective of the Study

This research aims to analyse whether remittances could help increase human capital in households, which is proxied by a continuation to post-compulsory education among children aged 15 - 17. This study attempts to provide both descriptive analysis and empirical analysis. The empirical analysis employs the instrumental variable approach to take into account the endogeneity problem that arises from remittances received by households. This research also aims to study the relationship between remittance and household expenditure behaviour (or the remittance elasticity of education expenditure), using the Engel curve approach. This study observes a change in education spending when there is a change in the amount of remittances received by a household. The results of this study are useful for policy design and future research that helps rural-rural inequality, and the notion of human capital brain drain from rural areas.

1.4 The Organisation of the Study

This research study consists of 5 sections. The first section introduces the statement of the problem, research question and objectives. The second section then provides literature reviews including theoretical and empirical studies. The third section will discuss the data and research methodology employed in this study. The fourth section shows an estimated result and discussion. The final section concludes.

CHAPTER 2
REVIEW OF LITERATURE

2.1 Theoretical Studies

2.1.1 Theory of Labour Migration

There is a variety of theories that have been proposed to explain the cause of labour migration. The movement of rural people to seek career opportunities in urban areas is common in developing countries including Thailand. Lewis develops the dual economy model in 1954 emphasising that the labour migration between rural areas and urban areas facilitates the transition from a less-developed economy to a modern economy through the development driven by urban areas. The internal migration transition facilitates the movement of the labour force from low-population-density rural areas to high-population-density urban areas. He suggests that this migration pattern can generate economic growth as well as lower disguised unemployment and enable the transition to a modern economy in rural areas (Lall et al., 2006).

Migration is seen as a life-support strategy, which involves both individual and mutual decisions. The decision to migrate is not simply derived from a simple calculation of push factors, factors that drive some locals to migrate, and pull factors, factors that attract migrants to destinations, but it also takes into account intervening obstacles and personal factors (Lee, 1966). The common factor engaged in migration decisions is wage differentiations between regions for internal migration and between countries for international migration.

Massey et al. (1993) suggest that an individual derives a decision through a cost-benefit approach, usually over higher earnings from the movement. A migration decision is determined over the expected net return to migration, which is estimated by a comparison of expected earnings if employed at the destination and the origin, net of migration costs. Migration cost is the sum of the total costs of reallocation, including direct costs and psychological costs. The probability of being unemployed in the destination or being deported for undocumented workers is augmented in the calculation. Individuals from the same area perceive different probabilities to migrate

as a result of individuals' characteristics and social conditions. A potential migrant moves to a destination with the highest expected net return and the migration flow stops when expected net returns have been equalized. This is consistent with the findings of Borjas (1999) that migrants engage in a cost-benefit approach by comparing earning opportunities and migration costs. They move to a country/area with the highest net returns of migration. The emigration rate would fall if the mean income in a sending area and migration costs rise. Borjas (1999) also suggests that migration costs also include opportunity costs of migration.

So far, the migration decision has been considered an individual decision. Stark and Bloom (1985) propose the New Economics of Labour Migration that highlights the decision as mutual interdependence in which the decision to migrate is optimal for all stakeholders. The migration decision is a calculated strategy: migrant members and other household members enter into a self-enforcing contractual arrangement. Costs and returns are shared among those in the contract. The direct return to the family is the migrant's remittance while the cost could be considered risk diversification against income losses. A commitment to share income is also a coinsurance toward a financial loss. This type of migration could influence the magnitude of remittances, depending on the bargaining power of the family and the importance of its support.

Massey (1990) proposes the idea of cumulative causation of migration that induces some locals to migrate. He suggests that network connections between migrants and non-migrants reduce migration costs, which hence increases the return to migration. He argues that household decision-making is influenced by local social and economic conditions and normative pressures caused by cumulative migration. Migration streams become self-sustaining and cumulatively caused over time. This theory is evidenced by the findings of Jones and Kittisuksathit (2003). They observe a similar pattern of the allocation of remittances among households in Udon Thani, Thailand that migrant households tend to purchase consumer goods and household consumption that stem from modernisation. This allocation reflects demonstration and emulation effects within the sample households. Migrant households are influenced by normative pressures from formal migrants, which induce some locals to migrate and fulfil economic and social desires at home.

2.1.2 Theory of Remittances

Rapoport and Docquier (2006) review a theoretical framework of remittance behaviour both from microeconomic and macroeconomic perspectives. Some of the theories are summarised below.

2.1.2.1 Altruism Motive

Remittances are aimed to increase household income and improve the well-being of those in the original household. The amount of remittances increases with the degree of altruism.

Lucas and Stark (1985) propose three types of remittance models describing the motivation for migrants to remit. The models are developed from pure altruism, pure self-interest and tempered altruism or enlightened self-interest. In the pure altruism model, the utility of households in a sender country is augmented in migrants' utilities. The model predicts that the amount to remit increases with the migrant's wage and decreases with household income. In the pure self-interest model, the motivation to remit is based purely on self-interest or in the absence of altruism toward the family. Firstly, migrants remit to secure the position to inherit from their parents, assuming that inheritance is conditioned on behaviour and supports from migrants. Second, migrants remit to invest in fixed assets, such as land, livestock and a house, and to ensure careful maintenance from the family; this is also associated with their intentions to return. The enlightened self-interest model describes remittances as mutually contractual arrangements between migrants and their families. They receive remittances as loan repayments in education investments for migrants and claims during the presence of income risks, such as crop failure, price fluctuations and insecurity of land tenancy.

2.1.2.2 Exchange Motive

Remittances buy services such as land and cattle at home, or they can be considered loan repayments for migrants' education and migration expenditures. This is a sign of temporary migration and the remitter's intention to return. The amount of remittances increases with the quantity of services.

2.1.2.3 Insurance Motive

This is considered a contractual arrangement between migrants and their families. Remitters agree to support their families against uncertainties in

household income, health and employment. This motive is self-enforcing as there is altruism within the family and remittances could ensure future outcomes such as family solidarity and inheritance. The amount of remittances increases with negative shocks in the family.

2.1.2.4 Investment Motive

Remittances are seen as loan repayments on investments in education and migration. It aims at increasing household income rather than reducing uncertainties or smoothing consumption. High-income households are more likely to engage in this motive as low-income households are financially constrained in sending household members elsewhere. The amount of remittances varies with the loan amount.

2.1.3 The Engel Curve Approach

An Engel curve models the relationship of how expenditure on a particular commodity varies with the income level of the household holding prices fixed (Prais and Houthakker, 1955; Lewbel and Houthakker, 2008). Prais and Houthakker (1955) argue that total expenditure can be used as a proxy for household income as income in a particular period is a poor indicator of the standard of living. However, different consumers record different unit prices at the same time, so it is necessary that expenditure categories are well-defined to include details of more than one variety or brand. Therefore, an Engel curve function defines $q_i = g_i(y, z)$, where q_i is the quantity consumed of goods i, y is income, wealth, or total expenditure, and z is a vector of household composition that influences the preferences of the household. Engel curves can be used to compute a commodity's income elasticity; elasticities can vary with income levels, so a good that is a necessity for high-income households can be a luxury for low-income households (Lewbel and Houthakker, 2008).

The choice of the functional forms of the Engel curve is based on theoretical plausibility, which has been extensively studied since then. Prais and Houthakker (1955) test the alternative forms of the Engel curve for food (six expenditure groups) and non-food commodities (six expenditure groups including literacy activities) for five different functional forms. The authors conclude that, for literacy activities such as newspapers and books, the hypothesis of a constant elasticity is appropriate and should be estimated from a double logarithmic Engel curve. Also, the double-logarithmic form gives a satisfactory description of the curvature of the

Engel curve found in most commodities. However, there is difficulty in treating zero expenditure when employing an econometric tool.

2.2 Empirical Studies

This section explores empirical evidence from some Asian countries and Thailand. Particular Asian countries explored are among the top remittance-receiving countries in 2014 in either absolute amount or as a percentage of GDP (World Bank, 2016). Generally, these countries share a common belief that the governance system plays an important role in how effectively remittance-receiving households invest. However, the remittance behaviour differs largely due to cultural norms and how they perceive remittances: either a transitory income or a stable income.

Most research in Asian countries focuses predominantly on school attendance as a proxy for human capital development, although a few pieces of the research study the impact on school completion. Early studies in Thailand often employ detailed interviews with migrant households. The participants are asked specific questions on how they allocate their remitted income. However, this could lead to quality problems when the responses of interviewees are influenced by the interviewers.

2.2.1 The impact of remittances on human capital development

Mohamed and Sivarajasingham (2021) find that short-term human capital is developed through health expenditure while, in the long run, there is a causality between remittance income and human capital formation. An increase in remittances has an immediate positive effect on the human capital formulation. Surprisingly, the positive impact lasts for longer than ten years in Sri Lanka. Meanwhile, Garip (2014) observes that the effect of remittances on productive assets varies with household income levels, while the effect of migration on future investment depends largely on the initial wealth of households. In low-income households, having migrant members is associated with increases in productive assets while high-income households experience lower productive assets. His model implies that although high-income households face decreased productive assets, they will benefit from higher returns to resources in the next generation.

Yang (2008) finds that a temporary increase in remittances has significantly positive impacts on child schooling, child labour and educational expenditure in the Philippines. Unexpectedly, there is no statistically significant impact on aggregate household consumption. Relevant to the above findings, Parida et al. (2015) find that remittance-receiving households in India spend less on food but increase investment in human capital and healthcare services. This is proven to help them move up the income ladder in terms of human capital formation.

Edwards and Ureta (2003) find that remittances lower the probability of a child never enrol in school or will leave before graduation in El Salvador although the effect of remittances is lower in rural households than in urban households. They highlight that the positive impact of remittances on the probability is larger than those of other income sources. They explain the phenomenon by 2 causations: (1) rural households consider remittances as stable income and invest based on this source of income and (2) this may be previously agreed under their contractual arrangements in migration. Similarly, Zhunio et al. (2012) found that remittances exhibit a significantly positive impact on a school enrolment rate and a completion rate in primary education and school enrolment in secondary level in 69 countries including Thailand, although primary education is compulsory in many countries. The authors point out that the magnitudes of remittance effects are greater than that of public education expenditure; private spending through remittances is more effective than the public allocation of education.

Although they find similar results to Edwards and Ureta (2003), Adams and Cuecuecha (2010) observe that households in Guatemala perceive remittances as transitory income, which according to the permanent income hypothesis, exhibits a higher propensity to invest than that of permanent income. They conclude that remittance-receiving households allocate more income toward education and housing compared to what they would have spent without remittances. Acharya and Leon-Gonzalez (2014) find that the effect of remittance income on the human capital formulation in Nepal is smaller than that of non-remittance income; some estimated results of remittance income also return insignificant effects. They conclude that remittance-receiving households are more likely to enrol their children in a private school, and the probability of being out of school among remittance-receiving

households, rural households and poor children is lower. There is a strong effect on public school enrolment among children of uneducated mothers and on school transfers to private schools among children of educated mothers. They highlight that parental migration help to realise the importance and returns to education and the quality of education among information-constrained households. Credit-constrained households increase the quantity of education while less severely credit-constrained households increase the quality of education. The positive impact of remittances on human capital investment can also be found in Nepal (Bansak et al., 2015) and Ghana households especially among female recipients (Pickbourn, 2016).

Bansak et al. (2015) find that remittances, the number of remitters, urban location and wage income increase education spending. The results also indicate that the allocation of remittance toward education is grater in the areas where the quality of education is higher. However, remittance income has no significant impact on education spending among households living in areas with schools performing below the median. Pickbourn (2016) finds that remittance-receiving households with female recipients spend more on education per child, although the receipt of remittances does not increase women's influence over the decision to enrol children in school. Also, household size, proximity to a primary school and total household expenditure each have a positive impact on a household's decision to spend on education.

Unlike previous studies, Gao et al. (2021) find a negative impact of remittances on both educational investment and school attendance in the Kyrgyz Republic. Remittance-receiving households tend to allocate their income toward consumption, and school-age children have to work extra hours on housework and family businesses to compensate for missing adult labour. Similarly, Jampaklay (2006) finds that remittances have a twofold effect on human capital development in Kanchanaburi, Thailand. Although children of remittance-receiving households are more likely to enrol in schools, remittances also attract unenrolled students to migrate and enter the labour market. She highlights that the effect of remittances attracting children to work is larger than its influence on school enrolment.

Similar to the finding above, Dietz et al. (2015) find that emigration in Tajikistan, especially of non-parent family members, leads to lower school attendance in children, especially in older-aged groups. This is driven by older children

having to work extra hours for both housework and paid work. Moreover, the positive effect of remittances is not large enough to offset the adverse impact of migration; in fact, receiving remittances has no significant impact on school attendance. The authors observe that (1) households view education as a risky investment because high levels of education do not always improve labour market outcomes in Tajikistan, (2) even low-skilled jobs in Russia often pay better than some high-skilled jobs at home, (3) access to better-income jobs is limited, especially for low-skilled and ethnic minority households and (4) children consider legal migration more successful and desirable option than completing education.

Likewise, Murakami (2021) finds that migration of family members who previously supervised children has a negative impact on children's school enrolment as they have to take up paid and unpaid work in compensation for their supervisors. The impact is highest among children in primary and upper-secondary levels and those of younger and low-educated household heads. Whereas, the probability of school enrolment between children from migrant and non-migrant households does not differ largely. Similarly, Antman (2011) finds that, in response to parental migration, children in Mexico decreased study hours and school participation. There is a significant drop in school participation and a significant increase in work participation and work hours in younger boys. Although the result is insignificant, girls also allocate their study hours toward domestic work.

Hu (2012) finds similar impacts in China. School-aged children tend to work extra hours to compensate for their family member's absence, particularly in low-income households. This adversely affects their school performance. Middle-school graduates in rural areas may even choose to supply labour responsibility as the presence of the migration network increases the opportunity cost of pursuing further education. However, remittances have a significantly positive effect on high school attendance in girls; the effect is not statistically significant in boys. Hence, receiving remittances only partially compensates for such negative impacts. The literature on the negative impact of remittances on human capital investment can also be found in Cambodia (Chea and Wongboonsin, 2020) and Eritrea (Kifle, 2007).

Chea and Wongboonsin (2020) suggest that only international remittances have a significant effect on educational spending in Cambodia, which also

exhibits a negative impact. The authors argue that their analysis does not include migrant children and households from which everyone has migrated and indirect effects such as decreases in child labour or increases in childrearing time. Kifle (2007) finds that households in central and southern regions of Eritrea tend to spend smaller shares on child education as total remittances rise. The possibility to spend more remittances on child education is relatively higher for higher-income families.

Azam and Raza (2016) and De Haas (2005) highlight the importance of the governance system in enhancing human capital through the spending of remittances. They agree that a strong economic governance system could strengthen the relationship between remittances and human capital development in all countries. The former study finds a significantly positive impact of remittances on gross secondary school enrolment in 17 countries including Thailand and concludes that human capital is enhanced through better schooling and a healthy environment. The latter study suggests that the degree to which remittances could lead to more development depends on the specific political, economic and social conditions. Factors that decrease legal security and the economic, political and financial freedom of households, communities and migrants are more likely to create risks of investment and hence lower productive investment as well as lower their incentives to return.

The following sections summarise the previous literature in Thailand. Jones and Pardthaisong (1999) observe a common pattern among rural households in Northern and Northeastern regions where remittance-receiving households often rank productive investment well below consumptive investment. Educational expenditures and business investments are not the top priorities. Some migrants emphasise that remitted income is committed to household expenditure, consumer durables, house construction and family savings. Migrants often consider working abroad as ‘successful’ as a means to support their families and sustain their household consumption. The authors highlight that migration is a strategy of life-support and sometimes life-enhancing, but rarely as life-changing.

Jones and Kittisuksathit (2003) confirm the above findings that households perceive working overseas as a life-support strategy. The allocation of remitted income also reflects demonstration and emulation effects within the sample households in Udon Thani. However, parental migrants consider children’s education

an important element of their standard of living. Evidently, there is a greater share of children in migrant households who are currently pursuing secondary school level or above. The authors assume that this reflects a higher ability to afford schooling costs and parents having wider awareness of opportunity costs through migration. In contrast, the authors observe that income levels in returned migrant households are only slightly higher than those of non-migrant households. This reflects an insufficient productive investment to increase income in the longer term.

Their findings support the arguments of Chami et al. (2003) that altruistically motivated remittances could lead to moral hazard problems, where receiving remittances indirectly reduces economic activities. They tend to overcompensate their recipients for bad economic outcomes and do not contribute to sustainable economic development. This also indicates increasing dependence on remitted incomes and labour income being substituted. The authors point out that households may view remittances as returns to their main investment projects, which yield higher dividends than investment opportunities at home, including human capital investment. Similarly, they claim that only strong policies will be able to motivate remitters and their recipients to change the nature of remittances and start to invest in productive investments.

Moreover, Porst and Sakdapolrak (2020) suggest that the pattern of remittance usage among rural households is interdependent on the initial socio-economic circumstances of migrants' households, their financial stability, indebtedness, land ownership, education levels of household members, access to jobs, non-farming income opportunities and gender relations to households. Meanwhile, the amount and frequency of remittances depend on the remitter's income, living costs and circumstances in destinations, and needs of parental households, such as siblings' education, health issues and debt.

In the longer term, Rigg et al. (2014) observe that the first-generation migrants in rural Khon Kaen significantly invest in their children's education. However, they choose not to acquire higher educational qualifications themselves. Meanwhile, several second-generation migrants report completing higher-level degrees on their return despite obtaining higher education levels than the first-generation migrants due to the free basic education scheme enforced by the government. The

authors also report that there are signs of lifelong learning among this generation. However, it is not certain that higher education levels bring about higher-wage jobs among them. Similar to the above observations, they highlight the importance of government assistance in promoting adult education and incentivising the private sector in investing in skill development in their workplaces.

2.2.2 The elasticity of education expenditure in households

The early literature on the elasticity of education expenditure employs Ordinary Least Squares (OLS) as their methodologies, such as Matsuda et al. (1999), Glewwe and Patrinos (1999), Tilak (2002), and Psacharopoulos and Papakonstantinou (2005). The elasticity of education expenditure varies across countries, types of education expenditure and household income levels.

Matsuda et al. (1999) found that the expenditure elasticity and the income elasticity of education spending in Japan during 1980, 1985, 1990 and 1995 are greater than 1: the former elasticity is slightly higher in every survey year. Psacharopoulos and Papakonstantinou (2005) focus on the education expenditure for university entry and during university in Greece. The income elasticities are less than one for both expenditures, indicating that university spending is a necessity. However, as summarised in Table 2.1, their estimated models do not include a vector of control variables for households' characteristics, in other words, they fail to take into account differences in household preferences in education expenditure. Although Glewwe and Patrinos (1999) employ a standard regression technique, their estimated model takes into account this issue by including household variables, such as parents' schooling, household size and location dummies. They conclude that expenditure elasticities of education spending are necessities for primary and secondary education.

However, the estimated results in this section are then subject to bias and inconsistency if they employ OLS to significant censored data, which occurs when a household does not have education expenditure. The literature in later years then tries to avoid these problems by using alternative models for the analysis of a limited dependent variable, such as Tobit (Tansel and Bircan, 2006; Tabuga, 2007; Acar et al., (2016)). Some studies employ different models for robustness check; for instance, Tabuga (2007) employs OLS, Tobit and the quantile regression (QR), and Wongmonta

and Glewwe (2017) employ OLS, the censored least absolute deviations (CLAD) estimator and Tobit.

Tansel (1986) applied an Engel curve function to the urban household expenditure survey of Turkey in 1978 – 1979. She explores the changes in household expenditure for eleven expenditure categories including education under cultural expenditure in response to total expenditure. The author concludes that the total expenditure elasticities yielded by different functional forms are similar in magnitude. The elasticity of cultural expenditure is greater than unity, implying that education is a luxury commodity for Turkish households. Similarly, Acar et al. (2016) observe that household education expenditure is a luxury commodity for Turkish households in 2003, 2007 and 2012. They also observe that the degree of elasticities is associated with income groups, that is, the estimated elasticity is peaked in the middle-income household, and decreases at both ends for the bottom- and the top-income households. The elasticity of education also increases over time: the authors suspect that households spend more on private schools and private tutoring. In contrast, Tansel and Bircan (2006) found that private tutoring has a unitary elasticity in Turkish households in 1994.

In the Philippines, Tabuga (2007) studied the influence of remittance income on education expenditure. The author found that remittances positively influence the likelihood that the household spends on education. All results from different models agree that remittance income becomes more important as an education share gets bigger in household expenditure. In Thailand, Wongmonta and Glewwe (2017) observe that non-tuition expenditure is a necessity, whereas tuition and private tutoring expenditures are luxuries, and the degree of luxury goods is highly associated with household income.

Table 2.1

The summary of previous studies on the elasticity of education expenditure

Authors	Model	Form	Dependent variable	Independent variables
Matsuda et al. (1999)	OLS	Double-log	Log of education expenditure	Log of annual income, log of living expenditures
Glewwe and Patrinos (1999)	OLS	Double-log	Log of household education expenditure per student	Log of household expenditure per capita, parents' years of education, student's variables (female, school types), and household's variables (location, ethnic group, religion, size)
Tilak (2002)*	OLS	Double-log	Logs of household education expenditure per capita	Log of government education expenditure per capita/ Log of household income per capita
		Double-log	Log of household elementary education expenditure per student	Log of government elementary expenditure per capita

Table 2.1

The summary of previous studies on the elasticity of education expenditure (Cont.)

Authors	Model	Form	Dependent variable	Independent variables
Tilak (2002)*	OLS	Double-log	Log of total household education expenditure	Log of total household income
		Double-log	Log of household education expenditure per student	Log of household income per capita
Psacharopoulos and Papakonstantinou (2005)	OLS	Double-log	Logs of expenditures for preparing for university entry and during university	Log of household income
Tansel and Bircan (2006)*	Tobit	Double-log	Log of private tutoring expenditure	Log of total expenditure, head's variables (age, age squared, schooling), mother's variables (schooling, work status, being single mother, being single mother and work), location and the number of children

Table 2.1

The summary of previous studies on the elasticity of education expenditure (Cont.)

Authors	Model	Form	Dependent variable	Independent variables
Kifle (2007)*	OLS	Semi-log	An education ratio (out of remittances)	Logs of annual income and annual remittances, numbers of children aged 7-20 years old who are in school and not in school, parents' years of education, and father's education (=1 if skilled).
Tabuga (2007)*	OLS, Quantile Regression, Tobit	Working-Leser	A share of commodity expenditure to total expenditure (per capita basis)	Log of total expenditure per capita, an interaction term of a dummy for receiving remittances and log of total expenditure per capita, and head's variables (age, schooling, occupation), household size, a ratio of employed member and location)

Table 2.1

The summary of previous studies on the elasticity of education expenditure (Cont.)

Authors	Model	Form	Dependent variable	Independent variables
Acar et al. (2016)*	Tobit	Double-log	Log of education expenditure	Log of household expenditure, household head's variables (age, schooling, work status), student's variables (share of primary school students, shares of female students, number of students), and household's variables (size, location)
		Working-Leser	A budget share of education expenditure	
Wongmonta and Glewwe (2017)	OLS, CLAD, Tobit	Working-Leser	The budget share of the education expenditure category of interest	Log of total expenditure per capita, a square of log of total expenditure per capita, log of household size, the number of children, head's variables (age, gender, schooling), log of household assets and the age-gender composition

Note. * refers to a study that employs the Engel curve approach

2.2.3 Research Gap

This paper attempts to provide both descriptive analysis and empirical analysis using more extensive observations and longer sampling years. Only a few previous studies employed econometric tools to analyse the impact of remittance income on human capital development in Thai households. For example, Jones and Pardthaisong (1999), Jones and Kittisuksathit (2003) and Rigg et al. (2014) provide a descriptive analysis of Northern and Northeastern regions to investigate migration patterns and remittance usage, including education spending. Although Jampaklay (2006) employs a multinomial logistic regression model to analyse the impact of parents' living status on school enrolment in children, her study focuses on only one province.

Previous studies on remittances in Thailand focus on particular areas where there are high migration rates such as Kanchanaburi (Jampaklay; 2006) and selected provinces in Northern and Northeastern regions (Jones and Pardthaisong; 1999, Jones and Kittisuksathit; 2003, Rigg et al.; 2014). This paper aims to utilise household data from all provinces for analysing the impact of remittance income on human capital in Thai households. This results in more extensive observations and a better representation of the Thai population.

Econometric tools employed in this paper enable the estimation of how close and well-determined the relationship between remittance income and human capital development at a household level. In the analysis of remittance's impact on continuation to study in post-compulsory education in children aged 15-17, the instrumental variable approach is employed to avoid the endogeneity problem that arises from remittance income. Without taking into account this problem, the estimated result could be biased and inconsistent.

Finally, this paper also observes how a remittance-receiving household changes its education spending with respect to a change in remittance income, or the remittance elasticity of education expenditure in a household. By using econometric tools, this paper is able to quantify their relationship. This paper applies the Tobit model with left-censoring data to study remittance behaviour toward education expenditure in Thai households to avoid bias from the OLS estimation. This study also covers larger observations and longer sampling years than previous studies

on the elasticity of education expenditure in Thai households. It also takes into account additional transfers from migrant members. This is a crucial contribution considering its recipients report spending it on daily expenses and education. The household head's influence over household expenditure is well accounted for by controlling for their age, gender, education level and employment status.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Conceptual Framework

A conceptual framework employed in this study is shown in Figure 3.1. The framework will guide the interpretation of the empirical results obtained from the econometric tool. This study assumes that migrants altruistically transfer remittances to their original households; this is consistent with findings of remittance determinants in Thailand which implies a certain degree of altruism toward those left at home (Vanway, 2004; Wongmonta, 2017; Techasunthornwat, 2013). The decision to migrate is dependent on mutual agreement and is influenced by migration networks. Porst and Sakdapolrak (2020) observe that multi-socio-spatial positioning and trans-local connectedness shape the arrangements of remittance sending and usage. Households then allocate their remitted income toward consumption and investment. This is evidenced by Jones and Pardthaisong (1999) and Jones and Kittisuksathit (2003) that households tend to prioritise productive investment below consumptive investment. Porst and Sakdapolrak (2020) also observe that households with limiting socio-economic status tend to spend remittances to stabilise their livelihood. Consequently, this generates a social normative effect among migration networks, which induces migration flow for similar purposes (Massey, 1990; Jones and Kittisuksathit, 2003; Porst and Sakdapolrak, 2020).

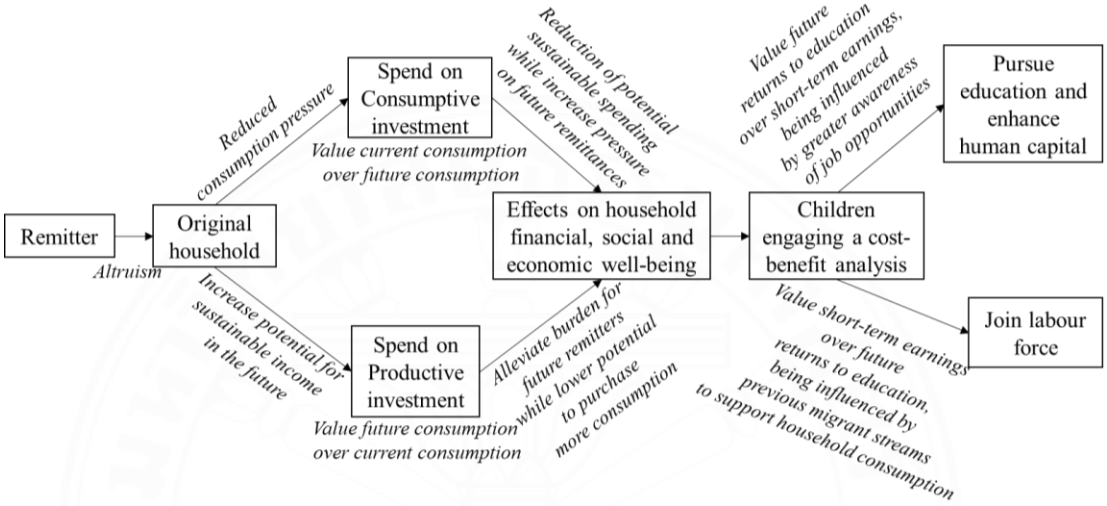
However, households also spend on productive investments such as children's education and business-enhancement projects (Rigg et al., 2014; Porst and Sakdapolrak, 2020). This contributes to a higher potential for sustainable incomes in the future and lower pressures on remittances as the main source of household income.

Children's decision to pursue higher education is influenced by (1) expected returns of education, which is positively affected when migrant households are aware of job opportunities, (2) the opportunity cost of schooling; this also includes a decision to migrate for employment both internally and internationally and (3)

normative pressures from former migrants (Jones and Kittisuksathit, 2003; Wongmonta, 2012; Hu, 2012; Acharya and Leon-Gonzalez, 2014; Dietz et al., 2015).

Figure 3.1

Conceptual Framework



Note. From Author's compilation.

3.2 Data and Methodology for the impact of remittances on a continuation to upper-secondary education

3.2.1 Data

This research employs two datasets from Thailand, the Household Socio-economic Survey (SES) and the National Labour Force Survey (LFS) conducted by the National Statistical Office (NSO) in 2015, 2017, 2019, and 2021 to analyse the impact of remittance income on a continuation to study in upper-secondary levels among children aged 15 – 17. The SES data collect detailed information on the economic and social conditions of Thai households in both municipal and non-municipal areas, covering all provinces. The sample survey method is a stratified two-stage sampling; Bangkok and other provinces constitute strata, which is then divided into either municipal or non-municipal areas. The primary sampling units are drawn from the enumeration area using probability proportional to the total number of households in that enumeration area. The secondary sampling units are private

households. The questionnaire collects information on each household member, including education levels, income, expenditures, work status, and so forth. The advantages of the SES dataset are its detailed information on household migration and remittance transfers. It includes details of up to three remitters on destinations of migration, the relationship of migrants to the household head, and annual remittance from each remitter.

However, the SES data lack information on the opportunity cost of pursuing higher education. To obtain such information, this study uses an average hourly wage of children aged 15-17 who are working and had completed lower-secondary education at a provincial level. This is aimed to proxy the opportunity cost of continuing to upper-secondary education. It is assumed that boys and girls have the same opportunity cost of schooling. The average hourly wages at a region level will be used in the provinces, which have no wage data.

In addition, due to data limitations, this study does not disaggregate internal and international migration. It is assumed that internal and international remittances exhibit the same propensity to spend. Thus, they have the same effect on education spending and a continuation to upper-secondary education.

Table 3.1 shows the descriptive statistics of all variables employed in the estimations. The target group is a student aged 15 to 17 who had completed lower-secondary education, and in a transition to or during upper-secondary education, or is not enrolled in school in each survey year. As shown in Table 3.1, a continuation rate to post-compulsory education levels among children aged 15 – 17 in each survey year is approximately 91 per cent. The mean continuation rate in municipal areas is higher than in non-municipal areas. Female and male continuation rates are 94% and 87% respectively. The average years of parental education are similar at around 8.24 years, while the maximum years of education reach 9.16 years on average.

Among households with the target group, the average amount of remittances a household received in the past 12 months in each survey year is around 75,636 Baht per year. The average remittance is higher in municipal areas than in non-municipal areas: 92,648 Baht per year in municipal households and 68,361 Baht per year in non-municipal households. Households with at least one remitter working overseas receive higher remittances: the average remittance in these households is

194,183 Baht per year, compared to 62,733 Baht per year in households with only internal remitters. However, the number of international remitters is much smaller than the number of internal remitters.

In addition, Table 3.2 reports children's school attendance by migration status of households. Overall, children in remittance-receiving households are more likely to pursue upper-secondary education. A similar pattern is observed among female students. Meanwhile, male students living in non-migrant households are more likely to continue studying than those living in migrant households. This may reflect the negative impact of migration where boys have to work to compensate for adult labour loss in the household.

Table 3.1

Descriptive statistics for the estimations of Probit and the instrumental variable Probit

	Whole Kingdom		Municipal areas		Non-municipal areas	
Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.
A continuation rate to post-compulsory education levels	0.91	0.29	0.92	0.27	0.89	0.31
Female students	0.94	0.24	0.95	0.23	0.93	0.26
Male students	0.87	0.33	0.89	0.31	0.85	0.35
Father's years of education	8.24	3.41	8.72	3.58	7.64	3.08
Mother's years of education	8.24	3.76	8.73	3.96	7.61	3.38
The maximum number of years of parental schooling	9.16	3.75	9.68	3.95	8.50	3.38
Father's age	50.22	6.85	50.40	6.68	50.00	7.04
Mother's age	47.46	7.20	47.61	7.02	47.27	7.41
Child's age	16.04	0.82	16.06	0.82	16.02	0.82
Hourly wage (Baht)	34.65	7.24	34.91	7.52	34.33	6.86
Log of total household asset	13.31	1.99	13.17	2.27	13.48	1.55
Log of total household expenditure per capita (Baht/year)	11.05	0.56	11.14	0.57	10.93	0.52
Log of total household remittance (Baht/year)	1.46	3.70	1.40	3.65	1.53	3.76
Total household remittances (Baht/year)	75,636	2,957	92,648	7,993	68,361	2,376
Internal remittances	62,733	1,603	73,154	3,218	58,312	1,804
International remittances	194,183	21,732	262,202	56,951	162,952	13,442
Low-asset households	0.50	0.50	0.53	0.50	0.47	0.50
Observations	16,506		9,178		7,328	

Note. International remittances refer to total household remittances that have at least one remitter working overseas. From Author's calculation

Table 3.2

A proportion of students attending upper-secondary education by migration status of households (%)

	Total	Non-migrant households	Remittance-receiving households	Non-remittance-receiving households
Total	90.0	89.9	91.2	89.3
Female	48.4	48.1	50.2	48.6
Male	41.6	41.8	41.0	40.7

Note. From Author's calculation

3.2.2 Methodology

This research uses a Probit model to investigate the effect of remittances on a continuation to study in upper-secondary education among children aged 15-17. It attempts to estimate the likelihood that a student will either continue upper-secondary education or leave school. By assuming that the probability of continuing upper-secondary education follows the cumulative standard normal distribution, the following equation is estimated:

$$\Pr(Con_i = 1 | X_{hi}, X_{ci}, W_i) = \Phi(\beta_0{}' + \beta_1{}' X_{hi} + \beta_2{}' X_{ci} + \beta_3 W_i + \beta_4 R_i + \beta_5{}' Y_i) + e_i \quad (3.1)$$

Where Con_i is a dummy variable that takes on the value of 1 if a child aged 15 - 17 continues studying in any level of upper-secondary education and 0 otherwise. X_{hi} is a vector of control variables for households' characteristics. X_{ci} is a vector of control variables for children's characteristics. W_i is the opportunity cost of pursuing upper-secondary education. R_i denotes total household remittances in a year and Y_i denotes year dummies. $\beta_1{}'$ and $\beta_2{}'$ represent a vector of parameters for households' characteristics, and children's characteristics respectively.

The vector of households' characteristics (X_{hi}) includes the years of education received by the child's parents (both father and mother), parents' age, total household assets, which include the value of houses, land and building owned by the household for both residential use and business use, total household expenditure, and

location dummy (either municipal or non-municipal) [1]. However, to avoid a multicollinearity problem, this study also employs the maximum number of years of schooling between fathers and mothers to represent parental education (Paweenawat, 2020). The location dummy should also reflect differences in school quality, resources, and choices.

Prais and Houthakker (1955) suggested that household income in a particular period may be a poor measure of the standard of living. In the analysis of the family budget, household expenditure is thus recommended as a proxy for the standard of living. Detailed information on the expenditure is also advantageous in terms of accuracy. Moreover, the SES records the detailed household expenditures on necessary items for daily life in both consumptive expenditures and non-consumptive expenditures. The questionnaire also allows the recording of different unit prices for the same item. Hence, total household expenditure is employed in this study to reflect household preferences and well-being as well as a complicated function of expected income.

Following Wongmonta (2012), this study also categorises households into two groups using the ratio of total household assets to total household annual income. The household is defined as a high-asset household (not credit constrained) if its asset ratio is greater than the median ratio of the entire sample, and the household is defined as a low-asset household (credit constrained) otherwise.

Moreover, this study categorises households using the definition of the poverty line in 2017 as guided by the Office of the National Economic and Social Development (NESDC). Students living below the poverty line are those living in a household with an average monthly consumption expenditure per capita of less than 2,920 Baht in municipal areas, and less than 2,439 Baht in non-municipal areas.

The vector of children's characteristics (X_{ci}) includes gender and age of a child. The age group of target children is specifically chosen because these young adults are capable of working (Dietz et al., 2015). According to the Ministry of Labour (2022), they are eligible to enter the labour force. They are either in transition to or

[1] In this study, the parent-child relationship is matched through each individual's relationship with the household head.

during education levels which are no longer compulsory. Amare et al. (2012) also highlight that remittance income motivates households to participate in migration insistently. Hence, the impact of remittances on school enrolment among these children is more prevailing since the alternative to schooling becomes more prevalent.

The variable W_i accounts for the opportunity cost of schooling. It contains the hourly average wage of a working child aged 15 – 17 who had completed lower-secondary education at provincial levels, and regional levels when wage data are not available at provincial levels. This aims to minimize problems related to omitted variables since a child's income could play an important role in credit-constrained households. They may have to work to lower financial burden in households once they completed lower-secondary education.

The variable R_i contains the total value of remittance income that a household reported receiving in the past 12 months in each survey year. The SES records a maximum of only three regular remitters per household. This variable includes both domestic and international remittances received by the household. However, due to data limitations in sample size, this analysis does not aggregate the analysis of the impact of different sources of remittances on the continuation to school.

Household remittance is proven to have both positive and negative impacts depending largely on cultural norms, the household's perspective on remittances and the governance system. Educational spending is not the top priority in rural areas of Northern and Northeastern regions in Thailand in 1995-1996 (Jones and Pardthaisong, 1999). Hence, this could lower the continuation rate to higher education among children. Meanwhile, the later research in Kanchanaburi observes a twofold effect of remittances. The remitted income not only increases school enrolment among children of remittance-receiving households, but it also attracts some locals to migrate and enter the labour market (Jampaklay, 2006).

McKenzie and Sasin (2007) suggest that decisions on migration, remittances, expenditure allocation, school attendance and child labour are usually made simultaneously. Hence, the simple Probit regression will suffer from endogenous bias as the assumption of exogeneity of total household remittances fails to hold. Unobserved households' characteristics and remittances may be correlated. For example, an adult household member may be influenced by the migration network

within the area to migrate and transfer remittances to the household. For example, Jones and Kittisuksathit (2003) observe that migrant households in Udon Thani are influenced by normative pressures from formal migrants. The estimated results may also suffer from omitted variable problems (McKenzie and Sasin, 2007; Calero et al., 2008; Hu, 2012). This occurs when some unobserved variables influence both remittances and the decision to continue studying. For instance, the cultural norm and remittance behaviour within a neighbourhood may influence the allocation of remittances toward education and the education level that parents are willing to support their children (Jones and Pardthaisong, 1999; Jones and Kittisuksathit, 2003; Chea and Wongboonsin, 2020).

Moreover, reverse causality may exhibit if children's school enrolment causes migration and remittances. An adult member may migrate to earn remittances to pay for children's education. Higher education could also induce higher remittance volume, which exhibits simultaneity (Calero et al., 2008; Hu, 2012; Chea and Wongboonsin, 2020). Therefore, the estimated results can be biased and inconsistent if these issues are not taken into account. The most popular tool to tackle these issues is an instrumental variable approach.

An instrumental variable needs to meet two basic requirements, which are (1) it has a strong correlation with the endogenous variable (remittances), and (2) it does not directly influence school continuation. The previous research has employed a variety of instrumental variables, for instance, transaction costs of international financial transfer for remittances (Calero et al., 2008), a migration rate as an instrument for remittance decision (Bansak et al., 2015), an emigration rate at district level for remittance income (Chea and Wongboonsin, 2020), average remittances received by other households in the village for remittance income (Hu, 2012), the average distance from the household to the nearest road, market, town hall and hospital for remittance income (Gao et al., 2021), and shares of migrant households and remittance-receiving households for remittances (Acharya and Leon-Gonzalez, 2014).

This study employs the average of total remittances from other households within the area as a proxy for the cultural norm to remit. For each survey year, the average of total remittances is calculated from either municipal or non-municipal areas in an observed province based on the residential location of the household. The rationale is that average remittances from other households should

reflect the remittance norm within the area. The allocation of remittances and remittance volume of a household are influenced by those of other households as evident in Udon Thani (Jones and Kittisuksathit, 2003). Although suggested by Funkhouser (1995) that the value of remittances increases with migrants' potential to earn, which is measured by work status and human capital variables, these variables may correlate with decisions to continue studying in children if they view the migrants as their role models. Also, the selected instrument is less likely to have a strong correlation with school continuation in a child. Therefore, the two-step Probit with an instrumental variable is applied in this estimation.

The instrumental variable used here meets the conditions of the instrumental variable approach. For the main regression, the instrumental variable included is statistically significant and has passed the weak instrumental variable tests since the F-statistics is larger than the threshold value of 10. Moreover, the Wald test of exogeneity in the second-stage test is statistically significant, which confirms that the estimated results are consistent.

However, household survey data often suffer from heteroskedasticity where the conditional variance of a dependent variable is not constant. Children in non-municipal areas are less likely to continue studying in post-compulsory education levels since they are constrained by school choices and household economic status (EEF, 2022). Moreover, the sampling method of SES could also lead to autocorrelation. Using a stratified two-stage sampling, it is possible that a continuation rate of children within the same area relates through unobserved effects. Therefore, robust standard errors are reported in the main regressions (Wongmonta, 2012; Wongmontan and Glewwe, 2017).

3.2.3 Expected Outcomes

Table 3.3 summarises the expected outcome for all variables employed in the analysis.

Table 3.3

The summary table for the expected outcome of all variables employed in the analysis

Variable	Expected outcome	Rationale
Total household remittance (Baht/year)	+	Remittances can smooth a transition to higher education. This effect is expected to be large in low-asset households. This extra income can also reduce child labour, which allows them to focus on studying, and hence increases the probability of continuing post-compulsory education. Moreover, migration raises awareness of the returns to education and the quality of education in information-constrained households (Acharya and Leon-Gonzalez, 2014).
	-	Remittances stemming from demonstration and emulation could reduce a continuation rate. Young adults are pressured to migrate and remit to fulfil economic and social desires at home (Jones and Kittisuksathit, 2013). Moreover, children may have to work extra hours to compensate for adult labour loss (Antman, 2011; Hu, 2012; Dietz et al., 2015; Gao et al., 2021). Remittances may not be spent toward education if migration is temporary (Jones and Pardthaisong, 1999).

Table 3.3

The summary table for the expected outcome of all variables employed in the analysis (Cont.)

Variable	Expected outcome	Rationale
Parents' age	+	Older parents are more mature in influencing household expenditure and consumption behaviour (Gao et al., 2021).
Parents' years of education	+	Parents with longer years in school are more aware of returns to education and job opportunities. In addition, Paweenawat (2020) observes that parental education has a positive impact on a child's years of schooling.
Total household asset	+	High-asset households get better access to credit, which allows them to invest more in education compared to lower-asset households.
Total household expenditure per capita (Baht/year)	+	Students from more affluent households are more likely to stay longer in school. The impact is expected to be larger in financial-constrained households and non-municipal households.
Child's age	-	Older children are more capable of working and hence exhibit a lower probability of staying in school (Dietz et al., 2015).
Hourly wage if completed lower-secondary education	-	Higher hourly wage increases the opportunity costs of schooling. The negative effect is expected to be higher in financial-constrained households.

Table 3.3

The summary table for the expected outcome of all variables employed in the analysis (Cont.)

Variable	Expected outcome	Rationale
Female child	+	Warunsiri and McNown (2010) find that returns to education are higher for females than for males. Pattaravanich et al. (2005) also observe that females are more likely to pursue upper-secondary education due to changes in job opportunities and reductions in barriers to entering schools among girls. Moreover, due to missing adult labour, boys may be more obligated to care for their families than girls (Hu, 2012).
Municipal areas	+	Since returns to education are higher in municipal areas, this leads to a higher likelihood of continuing post-compulsory education as compared to non-municipal areas. Living in municipal areas also has better access to school choices, school programs and fundamental resources necessary for human capital development such as a public library or a science laboratory (Paweenawat, 2020).

Note. From Author's compilation

3.3 Data and Methodology for the remittance elasticity of education expenditure

3.3.1 Data

The analysis of the remittance elasticity on education expenditure in a household also employs the Household Socio-Economic Survey (SES) conducted by the National Statistical Office (NSO). Due to the limitations of the data, the analysis of remittance elasticity can be carried out only in 2015, 2017, 2019 and 2021. The SES records demographic information for a maximum of three remitters. The detail includes their age, gender, relationship to the household head, their professions, migration destination and annual remittance from each remitter. This study will focus mainly on remittance-receiving households, which report receiving remittances in the past 12 months in each survey year.

Table 3.4 and Table 3.5 summarise the characteristics of remitters in the sampling years. This summary is derived from part 6: Migration and remittance transfer in the SES data. Table 3.4 provides fundamental information on remitters and remittance transfer, while Table 3.5 provides further information on their relationship with the household head, migration decision, their occupation and migration destination.

From Table 3.4, the average number of remitters per household is approximately 1.32 remitters. They are in a working age group; male remitters are slightly older than female remitters. However, it is shown that women received longer years of education at around 11.58 years, compared to 10.76 years on average among men. Despite shorter duration in school, men remit to their original household more than women do; on average, men remit 59,771 Baht per year to their family while women remit 45,454 Baht per year. Households in municipal areas tend to receive more remittances. Overseas remitters also remit more to their original households with an average of 141,728 Baht per year, compared to an average internal remittance of 45,448 Baht per year.

Table 3.4

The summary of a remitter's characteristics

	Overall		Male		Female	
	Mean	Linearised S.E.	Mean	Linearised S.E.	Mean	Linearised S.E.
The number of remitters in a household	1.32	0.00	1.31	0.01	1.33	0.01
Remitter's age	36.07	0.08	37.33	0.13	34.82	0.11
Remitter's years of education	11.17	0.03	10.76	0.05	11.58	0.05
Remittance per remitter in the past 12 months (Baht)	52,615.76	609.21	59,770.95	1,043.54	45,453.96	613.37
By migration destination						
Internal	45,448.12	447.50	49,708.09	721.26	41,329.52	531.10
Abroad	141,728.40	5,201.88	160,922.50	7,797.43	111,960.10	5,072.46
By residential areas						
Non-municipal area	48,234.52	614.58	53,746.48	1,006.54	42,819.87	701.48
Municipal area	62,917.27	1,417.35	73,501.30	2,488.28	51,846.33	1,212.46
Observations	24,261		12,072		12,189	

Note. From Author's calculation

From Table 3.5, the majority of remitters are children of the household head. Daughters are more likely to transfer back to their original households. This may indicate the presence of the skipped-generation family, where grandchildren live with their grandparents while their parents are working elsewhere. Husband migrants are more common than wife migrants: 18.8% of male remitters are spouses of the household head, while only 3.1% of female remitters report being spouses of the household head. This is also evidenced in a higher proportion of son-in-law among remitters: 8.4% of remitters are son-in-law while only 1.6% of remitters are daughter-in-law. Moreover, the majority of remitters report seeking job opportunities as the main reason to engage in migration. The migration to have their own family is also common in Thai households, however, it is more prevalent among female remitters.

The primary occupations are associated with a remitter's gender. The majority of female remitters works as service and sales workers, mostly as sale assistants, cooks, shopkeepers and waiters. Whereas male remitters largely report working as craft and related trades workers, mostly as plasterers, motor vehicle

mechanics and repairers. Internal migration is more common in Thai households. Remitters usually relocate within the same province, especially female remitters. As expected, Bangkok is among the popular destinations. However, moving overseas constitutes a small proportion at approximately 7.4%; it is more common among male remitters.

Table 3.5

The additional summary of a remitter's characteristics

	Overall (%)	Male (%)	Female (%)
Relationship to the household head			
Son/Daughter	77.2	66.6	87.8
Spouse	11.0	18.8	3.1
Son/Daughter in law	5.0	8.4	1.6
Other relatives	3.1	3.0	3.1
Grandchild	2.2	1.9	2.6
Parents	1.6	1.4	1.8
Tenant/Maid/Workers	0.0	0.0	0.0
Migration decision			
To work	72.3	77.0	67.6
To have their own family	25.1	19.7	30.6
Others	1.3	1.7	0.9
To study	0.7	0.5	0.9
To be a soldier	0.6	1.1	0.0
Primary Occupation			
Service and sales workers	23.8	16.9	30.6
Craft and related trades workers	14.7	23.1	6.2
Plant and machine operators and assemblers	13.8	17.3	10.4
Elementary occupations	10.6	10.6	10.7
Professionals	8.2	6.5	9.8
Technicians and associate professionals	6.9	5.9	7.9
Clerical support workers	6.7	3.8	9.6
Skilled agricultural, forestry and fishery workers	6.4	7.3	5.5
Economically inactive	4.5	2.1	7.0
Managers	3.2	4.2	2.3
Armed forces occupations	1.2	2.4	0.1
Migration destination			
Within province	27.5	26.1	29.0
Bangkok	25.7	24.8	26.7
Other regions	25.6	25.1	26.2
Within region	13.7	15.0	12.3
Abroad	7.4	9.0	5.8
Observations	24,261	12,072	12,189

Note. Primary occupation is derived from the table of standard occupation codes (4 digits) employed in the SES questionnaire. From Author's calculation

However, the SES data lack information on the allocation of remittances. Such information is available in the Migration Survey (TMS), which is also conducted by the National Statistical Office (NSO). The TMS data adopt a stratified two-stage sampling as a survey method. Bangkok and other provinces constitute strata; each stratum is divided into either municipal or non-municipal areas. The primary sampling stage is enumeration areas and the secondary sampling stage is private households. The TMS data collect information on population migration, including the number of migrants, migration destination, migration means and reasons, and the allocation of remittances (both in-cash and in-kind transfers). The TMS data also survey demographic information from the target group, such as age, gender, education level, and employment status. Even so, the TMS data lack information on the actual amount of remittances being allocated to a particular expenditure category; it only records expenditure categories, to which remittances are being allocated to. Nonetheless, this analysis will investigate such information in an attempt to complete the overall description of remitters in Thai households.

Table 3.6 provides an additional description of remitters. This table aims to fulfil the overall characteristics of remitters in Thai households. Overall, only one in five migrants transfers back to their original households. Those who reside in Bangkok and the central region are more likely to remit, while those residing in the northeast region exhibit the largest proportion of not transferring to their original households. Remitters usually transfer back to their parents, their children and their spouses. This also supports the evidence of a skipped-generation family. The recipient mostly allocates remittances toward daily expenses. Only 4.6% of remitters reveal that remittances are spent on education.

Table 3.6

The summary of a remitter's transfer

	Overall (%)	Bangkok (%)	Central (%)	Northern (%)	Northeast (%)	Southern (%)
Remitter's transfers	(8,451)	(174)	(2,780)	(1,711)	(1,744)	(2,042)
Do not transfer back	76.6	52.1	67.5	79.8	91.9	79.1
Money	18.6	34.2	26.8	17.4	6.0	14.5
Money and Goods	4.2	10.1	5.5	2.6	2.1	4.5
Goods	0.6	3.5	0.2	0.3	0.0	1.9
Recipients	(1,645)	(70)	(702)	(277)	(202)	(394)
Parents	78.2	68.6	78.5	87.5	83.8	70.2
Children	15.4	16.7	15.5	8.4	12.3	23.2
Spouse	5.7	11.8	5.7	3.0	3.8	6.3
Other relatives	0.6	2.9	0.4	1.0	0.0	0.4
Others (unrelated)	0.0	0.0	0.0	0.0	0.0	0.0
Allocation of transfers	(1,584)	(68)	(689)	(261)	(197)	(369)
Daily Expenses	90.8	94.4	90.0	94.9	92.1	86.8
Education Expenses	4.6	2.6	4.1	4.1	0.5	10.3
Unknown	2.4	0.0	3.2	0.0	3.9	2.8
Debt Repayment	2.1	3.0	2.7	1.0	3.4	0.0
Business Investment	0.0	0.0	0.0	0.0	0.0	0.2
Others	0.0	0.0	0.0	0.0	0.0	0.0

Note. The respondents are asked if they are aware of the allocation of their transfer. The number of observations is shown in parentheses. From Author's calculation

Table 3.7 summarises education expenditures in all Thai households in the sampling years. There is a marked difference in education spending between municipal and non-municipal households. The former group spends around 43% more on total education expenditure. Tuition/school fees expenditure constitutes the largest proportion of total education expenditure: 59% for municipal households, and 39.2% for non-municipal households. Moreover, transportation costs become apparent that it is a burden cost for non-municipal households as it constitutes one-third of all education spending, compared to only 20.9% for municipal households.

Table 3.7

Descriptive statistics for education expenditure per household per year

	Whole Kingdom		Municipal areas		Non-municipal areas	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.
Total education expenditure	17,010.37 (100)	206.11	26,052.63 (100)	456.23	10,740.34 (100)	115.16
Tuition/School fees expenditure	8,792.87 (51.7)	169.16	15,402.20 (59.1)	384.39	4,209.86 (39.2)	80.65
Non-tuition expenditure	7,082.35 (41.6)	47.15	8,760.75 (33.6)	94.73	5,918.53 (55.1)	41.46
Uniforms	1,472.76 (8.7)	9.16	1,583.64 (6.1)	17.79	1,395.87 (13.0)	9.33
Books and other school equipment	1,313.75 (7.7)	20.59	1,728.28 (6.6)	47.59	1,026.30 (9.6)	10.42
Transportation costs	4,295.85 (25.3)	34.05	5,448.83 (20.9)	66.20	3,496.36 (32.6)	32.42
Private tutoring expenditure	1,135.15 (6.7)	29.61	1,889.68 (7.3)	61.17	611.95 (5.7)	25.98
Observations	64,271		35,505		28,766	

Note. The column percentages are shown in parentheses. From Author's calculation

Table 3.8 provides descriptive statistics of all variables employed in the empirical analysis. The target group is a remittance-receiving household: a household that reports receiving remittances every year from up to three remitters. Within the sample, a high proportion of households have zero expenditure on education (55.1% of the observations). Similar to the findings above, households in municipal areas own a higher value of total household assets. The household head is around 60 years old; household heads in municipal households are slightly older than those in non-municipal households. However, they stayed longer in school at around 6.12 years, compared to 5.19 years of household heads in non-municipal areas. The proportions of female household heads in these areas are comparable. Nonetheless, household heads in non-municipal areas are more likely to be economically active. Household compositions between municipal and non-municipal households are similar as shown by the proportion of having female students in a household, the average number of students, and the ratios of household members in each age group.

Table 3.8

Descriptive statistics for the remittance elasticity of education expenditure

	Whole Kingdom		Municipal areas		Non-municipal areas	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.
Log of household education expenditure	3.78	4.27	3.69	4.30	3.88	4.23
Log of total household remittances (Baht/year)	10.55	0.98	10.61	0.97	10.48	0.99
Log of total household asset	13.37	1.58	13.36	1.73	13.39	1.41
Household head's age	59.66	12.95	59.82	13.19	59.49	12.68
Household head's gender (=1 if female)	0.49	0.50	0.51	0.50	0.46	0.50
Household head's years of education	5.67	3.61	6.12	3.91	5.19	3.20
Household head's employment status (=1 if economically active)	0.62	0.49	0.58	0.49	0.66	0.47
A dummy if at least one female student in a household	0.22	0.42	0.22	0.41	0.23	0.42
The number of students in a household	0.53	0.77	0.51	0.77	0.54	0.77
The ratio of members aged under 6 years old	0.06	0.13	0.05	0.12	0.06	0.13
The ratio of members aged between 6 and 17 years old	0.15	0.21	0.15	0.21	0.16	0.21
The ratio of members aged between 18 and 59 years old	0.44	0.35	0.44	0.35	0.45	0.35
The ratio of members aged 60 years old and above	0.35	0.38	0.36	0.39	0.33	0.37
Observations	20,741		10,608		10,133	

Note. Economically inactive refers to those who report their primary occupations as a housewife, student, a child or elderly, unable to work, unemployed, other reasons, and do not want to work. From Author's calculation

3.3.2 Methodology

The analysis of the remittance elasticity of education spending employs the Engel curve approach by using remittances as a source of income and focusing on remittance-receiving households in each survey year from the SES data. Based on the suggestion of Prais and Houthakker (1955), this analysis chooses a double-logarithmic form as the functional form for the Engel curve approach. The previous literature, which employs this functional form, includes Matsuda et al. (1999), Glewwe and Patrinos (1999), Tilak (2002), Psacharopoulos and Papakonstantinou (2004), Tansel and Bircan (2006), and Acar et al. (2016). To estimate the Engel curve for total education spending, this analysis uses a standard linear regression technique (Ordinary Least Squares: OLS) in the estimation of the following equation:

$$\ln(Edu_i) = \alpha_0 + \alpha_1 \ln(R_i) + \alpha_2 X_{hhi} + \alpha_3 X_{si} + \alpha_4 X_{hi} + \alpha_5 Y_i + e_i \quad (3.2)$$

Where Edu_i is the total education expenditure of a household. R_i denotes total household remittances a household reported receiving in the past 12 months in each survey year. The α_1 coefficient measures the remittance elasticity on education expenditure in a household; education expenditure is a luxury if α_1>1, and a necessity otherwise. X_{hhi} is a vector of control variables for household heads' characteristics. X_{si} is a vector of control variables for students' characteristics and X_{hi} is a vector of households' characteristics. Finally, Y_i denotes year dummies.

For total education expenditure (Edu_i), the SES records education expenditure at an individual level for the whole academic year of the previous educational level. The expenditure includes (1) tuition/school fees, (2) uniforms, (3) books and other school equipment, and (4) transportation costs. Each household is also asked to estimate the amount spent on private tutoring sessions during the past 12 months; the SES then records monthly averages for both in-cash payments and the estimated value of in-kind payments. This study includes 12-month private tutoring expenditure as an additional category for household education expenditure.

Similar to the previous analysis, the variable R_i contains the total value of remittance income received from both internal and international remitters in the past 12 months in each survey year. This aims to investigate the sensitivity of the quantity of education demanded for children within the household to a change in total household remittances.

The vector of household heads' characteristics (X_{hhi}) includes the number of years of education received by household heads, their age, their gender, and their employment status. The vector of students' characteristics (X_{si}) includes a dummy variable if there is at least one female student in the household and the number of students in the household. The vector of households' characteristics (X_{hi}) includes the share of household members in each age group, the location dummy (either municipal or non-municipal), and total household assets. This study uses 5 age categories: under 6 years old, 6 – 17 years old, 18 – 24 years old, 25 – 59 years old, and 60 years old and above. The age group is inspired by the approximate age of each education level in Figure 1.3.

Prais and Houthakker (1955) highlight the importance of including the variation in household size when analysing family-budget data. Thus, these characteristic variables are aimed to reflect the impact of household compositions on the variation of household income and consumption levels of particular commodities, which, in this case, are the demand for education.

As 55.1% of the observations have zero education expenditure, taking the logarithm of total household education expenditure leads to a problem when total education expenditure is observed to be zero. Therefore, a Tobit model with robust standard errors will be used because the data is censored at zero. The dependent variable is non-negative and records the value of zero for a number of households. Using Ordinary Least Squares (OLS) regression without considering the probability of having positive education spending will not yield consistent estimates as it assumes that the dependent variable is normally distributed (Jonas, 2020). The Tobit model is more appropriate when the dependent variable of linear regression is incompletely observed or is observed only over some interval, which, in this case, it is a non-negative value (Cameron and Trivedi, 2022). Therefore, a Tobit model with left-censoring in the dependent variable is applied in this analysis. This analysis also provides both conditional and unconditional marginal effects (Parker, 2020).

The Tobit model assumes that there is an unobservable latent variable (Y_i^*), that is linearly related to a set of independent variables (X_i^*) through a vector of coefficients (β), which estimates the effect of X_i on Y_i^*. This relationship has a normally distributed random error term (ε_i). In this case, variable Y_i^* represents the household's desire to spend on education for their children. This relationship can be written as $Y_i^* = \beta X_i + \varepsilon_i$. The observable variable (Y_i) is related to the unobservable variable (Y_i^*) by $Y_i = max(0, Y_i^*)$, which says that Y_i is equal to zero if the household does not desire to spend on education and equal to Y_i^* otherwise (Tabuga, 2007). This analysis employs the maximum likelihood estimation for the Tobit model, which means that coefficient (β) is estimated to maximise the probability of having positive education expenditure (Tabuga, 2007).

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Results and Discussion for the impact of remittances on a continuation to upper-secondary education

The estimated results for the effect of remittances on a continuation rate to upper-secondary education among children aged 15 – 17 are summarised in the following tables. In Table 4.1, the Probit regression results without using the instrumental variable are presented in the first columns, reporting estimated coefficients, marginal effects and standard errors. Whereas, the instrumental variable Probit results are presented in the last columns, with only estimated coefficients and standard errors. The first-step results are available in Appendix A. The estimated results using the maximum number of years of parental education can be found in Appendix B.

Table 4.1 displays Probit regression results for the impact of remittances on a continuation rate using full samples. In contrast to the expected outcome, parents' age is not a key determinant of continuation to upper-secondary education. Meanwhile, parents' years of education are the important determinants of the probability of continuing to upper-secondary education. The impacts are highly significant with p-values of 0.000. The marginal effect of a mother's years of education (0.53 percentage points) is higher than that of a father (0.42 percentage points).

Total household expenditure per capita per year also increases the probability of continuing to upper-secondary education. The marginal effect is large at 5.50 percentage points. However, the overall impact of total household assets is relatively smaller at approximately 0.72 percentage points.

A child's gender and age are important determinants of continuing to upper-secondary education after completing lower-secondary education. Their impacts are highly significant with p-values of 0.000. Female students are more likely to continue studying, with a marginal effect of 6.66 percentage points. This indicates gender bias in the favour of daughters since they are more likely to financially support their parents, which motivates parents to support those daughters who are capable of

completing a higher level of education (Wongmonta and Glewwe, 2017). Moreover, male students may be a better substitute for the absence of adult labour in family businesses. Although, this ignores the fact that men could have better job opportunities than women in Thailand.

Meanwhile, a child's age yields a negative impact; over-aged children are less likely to continue studying. A one-year increase in a child's age reduces the probability of continuing to upper-secondary education by 5.13 percentage points. Dietz et al. (2015) suggest that older children are more capable of performing more work and are mature enough to consider emigration as an alternative to schooling. The negative effect of a child's age on school enrollment is also evidenced in the Kyrgyz Republic (Gao et al., 2021) and Thailand (Wongmonta, 2012). The opportunity cost of schooling reduces the probability of continuing to study. However, the marginal effect is very small at around -0.09 percentage points.

Moreover, living in municipal areas increases the probability of studying upper-secondary education by 1.36 percentage points. This demonstrates that children are more aware of returns to education, as evidenced by Warunsiri and McNown (2010), Paweenawat and McNown (2014) and Tangtipongkul (2015) that returns to education in municipal areas are higher than for those living in non-municipal areas. Also, it reflects the uneven economic development between municipal areas and non-municipal areas. Children in urban areas have better access to education infrastructures, which decreases the costs of education and hence increases the duration in school (Paweenawat, 2020).

Overall, total household remittances increase the probability of a child continuing to study in upper-secondary education. The marginal effect is recorded at 0.23 percentage points and it is statistically significant at a 1% level. This implies that the positive impact of remittances outweighs the negative impact of remittances in Thailand. Having extra income from remittances, in fact, increases the duration in school. This is consistent with the finding of Jampaklay (2006).

The instrumental variable Probit results are reported in the last columns in Table 4.1. In contrast to normal Probit results, the father's years of education have a negative impact on the probability of staying in school, although the estimated coefficient is very small and not statistically significant. The impact of parents' age

becomes statistically significant at a 5% level. This is consistent with the expected outcome. It is also observed in the finding of Gao et al. (2021) that older household heads in the Kyrgyz Republic tend to spend more on education. They highlight that this is because their maturity could influence household expenditure and consumption behaviour. The magnitude of the impact of other variables is consistent with earlier findings and in agreement with the expected outcome.

However, total household remittances reduce the probability of a child studying in upper-secondary education, in which it indicates that, without consideration of unobserved individual heterogeneity, the estimated result of total household remittances will be upward bias. The estimated coefficient is statistically significant at a 5% level. This result is consistent with previous survey studies in Thailand by Jones and Pardthaisong (1999) and Jones and Kittisuksathit (2003) that households tend to prioritise consumptive investment over productive investment such as education spending.

Table 4.1

The Probit estimates on a continuation to upper-secondary education

	Full samples				Full samples with IV	
Variable	Coeff.	Robust SE.	ME.x100	SE. x100	Coeff.	SE.
Father's age	0.002	0.003	0.030	0.039	0.042**	0.018
Mother's age	0.000	0.003	0.001	0.038	0.020**	0.009
Father's years of education	0.028***	0.006	0.416***	0.085	-0.002	0.016
Mother's years of education	0.036***	0.005	0.530***	0.082	0.033***	0.008
Log of total household expenditure per capita (Baht/year)	0.371***	0.034	5.499***	0.508	0.192**	0.090
Log of total household asset	0.049***	0.006	0.720***	0.095	0.070***	0.014
Female	0.449***	0.030	6.657***	0.441	0.497***	0.048
Child's age	-0.346***	0.018	-5.126***	0.273	-0.411***	0.039
Hourly wage (Baht)	-0.006***	0.002	-0.090***	0.033	-0.020***	0.007
Municipal	0.092***	0.030	1.364***	0.449	0.077*	0.045
Log of total household remittance (Baht/year)	0.016***	0.004	0.234***	0.062	-0.540**	0.241
Year						
2017	-0.040	0.039	-0.651	0.642	-0.154**	0.077
2019	0.063	0.042	0.972	0.637	-0.121	0.101
2021	0.237***	0.044	3.292***	0.600	0.018	0.114
Constant	1.507***	0.458			2.948***	0.898
Observations	16,506		16,506		16,506	
Pseudo R-squared	0.114					
Wald Chi stat	1,034.5				524.9	
Log-likelihood	-4,522.8					
Wald F stat					63.93	
P-value of Wald test of exogeneity					0.001	
First-stage results for IV					$3.95x10^{-6}$***	$1.25x10^{-6}$

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. Average marginal effect (AME) has been used. From Author's calculation

Table 4.2 provides the estimated results from the instrumental variable Probit regression of the sample disaggregated by household types using the threshold of household assets. Table 4.2 reveals that the negative impacts of remittance income are larger in low-asset households. This suggests that household economic status is an important determinant of school continuation: students in low-asset households are more sensitive to child's wage and receiving remittances could discourage studying while encouraging them to join the labour market. The statistically insignificant effects

of these variables among high-asset households implied that they may have better access to other means of financial support, or simply reflect differences in remittance behaviour among household types. This supports the finding of Vanwey (2004) that remittances among wealthier households tend to exhibit a contractual approach in more self-interested ways. It also reflects the fact that 42.8% of students who dropped out of upper-secondary education in 2021 reported that they had to provide for their families (NESDC, 2022).

Mothers' years of education are the important determinant of the continuation to upper-secondary education in both household types. This indicates the importance of having mothers at home for human capital development in childhood. Evidence from Cambodia, Lao PDR and Myanmar by Jampaklay et al. (2022) suggests that females are perceived as more trustworthy with the household's finances, and would spend remittances more responsibly. The finding of Cortes (2015) also supports the importance of having mothers at home. She observed that children in the Philippines with migrant mothers are doing worse in school than children with migrant fathers, even if controlled for the remittance amount, remittance behaviour and economic resources.

Table 4.2

The instrumental variable Probit estimates on a continuation to upper-secondary education by household types

	Low-asset households		High-asset households	
Variable	Coeff.	SE.	Coeff.	SE.
Father's age	0.069	0.052	0.018	0.014
Mother's age	0.041	0.033	0.006	0.007
Father's years of education	-0.039	0.052	0.025*	0.013
Mother's years of education	0.042**	0.017	0.037***	0.010
Log of total household expenditure per capita (Baht/year)	0.106	0.26	0.354***	0.061
Log of total household asset	0.058*	0.032	-0.07	0.058
Female	0.435***	0.092	0.549***	0.054
Child's age	-0.422***	0.077	-0.387***	0.042
Hourly wage (Baht)	-0.030	0.018	-0.009	0.006
Municipal	0.011	0.132	0.063	0.051
Log of total household remittance (Baht/year)	-1.036	0.825	-0.230	0.169
Year				
2017	-0.111	0.14	-0.152*	0.088
2019	-0.225	0.252	-0.031	0.098
2021	-0.01	0.265	0.051	0.112
Constant	3.088	1.889	3.629***	1.226
Observations	8,252		8,254	
Wald Chi stat	134.3		364.2	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Similarly, Table 4.3 reports the estimated results from the instrumental variable Probit regression of the sample disaggregated by the poverty line. The impact of a mother's education is statistically significant; this supports the above finding of having mothers at home for human capital development. The impact is significant even on students living below the poverty line. Meanwhile, the impact of the maturity of parents is directed toward children living above the poverty line. The positive impact of total household assets is larger in students from the former group. It is possible that household assets allow greater access to other means of financial support. The negative impact of the opportunity cost of schooling is statistically significant only on students from the latter group. This may indicate differences in job opportunities among these children. Total household remittances exhibit a negative sign; however, it is statistically significant at a 10% level only in students living above the poverty line.

Table 4.3

The instrumental variable Probit estimates on a continuation to upper-secondary education by the 2017 poverty line

	Below the poverty line		Above the poverty line	
Variable	Coeff.	SE.	Coeff.	SE.
Father's age	0.024	0.035	0.045**	0.021
Mother's age	0.034	0.034	0.016*	0.009
Father's years of education	0.017	0.029	0.001	0.019
Mother's years of education	0.068**	0.034	0.028***	0.009
Log of total household expenditure per capita (Baht/year)	0.557	0.367	0.131	0.095
Log of total household asset	0.169*	0.099	0.059***	0.013
Female	0.627**	0.278	0.483***	0.046
Child's age	-0.539***	0.143	-0.387***	0.040
Hourly wage (Baht)	-0.022	0.018	-0.019***	0.007
Municipal	0.256	0.162	0.047	0.050
Log of total household remittance (Baht/year)	-0.532	0.540	-0.521*	0.271
Year				
2017	-0.298	0.276	-0.131*	0.079
2019	-0.254	0.378	-0.108	0.101
2021	0.094	0.352	-0.007	0.121
Constant	-0.194	3.313	3.407***	0.993
Observations	2,165		14,341	
Wald Chi Stat	78.3		398.3	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Table 4.4 reports the estimated results from the instrumental variable Probit regression with the sample aggregated by child's gender. It reveals that the positive impacts of parents' age and mothers' education are directed toward male students. The negative impact of child's wage on female students supports the findings of Wongmonta (2012) that girls' enrollment in upper-secondary is more sensitive to an increase in child wage than boys' enrollment. Moreover, total household remittances exhibit a statistically significant and negative impact on boys' continuation to study. As expected, boys may be more obligated to care for their families than girls due to missing adult labour in households as found by Hu (2012) in China.

Table 4.4

The instrumental variable Probit estimates on a continuation to upper-secondary education by a child's gender

	Female students		Male Students	
Variable	Coeff.	SE.	Coeff.	SE.
Father's age	0.041	0.036	0.040**	0.018
Mother's age	0.013	0.013	0.025*	0.013
Father's years of education	0.003	0.018	-0.009	0.026
Mother's years of education	0.025	0.018	0.043***	0.012
Log of total household expenditure per capita (Baht/year)	0.175	0.195	0.231***	0.086
Log of total household asset	0.080***	0.022	0.062***	0.018
Child's age	-0.423***	0.077	-0.399***	0.044
Hourly wage (Baht)	-0.028*	0.014	-0.013**	0.006
Municipal	0.101	0.067	0.054	0.062
Log of total household remittance (Baht/year)	-0.554	0.428	-0.513*	0.285
Year				
2017	-0.151	0.124	-0.162	0.100
2019	0.015	0.129	-0.226	0.153
2021	0.087	0.190	-0.017	0.142
Constant	4.374**	2.151	2.027**	0.887
Observations	8,520		7,986	
Wald Chi Stat	207.24		249.3	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

4.1.1 Robustness checks using the skipped-generation households

The analysis can be extended to investigate the impact of remittances on the continuation to study in upper-secondary education in skipped-generation households[2]. Due to the limitation of the SES data, the skipped-generation households can be categorised only in 2021. This results in a small sample size of only 557 observations. Hence, this aims to ensure the direction of the impact of remittances on school continuation. The household head's characteristics are employed as a substitute for the parents' characteristics as the household head would have a direct influence over the children's decision to continue studying.

Most of the estimated coefficients are in the same direction as those obtained in the instrumental variable Probit of the full sample in Table 4.1. Similar to

[2] The skipped-generation household refers to households in which grandparents live with grandchildren without their parents (Department of Women's Affairs and Family Development, 2019).

parental influences, the maturity and the education level of household heads have positive impacts on the continuation to study. However, having female household heads lowers a continuation to study in children from skipped-generation households. Moreover, due to a small sample size, only the impacts of household expenditure, child's gender and child's age exhibit statistically significant impacts. The greater impact of a child's gender (coefficient of 0.534), compared to the effect obtained in Table 4.1 (coefficient of 0.497), indicates a stronger gender bias toward female students. Finally, the negative sign of an estimated coefficient of total household remittances confirms the negative impact on the continuation to upper-secondary education

Table 4.5

The instrumental variable Probit estimates on a continuation to upper-secondary education using the skipped-generation households

	Skipped-generation households	
Variable	Coeff.	SE.
Household head's age	0.005	0.015
Household head's gender (=1 if Female)	-0.109	0.192
Household head's years of education	0.079	0.052
Log of total household expenditure per capita (Baht/year)	0.510**	0.257
Log of total household assets	0.027	0.061
Female	0.534***	0.196
Child's age	-0.257**	0.115
Hourly wage (Baht)	-0.021	0.015
Municipal (=1 if municipal)	-0.032	0.193
Log of total household remittance (Baht/year)	-0.073	0.149
Constant	-0.054	3.255
Observations	557	
Wald Chi stat	21.73	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

4.2 Results and Discussion for the remittance elasticity of education expenditure

The OLS estimated results for the remittance elasticity of education expenditure are summarised in Table 4.6. This analysis performs OLS estimates on all observations, including those households that have zero education expenditure. Since

total household education expenditure and total household remittances are in logarithmic forms, the estimated coefficient can be interpreted as the remittance elasticity of education expenditure in a household. The coefficient of 0.136 is highly significant at a 1% level: a 1% increase in remittance income leads to a 13.6% increase in education expenditure by the household. This means that, on average, remittance-receiving households increase education spending once their remittance income rises. The elasticity of 0.136 indicates that education is a necessity for these households.

Household heads' characteristics are statistically significant at a 1% level with both positive and negative signs. These imply that the household head plays an important role in influencing household expenditure. The maturity of household heads leads to higher spending on education. This is consistent with the evidence found in the Kyrgyz Republic (Gao et. al, 2021), and the above findings of the positive impact of parents' age. The household head's years of education significantly increase education expenditure in the household. A one-year increase in their education increases total education expenditure by 5%. The impact of the employment status of household heads is large; having economically active heads significantly boosts education expenditure by 12.4%. However, on average, female heads spend less than male heads on education. Unlike the finding of Pickbourn (2016) that remittance recipients who are females tend to spend more on education per child.

The statistically significant estimated coefficient of having at least one female student at home implies a gender bias toward female students. Having female students encourages a greater allocation of income toward education: it increases spending by 89.5%. Also, the number of students currently in school has a positive impact on education spending in the sampling household. This may reflect the nature of necessity goods.

All estimated coefficients of household composition are positive, this indicates that these members spend more on education compared to the reference group of those aged 60 and above. The estimated coefficient is largest in members aged between 6 and 17 years old, which is an age group in compulsory education. The positive estimate of members aged between 18 and 59 years old reflects the fact that some members are currently studying higher education. Therefore, they spend more on

education compared to the elderly. However, residential locations do not have a significant impact on education expenditure.

However, the above OLS estimates suffer from biasedness as the OLS model involves households with zero expenditure. This ignores the household's desire to spend on education or, in other words, it ignores the probability of having positive education spending (Jonas, 2020). The following analysis then takes into account this concern and performs OLS estimates only on households that have positive education expenditure. Hence, this results in a smaller sample size; the observation reduces to only 9,303 observations. The relationship between remittance income and education spending in remittance-receiving households that have positive education spending is summarised in the last columns in Table 4.6.

Most of the OLS estimates with selected samples exhibit the same signs as the OLS estimates with full samples. However, the elasticity value slightly increases to 0.172, in which, education is still a necessity commodity. Once taking into account the selection probability of having positive education spending, a 1% increase in remittance income leads to a higher increase in education spending at 17.2%. The remittance-receiving household, which already allocates some income toward education, will increase education spending more than all remittance-receiving households would. Moreover, female household heads are, in fact, spending more on education for children. Having female household heads increases education spending by 16.9%. The impact of household heads' education level becomes greater. A one-year increase in their schooling prompts education spending by 7.2%, compared to 5% in the OLS estimates with full samples. Unexpectedly, the OLS estimates with selected samples suggest that employed household heads spend less on education.

In contrast to OLS estimates with full samples, it is suggested that a child's gender does not have a significant impact on education spending. This invalidates a gender bias toward female students in these households. Also, a larger share of school-aged children in a household lead to lower education spending. This implies financial constraints in supporting school-aged children in these households. This is also evidenced in the smaller positive impact of the number of students in the household; an additional student results in a 47.8% increase in education, compared to a 161.2% increase in the OLS estimates with full samples.

Table 4.6

The OLS estimates on the remittance elasticity of education expenditure

	OLS (Full samples)		OLS (Selected sample)	
Variable	Coeff.	Robust SE.	Coeff.	Robust SE.
Log of total household remittance (Baht/year)	0.136***	0.021	0.172***	0.013
Log of total household assets	0.042***	0.014	-0.007	0.008
Household head's age	0.025***	0.002	0.003*	0.001
Household head's gender (=1 if Female)	-0.109***	0.039	0.169***	0.025
Household head's years of education	0.050***	0.006	0.072***	0.004
Household head's employment status	0.124***	0.047	-0.147***	0.028
Student's gender (=1 if at least one female student)	0.895***	0.058	0.028	0.025
The number of students	1.612***	0.073	0.478***	0.023
Household's composition				
The ratio of members aged under 6 years old	7.621***	0.199	-1.266***	0.119
The ratio of members aged between 6 and 17 years old	9.673***	0.257	-1.375***	0.133
The ratio of members aged between 18 and 59 years old	1.451***	0.058	0.168**	0.073
Municipal	0.030	0.037	0.116***	0.023
Year				
2017	0.169***	0.050	0.117***	0.031
2019	0.137***	0.051	0.287***	0.032
2021	0.165***	0.051	0.188***	0.032
Constant	-3.762***	0.303	5.849***	0.201
Observations	20,741		9,303	
Wald F stat	3,311.76		104.12	
R-squared	0.631		0.1541	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Next, the analysis will focus on the Tobit estimates. The estimated coefficients are the marginal effect on the unobservable latent variable, which is the desire to spend on education in remittance-receiving households. The discussion of Tobit estimates will be directed toward sign and significance. The objective of Tobit estimates is to account for observations that have zero education expenditure, or the selection probability of having positive education spending. The more useful estimates from the Tobit model are their marginal effects on the observed data, which are shown in the last columns in Table 4.7. The conditional marginal effect refers to the marginal effect on the expected value of the censored data conditional on the dependent value being positive. The unconditional marginal effect refers to the marginal effects on the unconditional expected value of the observed data (Cong, 2000; Parker, 2020).

Table 4.7 shows the Tobit regression results with robust standard errors and their marginal effects. Most of the estimates yield the same sign and significant levels as OLS estimates with full samples. The highly significant coefficient of total household remittances shows that remittances positively influence the likelihood that remittance-receiving households will spend on education. Tabuga (2007) finds a similar result in Philippine households. The positive impact of remittance on household education expenditure is also found by Edwards and Ureta (2003), Adams and Cuecuecha (2010), Bansak et al. (2015) and Parida et al. (2015).

The conditional marginal effect of 0.1176 is the remittance elasticity of education for remittance-receiving households with positive education spending while 0.1347 is the remittance elasticity of education for all remittance-receiving households. The coefficients are highly significant at a 1% level. This indicates that remittance-receiving households that do not currently spend on education would increase education expenditure in a larger proportion if they receive more remittance income. As a result, it can be concluded that education is a necessity, and remittance does positively impact education spending at the household level.

Table 4.7

The Tobit estimates on the remittance elasticity of education expenditure

	Tobit		Conditional Marginal Effects		Unconditional Marginal Effects	
Variable	Coeff.	Robust SE.	ME.x100	SE.x100	ME.x100	SE.x100
Log of total household remittance (Baht/year)	0.265***	0.045	11.76***	2.00	13.47***	2.30
Log of total household assets	0.117***	0.034	5.21***	1.53	5.96***	1.75
Household head's age	0.074***	0.005	3.27***	0.24	3.75***	0.27
Household head's gender (=1 if Female)	-0.467***	0.088	-20.72***	3.89	-23.74***	4.45
Household head's years of education	0.089***	0.013	3.97***	0.59	4.54***	0.67
Household head's employment status	0.345***	0.107	15.29***	4.74	17.52***	5.43
Student's gender (=1 if at least one female student)	1.390***	0.086	61.65***	3.79	70.63***	4.34
The number of students	1.883***	0.112	83.51***	4.92	95.67***	5.64
Household's composition						
The ratio of members aged under 6 years old	17.645***	0.334	782.57***	15.75	896.50***	17.72
The ratio of members aged between 6 and 17 years old	21.025***	0.421	932.45***	19.45	1,068.20***	21.73
The ratio of members aged between 18 and 59 years old	5.064***	0.160	224.60***	7.19	257.30***	8.43
Municipal	0.053	0.080	2.33	3.56	2.67	4.07
Year						
2017	0.314***	0.109	13.88***	4.82	15.89***	5.52
2019	0.177	0.111	7.77	4.86	8.89	5.56
2021	0.311***	0.113	13.74***	4.99	15.73***	5.72
Constant	-16.588***	0.676				
Sigma	4.701***	0.040				
Pseudo R-squared	0.213					
Log pseudo-likelihood	-32,301.13					
Observations	20,741					
Censored observation	11,438					
Uncensored observation	9,303					

Note. The conditional marginal effect is $\frac{\partial E[y|y>0,x]}{\partial x}$. The unconditional marginal effect is $\frac{\partial E[y|x]}{\partial x}$ (Parker, 2020). Standard errors of marginal effects are obtained using the delta method. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Table 4.8 shows the estimations results of the unconditional marginal effects of the Tobit model. The parameter estimates for total household remittances give the remittance elasticity of education expenditure in a remittance-receiving household in each income quintile. The estimated remittance elasticities are statistically significant in most income quintiles; the magnitude of the remittance elasticity confirms that

education is a necessity. The value of elasticities varies across income classes. The remittance elasticity is peaked in the second quintile, where a one percentage increase in remittance income leads to a 21.2% increase in household education expenditure. Meanwhile, the estimated remittance elasticity has lower values for the highest and the lowest income quintiles. A one percentage increase in remittance income leads to only a 10.7% increase in education spending in the bottom-income quintile and a 10.2% rise in the top-income quintile.

Different degrees of elasticities across income levels are consistent with the finding of Garip (2014) that the effect of remittances on productive assets varies with income levels. The smaller impact of remittance in the highest-income quintile supports the finding of Vanway (2004) in Thailand that remittance behaviour in wealthier households tends to exhibit a contractual approach in more self-interested ways.

The impact of total household assets on education spending is directed toward households in the lowest-income quintile. This supports the findings from the previous analysis that household assets give better access to financial support, which could allow them to spend more on education. The estimated result suggests that a 1% increase in total household assets increases education expenditure by 15.6%.

However, the effect of household heads' schooling shows statistical significance only in higher-income households. Having educated household heads in the lowest-income quintile has no impact on education spending. Household heads' employment status is more important in the lowest- and the second-income quintiles. Having employed heads in the second-income quintile increases education spending by 38.5%. The magnitude is larger compared to the impact of total household remittances. This indicates the awareness of education investment of household heads.

All households spend more on education if there is at least one female student in a household. This also supports the finding of Wongmonta and Glewwe (2017). The gender bias is greatest in the lowest-income quintile; they will spend 84.5% more on education if there is at least one female student in a household. The fourth-income quintile is more willing to spend on education if there is an additional student. As expected, the lowest-income quintile increases education spending by the smallest proportion.

Table 4.8

The Tobit estimates on the remittance elasticity of education expenditure by income quintiles

	Lowest Quintile		Second Quintile		Middle Quintile		Fourth Quintile		Highest Quintile	
Variable	ME.	SE.	ME.	SE.	ME.	SE.	ME.	SE.	ME.	SE.
Log of total household remittance (Baht/year)	0.107**	0.049	0.212***	0.048	0.143***	0.048	0.185***	0.055	0.102	0.066
Log of total household assets	0.156***	0.031	0.046	0.030	0.040	0.034	-0.005	0.042	0.018	0.064
Household head's age	0.045***	0.005	0.045***	0.005	0.020***	0.006	0.018**	0.008	0.015	0.010
Household head's gender (=1 if Female)	-0.353***	0.086	-0.006	0.083	-0.175**	0.086	-0.149	0.116	-0.215	0.146
Household head's years of education	0.015	0.017	0.032**	0.015	0.042***	0.014	0.082***	0.014	0.043***	0.015
Household head's employment status	0.271***	0.096	0.385***	0.099	0.077	0.108	-0.161	0.151	-0.168	0.182
Student's gender (=1 if at least one female student)	0.845***	0.080	0.687***	0.077	0.429***	0.088	0.603***	0.126	0.529***	0.177
The number of students	0.747***	0.089	1.339***	0.104	1.580***	0.134	1.825***	0.206	1.103***	0.328
Household's composition										
The ratio of members aged under 6 years old	8.960***	0.331	8.911***	0.338	8.148***	0.396	7.759***	0.579	7.377***	0.685
The ratio of members aged between 6 and 17 years old	12.562***	0.405	9.980***	0.379	7.441***	0.435	6.079***	0.612	6.976***	0.923
The ratio of members aged between 18 and 59 years old	2.854***	0.187	2.950***	0.160	2.242***	0.158	2.063***	0.215	1.590***	0.273
Municipal	-0.070	0.078	0.010	0.075	0.132	0.081	0.106	0.108	0.081	0.144
Year										
2017	0.124	0.104	0.183*	0.104	0.158	0.113	0.056	0.149	0.286	0.175
2019	0.209*	0.107	0.013	0.103	0.062	0.110	-0.070	0.147	0.160	0.176
2021	0.249**	0.111	0.201*	0.105	0.085	0.114	-0.065	0.148	0.278	0.191
Observations	5,977		5,949		4,548		2,669		1,598	

Note. This table uses the unconditional marginal effect is $\frac{\partial E[y|x]}{\partial x}$ (Parker, 2020). Standard errors of marginal effects are obtained using the delta method.

Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this paper has studied the impact of remittance income on human capital development in Thai households by looking at the impact of remittance on continuation to study in upper-secondary education and its influence on a household's desire to spend on education as well as its impact on household education expenditure. This paper reveals that households' socioeconomic status is the key determinant of the continuation to study in upper-secondary education; such factors include parents' maturity and education, household expenditure and assets. Total household expenditure (as a proxy of the standard of living) has a large positive impact on the probability of a child studying in upper-secondary education. A higher value of total household assets also widens the range of choices for children. Children from high-asset households have greater choices in both financial sources for education and better access to job opportunities. The positive influence of mothers' education is strong even on children living below the poverty line. A child's characteristics are also important determinants of the probability of enrolling in upper-secondary education. Male students are more exposed to the negative impact of remittance income. Moreover, over-aged children are less likely to continue studying.

Remittance income lowers the probability of a child continuing to study in upper-secondary education. The impact is more pronounced in children from low-asset households. They become more vulnerable to the alternative of schooling, such as job opportunities at home and labour migration. This may indicate insufficient financial support for vulnerable children. The negative impact is also directed toward male students. Although it is found that households are biased toward female students, girls are more sensitive to wage income. Therefore, it is important to deliver appropriate policies as their education is the key influence for their children.

Unexpectedly, household heads' characteristics do not have significant impacts on the probability of a child studying in upper-secondary education in skipped-generation households. The significant determinants are their living standard (proxied by total household expenditure) and the child's characteristics (age and gender).

The analysis of the remittance elasticity of education reveals that remittance income positively influences the likelihood that remittance-receiving households spend on education. They also consider education as a necessity good, in which they will increase education spending once they receive more remittances. The crucial determinants of household education spending are the household head's age, education level, employed household heads and household assets, particularly in the lowest-income quintile. This paper also identifies vulnerable groups, who need some additional support. Male students are disproportionately affected by the impact of remittance income. Finally, there should be sufficient access to financial support for students from low-asset households.

Although remittance-receiving households spend on education, remittance still decreases the probability of a child aged 15-17 continuing to study in upper-secondary education. This supports the idea introduced by Jampaklay (2006) that the effects of remittances are twofold. Remittance is spent on education but it also encourages some students to seek jobs elsewhere rather than continuing to study in upper-secondary education. Children from remittance-receiving households may be more eager to earn and provide for their families. In addition, remittance income motivates households to participate in migration insistently (Amare et al., 2012). The connection between students and migrant members could also lower migration costs and, simultaneously, increase their return to migration (Massey, 1990). Thus, the presence of a migration network increases the opportunity costs of pursuing upper-secondary education.

Moreover, as suggested by Chami et al. (2003) that altruistically motivated remittance could lead to moral hazard problems. It tends to reduce economic activities at home while increasing dependence on remitted income. Households that receive higher returns to migration than returns to education may choose labour migration as their main investment project over higher education. It is also observed that working abroad is considered 'successful' in Northern and Northeastern regions (Jones and Pardthaisong (1999). In addition, these young adults may be obligated to work to compensate for missing adult labour at home as evidenced by Antman (2011), Hu (2012), Dietz et al. (2015), Gao et al. (2021) and Murakami (2021). In other words,

unsuccessful migration may induce children to leave schools and join the labour market instead.

In order to ensure that upper-secondary education is affordable, policymakers are advised to ensure that there is sufficient investment in education during transitions to upper-secondary education. The policy should focus on reducing entrance fees; this includes increases in subsidies for students in transitions to the upper-secondary level. So, upper-secondary education becomes more affordable to households. The tax incentive for migrant parents should induce a greater allocation toward children's education. Moreover, the policy to raise awareness of the long-term benefits of education should be implemented along with the policy to reduce the opportunity costs of schooling.

Since assets widen choices of financial support and career opportunities in Thai households, an asset-building scheme should be accessible to all households. Options for withdrawing assets should also be flexible. The scheme should be accepted as collateral for student loans. Moreover, policymakers should ensure that over-aged students could stay in school. There should be school mobility, in which students do not feel discouraged when switching between programmes. Moreover, because mothers' education has a significant impact on children's education, a special scheme to improve education for females should also be implemented. Finally, policymakers should ensure that low-asset households receive sufficient support.

However, there are some limitations in this study. It can be argued that the probability of continuing to upper-secondary education depends largely on student academic performance and school quality. As investigated by Wongmonta (2012), the indicator of school quality as proxied by the average ONET scores at provincial levels has a negligible effect on upper-secondary attainment when treating the general and vocational tracks as the same choices. The analysis of school choices (private vs public) would also help to understand the impact of remittance income on the information-constrained household. Moreover, the estimated equation should account for health expenditure as student health could affect their continuation to study.

The need to allocate income toward education is also dependent on the available resources at school. Due to limitations in data, this study cannot incorporate school-resources variables in the area such as the share of the education budget from

the government, access to education infrastructure and the availability of school choices and academic programmes (vocational-track students receive larger subsidies). By incorporating these variables, it could help to understand the true impact of remittances on school attainment and education expenditure in Thai households.

Moreover, the research topic can be further analysed based on more extensive information on time allocation in children, choices and attitudes, returns to migration and a remitter's relationship with children. The additional information on time allocation among children toward education, work participation and leisure could ease the analysis of the indirect impact of remittance on human capital in Thai households. The analysis should focus on differences in time allocation among children from different households (remittance-receiving, non-remittance and non-migrant households) and by remittance levels. The remittance level should reflect the significant degree of remittance income in household consumption; higher remittances could lower more financial burden but also contribute to a greater loss of adult labour at home. Choices and attitudes toward education in children could help to better understand income allocation toward education and their decision to leave school. The data on choices should include available and interested academic programs, labour responsibility at home and the availability of supportive adults. Meanwhile, the data on attitudes should record children's goals, expectations and intentions. The household returns to migration take into account the true opportunity cost of schooling in children from remittance-receiving households once they consider labour migration as an alternative to schooling. Finally, the remitter's relationship with children could also account for the connection between them. A closer connection between migrant members and students may lead to much lower migration costs and hence higher migration returns. Thus, this could induce some students to choose labour migration over continuing to study in higher levels.

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APPENDICES

APPENDIX A

THE FIRST-STEP RESULTS OF PROBIT REGRESSIONS

Table A.1

The first-step results of instrumental variable Probit regressions of the average of total remittances from other households in the same area and province

	Coeff.	SE.
Full sample	$3.95x10^{-6}$***	$1.25\ x10^{-6}$
By household types		
Low-asset	$2.22\ x10^{-6}$	$1.54\ x10^{-6}$
High-asset	$7.10\ x10^{-6}$***	$2.02\ x10^{-6}$
By the 2017 poverty line		
Below the poverty line	$5.85\ x10^{-6}$	$4.66\ x10^{-6}$
Above the poverty line	$3.62\ x10^{-6}$***	$1.29\ x10^{-6}$
By child's gender		
Female	$3.39\ x10^{-6}$*	$1.78\ x10^{-6}$
Male	$4.38\ x10^{-6}$**	$1.75\ x10^{-6}$
Skipped-generation households	0.0000319***	0.0000109

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

APPENDIX B

THE ESTIMATED RESULTS USING THE MAXIMUM NUMBER OF YEARS OF PARENTAL EDUCATION

Table B.1

The Probit estimates on a continuation to upper-secondary education using the maximum number of years of parental education

	Full samples				Full samples with IV	
Variable	Coeff.	Robust SE.	ME x100	SE. x100	Coeff.	SE.
Father's age	0.002	0.003	0.026	0.039	0.041**	0.019
Mother's age	0.001	0.003	0.016	0.037	0.017**	0.008
Maximum number of years of parental education	0.055***	0.005	0.816***	0.075	0.023	0.016
Log of total household expenditure per capita (Baht/year)	0.381***	0.034	5.642***	0.502	0.222***	0.085
Log of total household asset	0.048***	0.006	0.716***	0.094	0.070***	0.014
Female	0.453***	0.030	6.719***	0.442	0.496***	0.046
Child's age	-0.345***	0.018	-5.118***	0.273	-0.407***	0.039
Hourly wage (Baht)	-0.006**	0.002	-0.083**	0.033	-0.019***	0.007
Municipal	0.095***	0.030	1.413***	0.449	0.084*	0.043
Log of total household remittance (Baht/year)	0.017***	0.004	0.248***	0.062	-0.510**	0.242
Year						
2017	-0.041	0.039	-0.662	0.641	-0.144*	0.075
2019	0.060	0.042	0.924	0.638	-0.105	0.097
2021	0.236***	0.043	3.276***	0.598	0.041	0.108
Constant	1.363***	0.455			2.699***	0.876
Observations	16,506		16,506		16,506	
Pseudo R-squared	0.115					
Wald Chi stat	1,009.6				551.3	
Log-likelihood	-4,520.2					
Wald F stat					69.53	
P-value of Wald test of exogeneity					0.002	
First-stage results for IV					$3.82x10^{-6}$***	$1.25x10^{-6}$

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. Average marginal effect (AME) has been used. From Author's calculation

Table B.2

The instrumental variable Probit estimates on a continuation to upper-secondary education using the maximum number of years of parental education by household types

	Low-asset households		High-asset households	
Variable	Coeff.	SE.	Coeff.	SE.
Father's age	0.073	0.058	0.014	0.014
Mother's age	0.035	0.028	0.004	0.006
Maximum number of years of parental education	0.002	0.052	0.039***	0.012
Log of total household expenditure per capita (Baht/year)	0.126	0.254	0.389***	0.059
Log of total household asset	0.060	0.037	-0.052	0.057
Female	0.437***	0.091	0.542***	0.053
Child's age	-0.424***	0.081	-0.380***	0.041
Hourly wage (Baht)	-0.030	0.020	-0.007	0.006
Municipal	0.016	0.132	0.072	0.049
Log of total household remittance (Baht/year)	-1.033	0.879	-0.187	0.167
Year				
2017	-0.100	0.137	-0.131	0.085
2019	-0.215	0.251	-0.003	0.095
2021	0.016	0.252	0.088	0.108
Constant	2.966	1.949	3.172***	1.189
Observations	8,252		8,254	
Wald Chi stat	141.2		369.6	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Table B.3

The instrumental variable Probit estimates on a continuation to upper-secondary education using the maximum number of years of parental education by the 2017 poverty line

	Below the poverty line		Above the poverty line	
Variable	Coeff.	SE.	Coeff.	SE.
Father's age	0.019	0.029	0.045**	0.022
Mother's age	0.030	0.029	0.013*	0.008
Maximum number of years of parental education	0.058**	0.025	0.024	0.020
Log of total household expenditure per capita (Baht/year)	0.656**	0.309	0.146	0.094
Log of total household asset	0.166*	0.090	0.059***	0.013
Female	0.604**	0.245	0.484***	0.045
Child's age	-0.524***	0.126	-0.384***	0.040
Hourly wage (Baht)	-0.019	0.016	-0.018**	0.007
Municipal	0.261*	0.150	0.052	0.049
Log of total household remittance (Baht/year)	-0.462	0.464	-0.493*	0.279
Year				
2017	-0.264	0.237	-0.124	0.077
2019	-0.207	0.322	-0.097	0.099
2021	0.158	0.289	0.009	0.118
Constant	-1.066	2.947	3.299***	0.991
Observations	2,165		14,341	
Wald Chi stat	90.05		417.67	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Table B.4

The instrumental variable Probit estimates on a continuation to upper-secondary education using the maximum number of years of parental education by a *child's gender*

	Female students		Male students	
Variable	Coeff.	SE.	Coeff.	SE.
Father's age	0.040	0.037	0.040**	0.019
Mother's age	0.012	0.013	0.020*	0.010
Maximum number of years of parental education	0.023	0.029	0.025	0.019
Log of total household expenditure per capita (Baht/year)	0.193	0.188	0.265***	0.080
Log of total household asset	0.081***	0.023	0.062***	0.018
Child's age	-0.423***	0.078	-0.393***	0.042
Hourly wage (Baht)	-0.027*	0.015	-0.012*	0.006
Municipal	0.103	0.066	0.065	0.059
Log of total household remittance (Baht/year)	-0.538	0.438	-0.471*	0.279
Year				
2017	-0.150	0.123	-0.142	0.093
2019	0.020	0.127	-0.197	0.143
2021	0.095	0.188	0.018	0.130
Constant	4.199**	2.136	1.759**	0.846
Observations	8,520		7,986	
Wald Chi stat	214.43		265.37	

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation

Table B.5

The first-step results of instrumental variable Probit regressions of the average of total remittances from other households in the same area and province using the maximum number of years of education

	Coeff.	SE.
Full sample	3.82×10^{-6}***	1.25×10^{-6}
By household types		
Low-asset	2.08×10^{-6}	1.54×10^{-6}
High-asset	6.94×10^{-6}***	2.02×10^{-6}
By the 2017 poverty line		
Below the poverty line	6.25×10^{-6}	4.65×10^{-6}
Above the poverty line	3.44×10^{-6}***	1.29×10^{-6}
By child's gender		
Female	3.27×10^{-6}*	1.77×10^{-6}
Male	4.29×10^{-6}**	1.75×10^{-6}

Note. Significant levels of ***p<0.01, **p<0.05 and *p<0.1. From Author's calculation