ESSAYS ON THE DETERMINANTS OF VIETNAMESE HOUSEHOLD SAVING RATES

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Hua Thanh Xuan

Abstract

Household saving plays a crucial role in the economic growth and social development of a country. Especially in poor and developing countries, household savings are an important financial source for families to overcome difficulties, reduce poverty, stimulate wealth creation, and increase their quality of life. Calculated as household savings divided by household income, the household saving rate shows us how much households can save compared with their income. In this dissertation, we use the dataset VHLSS 2010 and 2012 to investigate the determinants of household saving rates in Vietnam, a developing country in South East Asia. In Chapter 1 we set the scene: we review influential saving theories and provide a general overview of the Vietnamese economy. The following chapters are devoted to empirical analysis. In Chapter 2 we apply conditional quantile regression to determine the effect of household characteristics on household saving rates. We find evidence that household and household head characteristics have significant effects on family saving rates. Particularly, the marginal propensity to save of households at the low quantiles is higher than that of those at the high quantiles. Since household characteristics and household saving rates between urban and rural families tend to be different in Vietnam, we examine in Chapter 3, using unconditional quantile regression, whether these differences in household characteristics between the two areas can help explain why urban households save more than rural families. We find that the urban-rural saving rate differences are low at the high quantiles. In addition, the higher income and smaller size of urban households allows them to save more compared with rural families. In contrast, the differences in ethnic structure and education between the two areas tend to reduce the urban-rural saving rate difference. Finally, in Chapter 4 we examine the influence of remittances on saving and consumption behaviour by using the technique of propensity score matching. We observe that remittances have a positive impact on household savings by increasing both saving rates and saving amounts.

Samenvatting

Het sparen door huishoudens speelt een cruciale rol in de economische groei en de sociale ontwikkeling van een land. Vooral in arme landen en ontwikkelingslanden is spaargeld een belangrijk financieel instrument om moeilijkheden het hoofd te bieden, armoede te bestrijden, welvaart te creëren en de levenskwaliteit te verbeteren. De spaarquote, gedefinieerd als het gespaarde bedrag gedeeld door het beschikbare inkomen, geeft een idee van hoeveel huishoudens kunnen sparen in verhouding tot hun inkomen. In deze thesis onderzoeken we de determinanten van de spaarquote van huishoudens in Vietnam, een ontwikkelingsland in Zuidoost-Azië, aan de hand van twee datasets (VHLSS 2010 en 2012). In hoofdstuk 1 wordt de achtergrond geschetst, met een overzicht van invloedrijke theorieën over sparen enerzijds en de Vietnamese economie anderzijds. De hoofdstukken daarna zijn gewijd aan empirische analyse. In hoofdstuk 2 onderzoeken we via voorwaardelijke kwantielregressie het effect van bepaalde kenmerken van huishoudens op hun spaarquote. We stellen vast dat de kenmerken van het huishouden en van het gezinshoofd significante effecten hebben op de spaarquote. Zo blijkt de marginale geneigdheid tot sparen (MGS) bij huishoudens in de lage kwantielen groter dan in de hoge kwantielen. Aangezien in Vietnam de kenmerken van huishoudens en de spaarquote verschillen in de stad en op het platteland, onderzoeken we in hoofdstuk 3, met behulp van onvoorwaardelijke kwantielregressie, of deze verschillen kunnen verklaren waarom men in de stad meer spaart dan op het platteland. We stellen vast dat de verschillen in de spaarquote in de stad en op het platteland gering zijn in de hoge kwantielen. Bovendien kunnen stedelijke gezinnen, door hun hogere inkomen en kleinere omvang, meer sparen dan gezinnen op het platteland. De verschillen qua etnische structuur en opleidingsniveau tussen beide gebieden verminderen echter het verschil in spaarquote tussen stad en platteland. Tot slot onderzoeken we in hoofdstuk 4 de invloed van geldzendingen van gezinsleden vanuit het buitenland op het spaar- en consumptiegedrag, door geneigdheidsscores te vergelijken via *'propensity score matching'*. We kunnen concluderen dat deze geldzendingen een positieve invloed hebben op het sparen, want hierdoor stijgen zowel de spaarquote als de gespaarde bedragen.

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List of Abbreviations

Average Treatment effect on the Treated (ATT)

Conditional Quantile Regression (CQR)

European Union (EU)

General Statistics Office (GSO)

Gross Domestic Product (GDP)

Human Development Index (HDI)

Influence Function (IF)

International Orangization for Migration (IOM)

International Monetary Fund (IMF)

Marginal Propensity to Save (MPS)

Ordinary Least Squares (OLS)

Propensity Score Matching (PSM)

Recentred Influence Function (RIF)

Swedish International Development Agency (SIDA)

Unconditional Quantile Regressions (UQR)

United Nations Development Program (UNDP)

Vietnam Dong Currency (VND)

Vietnam General Statistics Office (VGSO)

Vietnam Household Living Standard Surveys (VHLSS)

Introduction

Aggregate saving plays a crucial role in the economic growth and social development of a country. Adam Smith emphasized in his book published in 1776 (Chapter VIII: Of the wages of labour) that aggregate savings recognized as the annual income not to be consumed of the workers would become the future national investment, and thus, would be the foundation for economic growth and social development for the nation. Without saving, there is no capital investment and hence no capital accumulation (Solow, 1956). Recognized as a large proportion of aggregate saving, domestic saving consists of the savings by the household sector, the private corporation sector and the public sector. A comprehensive study of domestic saving behaviour would thus require an investigation into the consumption and saving decisions of households, firms and the government. However, economic research on saving behaviour has concentrated mostly on households (Sorensen & Jacobsen, 2005). In fact, household savings defined as the portion of household income after final household consumption are the dominant proportion of domestic savings, especially in developing countries. Hence, household savings play an important role in the growth of the economy. Besides, in micro-economic perspective, household saving is the root for all investment of households. In addition, most of their decisions on consumption and purchasing assets are influenced by their savings. Moreover, as households face unexpected risks and problems in their life and their business, their savings are expected to be the crucial financial source for them to solve and overcome their difficulties.

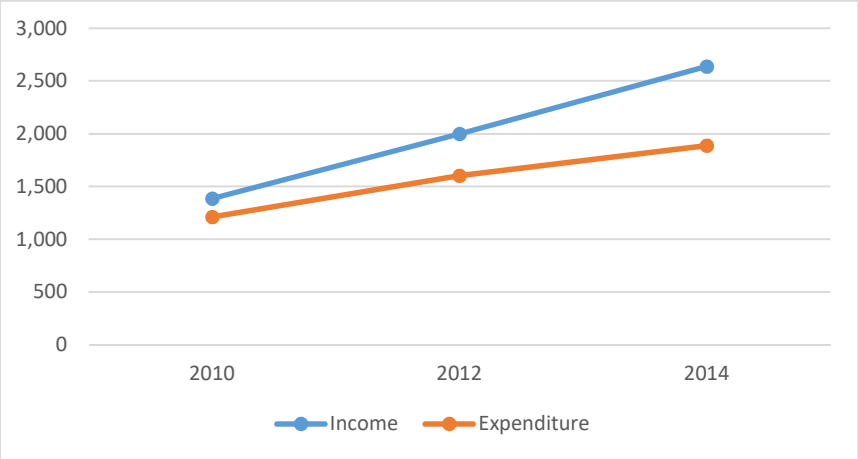
The role of household saving is especially important in case of the poor and developing countries (Abdelkhalek et al., 2010; Attanasio & Székely, 2001; Nguyen et al., 2013; Sepehri & Akram-Lodhi, 2005). In these countries, people receive relatively little support in health care and education from the government's social welfare policies. Savings can help them to overcome difficulties, reduce poverty, stimulate wealth creation, and increase their quality of life (Steindl, 2013; Suppakitjarak & Krishnamra, 2015). Household saving is a crucial factor influencing household welfare due to limitations on credit availability and social security provision; these factors are particularly relevant for developing countries such as Vietnam (Newman et al., 2008). Indeed, due to the weakness of financial markets, the possibilities of strengthening future household income depend mostly on household savings, especially in rural areas (Newman et al., 2008). Without savings, households have limited options to handle unexpected risks, and as a result shocks may leave permanent scars on consumption and financial decisions. For instance, the

process of human capital accumulation may be disrupted at a very early age. Hence, it is not exaggerated to state that household savings are the most crucial financial source for households to solve their problems and to improve their quality of life.

Vietnam has been quite successful in both economic growth and social development since "Doi moi" economic reform in 1986. Income per capita at the current price are over $2,000 in 2014 and over $2,700 in 2019 (according to the World Bank), although it was one of the poorest countries in the world with income per capita of around $100 in 1986. Since 2000, annual GDP growth rate of the coutry is over 5% despite of the worldwide financial crisis in the period 2007-2008. Quality of household living standard has been improved with changes in demographic characteristics; such as education, doctor per 10,000 inhabitants, proportion of household having hygienic water and using electricity. With such development, both household and national savings have been influenced. Indeed, according to the General Statistics Office (GSO) in current prices average monthly per capita income has increased more than average monthly per capita expenditure in the period 2010-2014 (see Figure A), which proves that Vietnamese household saving has an increasing trend. Besides, using the Vietnam Household Living Standard Surveys (VHLSS) data, we find that aggregate household saving rates are 18.6% and 23.37% in 2010 and 2012.

Economic theory suggests that household and household-head characteristics play an important role in explaining household saving behaviours.The aim in this thesis is to investigate how household characteristics (mainly: age, gender, education, income, and dependency) affect the rate of household saving, which is defined as household saving divided by household income. Although there is a vast amount of studies on household saving rates in many countries of the world, not much work in this area has been done for Vietnam, especially pertaining to urban areas. This is the main reason why I decided to write my PhD thesis "***Essays on the determinants of Vietnamese household saving rates***".

Figure A - Average monthly per capita income and expenditure at current prices



The determinants of household savings have been investigated from both a macroeconomic and a microeconomic perspective. On the one hand, household savings are affected by macroeconomic factors such as the level and the growth of GDP, inflation, the interest rate, demography and public policies such as liquidity constraints and fiscal policies (Aron & Mihaescu, 2014; Athukorala & Tsai, 2003; Samantaraya & Patra, 2014). On the other, they are also the result of household choices, so that household characteristics are relevant (Fuchs- Schündeln et al., 2019; Nwosu et al., 2019; Pan, 2016; Saqib et al., 2016; Szopinski, 2017). In this thesis, we adopt the microeconomic perspective and focus on the determinants of Vietnamese household saving rates using the information on household characteristics collected in the Vietnam Household Living Standard Surveys (VHLSS) data. In doing so, we aim to obtain a better understanding of the factors that determine household savings in Vietnam. Hence, the results of our research contribute to the design and evaluation of social and economic policies to stimulate household savings in the country.

There are four objectives in this thesis. *First*, we start our research by a brief summary of key theories of savings and an overview of Vietnam's economic growth and social development in recent decades. Most theories state that income and household characteristics are the key determinants of household saving rates. Since 1986, Vietnam has changed from one of the poorest countries in the world to a middle-income developing country with high economic growth. Major improvements have occurred in average household incomes, educational attainments and health levels. Understanding the way household characteristics (such as: income, education, age, living place, etc.) influence their saving behavior is *the second objective* of our thesis. The rapid

urbanization which has accompanied economic growth in Vietnam has increased the differences between families in urban and rural areas. On the whole, urban households tend to have higher incomes, to attain higher educational outcomes, etc. *Our third objective* is to explore to what extent the differences in household and household-head characteristics have an effect on the difference in household saving rates between the two areas. The high economic growth and the rapid urbanization have induced a flow of labour migration from rural to urban areas and from Vietnam to other countries. This has led to an increasing trend of both internal and external remittances; and hence, this source of income has become more prevalent in the country, according to the World Bank (2012). Therefore, *our last aim* in this thesis is to uncover the impact of remittances on saving behaviour and expenditure patterns of Vietnamese households.

The thesis consists of four chapters. After the general introduction, the first chapter begins with a presentation of theories of savings and consumption which are used in the other chapters. This chapter also includes information of Vietnam's socio-economic development, which shows that research on Vietnamese household saving is relevant. Then, in the second chapter, we consider the possible heterogeneity of household saving propensity by estimating the effects of household characteristics on Vietnamese household saving rates by means of a quantile regression approach. Since household characteristics between urban and rural families tend to be different, we examine in chapter 3 whether these differences can help explain why urban households save more than rural families. Our objective in that chapter is achieved by applying the technique of unconditional quantile regression. Next, Chapter 4 aims to analyse the influence of remittances on saving and consumption behaviours by using the propensity score matching approach. Finally, we end the thesis with concluding remarks in which we summarize our key findings and discuss some limitations as well as possible avenues for further research.

Chapter 1 Theories of saving and economic overviews in Vietnam[1]

Abstract

This chapter serves as a background for this thesis. We start this chapter by reviewing saving the best known theories of saving determination, including the Absolute Income Hypothesis, the Life-Cycle Hypothesis, and the Permanent Income Hypothesis. According to the Absolute Income Hypothesis, household savings depend on current income. According to the Life-cycle Hypothesis and the Permanent Income Hypothesis instead, household savings depend on long-term income. However, some key assumptions of these theories are likely to be violated, especially in the context of a poor and developing country such as Vietnam. Challenging these assumptions allows savings to be affected by other factors, such as household characteristics, that are shown to be relevant in the remainder of this thesis. The second part of this chapter reviews the recent history of Vietnam, focusing on the economic changes and social developments in the periods 2010-2014. The data show that Vietnam is on a path of stable economic growth and development in this period. These changes could in turn have affected household saving decisions. Hence, a deeper analysis of Vietnamese household saving decisions is necessary.

Keywords: saving theories, household savings, Vietnam

[1] This chapter is written by Hua Thanh Xuan, Professor Guido Erreygers, Professor Luca Paolo Merlino.

1.1 Introduction

Household savings, a large proportion of which are domestic savings, are the crucial capital source for investment of both economy and households. Hence, these resources are considered the foundation for economic growth (Deaton, 1990; Deaton & Paxson, 2000; Keynes, 1936; Solow, 1956).

Household savings are the main domestic source of funds to finance capital investments for firms and companies, a major impetus for both short and long-term economic growth (Harrod, 1939; Keynes, 1936). Besides, savings are also consumption of households in the future. For all these reasons, savings are necessary for economic growth (Friedman, 1957).

Additionally, savings can help households to overcome their difficulties, reduce poverty, stimulate wealth, and increase quality-life (Steindl, 2013; Suppakitjarak & Krishnamra, 2015). Household saving is a crucial factor impacting household welfare due to the limitation of credit availability and social security provision. These factors are particularly relevant for developing countries such as Vietnam. Indeed, due to the weakness of financial markets, the possibilities of strengthening future household income depends mostly on their savings, especially in rural areas (Newman et al., 2008). Without savings, households have limited options to avoid unexpected risks, and hence shocks may leave permanent scars on consumption and financial decisions. For instance, the process of human capital accumulation may be disrupted at a very early age.

Understanding the determinants of household savings is thus key to understand and foster economic growth: savings are the source of investment and capital accumulation, which in turn are the engine of economic growth (Domar, 1946; Harrod, 1939; Solow, 1956). This issue has been investigated in both developed and developing economies, such as Poland (Korzeniowska, 2019), China (Curtis et al., 2015; Pan, 2016) and Bangladesh (Haider et al., 2016). Despite Vietnam being a developing country with good achievements in both economic growth and socio development (World Bank, 2012), studies on determinants of household savings are still rare for this country, especially pertaining urban areas. This is the main reason urging me to write my PhD. thesis “Essays on the determinants of Vietnamese household saving rates”.

The determinants of household savings can be investigated using both a macro and a microeconomic perspective. On the one hand, household savings are affected by macroeconomic factors such as the level and the growth of GDP, inflation, the interest rate, demography and public policies such as liquidity constrain and fiscal policies (Aron & Mihaescu, 2014; Athukorala & Tsai, 2003; Samantaraya & Patra, 2014). On the other hand, household savings are mostly a

household choice, so that are such as household and household-head characteristics are relevant (Fuchs-Schüdeln et al., 2019; Nwosu et al., 2019; Pan, 2016; Saqib et al., 2016; Szopinski, 2017). In this thesis, we adopt the determinants of Vietnamese household saving rates from the second perspective by using the information on household characteristics collected in the Vietnam Household Living Standard Surveys (VHLSS) data. In doing so, we aim to provide a comprehensive picture of the attitudes of household savings in Vietnam. Hence, the results of our research contribute to the design and evaluation of social and economic policies to stimulate household savings in the country.

This chapter sets the background for the following three essays studying different aspects of the determinants of the Vietnamese household saving rate. We structure this chapter into three sections. After the introduction, we summarise saving theories in previous studies.Next, we review macro and micro-economic achievement after economic structural reforms. Finally, this chapter ends with a conclusion.

1.2 Theories of determinants of savings and consumption

1.2.1 Individual household savings from a microeconomic perspective

Households receive income from their labour or their asset holdings and must decide what they will do with these resources. Mainly, they can consume (and thus, to dis-save) or save (and hence, to postpone their consumption) for their income. Thereby, savings are the part of income that is not consumed in a given period. For a given level of income, the more households consume, the smaller their savings are. In other words, the saving function can be interpreted as the inverse function of consumption. Hence, the theories of savings are simply the theories of consumption and basically, saving and consumption theories differ in their predictions regarding the main determinants of household decisions. In this section we review the theories that are relevant for the rest three chapters in this thesis: Absolute Income Hypothesis (Keynes, 1936), the Life-cycle Theory (Modigliani & Brumberg, 1954), and the Permanent Income Hypothesis (Friedman, 1957). The difference in these theories is the way how consumption changes with income.

We start this section by discussing theories for the determinants of individual household saving. Then, we expand to those of aggregate saving in macroeconomics.

Absolute Income Hypothesis (Keynes, 1936)

Household saving representing a decision to increase asset accumulation or consume less of current income in order to meet financial goals have firstly been attempted in developed countries for a long time (Chang, 1994). To understand savings, Browning and Lusardi (1996) listed the nine reasons to save highlighted by Keynes (1936):

(i) "*To build up a reverse against unforeseen contingencies*−the precaution motive;

(ii) "*To provide for an anticipated future relation between the income and the needs of the individual or his family different from that which exists in the present, as, for example, in relation to old age, family education, or the maintenance of dependents*"−the life-cycle motive;

(iii) *"To enjoy inter and appreciation, i.e, because a larger real consumption at a later date is preferred to a smaller immediate consumption"*−the intertemporal substitution motive;

(iv) *"To enjoy a gradually increasing expenditure, since it gratifies a common instinct to look forward to a gradually improving standard of life rather than the contrary, even though the capacity for enjoyment may be diminishing"*−the improvement motive;

(v) *"To enjoy a sense of independence and the power to do things, though without a clear idea or definite intention of specific action"*−the independence motive;

(vi) *"To secure a masse de manoeuvre to carry out speculative or business projects"*−the enterprise motive;

(vii) *"To bequeath a fortune"* – the bequest motive;

(viii) *"To satisfy pure miserliness, i.e., unreasonable but insistent inhibitions against acts of expenditure as such"*–the avarice motive;

(ix) *"To accumulate deposits to buy house, cars, and other durable"*−the downpayment motive.

According to Keynes (1936), these saving motives change very slowly. Hence, the propensity to save should be stable for a long time so that consumption and savings would be a positive function of current income. Indeed, he wrote: "*The fundamental psychological law, upon which we are entitled to depend with great confidence both a priori from our knowledge of human nature and from the detail facts of experience, is that men are disposed, as a rule and on the average, to*

increase their consumption as their income increase, but not by as much as the increase in their income" (Keynes, 1936, Ch. 8, p. 96). This is the main content of the Absolute Income Hypothesis by Keynes (1936).

The Absolute Income Hypothesis can be summarised as follows. *First*, the consumption and saving functions of this theory are based on Keynes' experience and intuition rather than formal reasoning. *Second*, consumption and savings should be impacted by the current disposable income. Thus, this theory is expressed by the below equation:

$$y_i = c_i + s_i$$

Hence: $s_i = y_i - c_i$ (**1**)

With y_i, c_i and s_i would be the current income, consumption and savings of household i.

Third, equation (**1**) also indicates that a high income should cause high consumption and high savings. The sensitivity of saving to income can be measured in marginal propensity to save (MPS):

$$MPS = \frac{\Delta s}{\Delta y} = b \quad (\mathbf{2})$$

Equation (**2**) indicates that households would have a fixed and exogenous propensity of saving. Mainly, if household income increases 1 unit, saving increases b units. Thus, household saving rate of individual households in this theory should be constant. Hence, the impact of income on savings can be estimated empirically using:

$$s_i = f(y_i) = a + b\, y_i \quad (\mathbf{3})$$

Equation (**3**) can be estimated by ordinary least squares (OLS). Applying this theory, we consider current household income as one of the covariates in our research.

There is however some evidence that the Absolute Income Hypothesis is inconsistent with both macro and micro level data. For aggregate data, the marginal propensity to consume is lower in the short run than in the long run (Katona, 1949). Additionally, Katona (1949) showed that saving rates seem to change systematically with the level of income and other household characteristics.

This evidence motivated the formulation of the Permanent Income Hypothesis (Friedman, 1957) and Life-cycle Theory (Modigliani & Brumberg, 1954), both of which recognise the intertemporal nature of savings and consumption. Both theories are then built on the key idea that consumption depends on long-term income, rather than on current income as in . In other words, households use their saving and borrowing to smooth the path of their consumption over lifetime.

Life-cycle Theory (Modigliani and Brumberg, 1954)

Modigliani and Brumberg (1954) formulated the Life-cycle Theory which focuses on the interaction between income, consumption, saving, wealth and age. A review of the Life-cycle Theory is given by Modigliani (1986) in his Nobel Prize lecture. In this theory, a life cycle or a life span consists of two spans: the working years (the earning span) and the retirement years (the retirement span). Consumers are assumed to start their life span at the beginning of their working age with low income, and thus they tend to borrow for their consumption during the early low-income years. Then, their income increase, they repay those loans, or accumulate wealth during the high-income years, and then spend off the accrued savings during their retirement. As a result, children and elderly people would be determinants of individual household consumption and savings. In addition, years of age is also a key factor in this theory; however, the relationship between age and savings is described non-linear. Various studies attempted to study household and individual savings by applying this theory and found that ages of household-head, square of age, numbers of children and old members in households been determinants of consumption and saving behaviours (Akhtar, 1987; Hurd, 1987; Mason, 1988).

The basic literature of this theory is that an individual attempts to maximise over his or her lifetime utility function that is homogeneous with respect to consumption at different point of time. Hence, the utility function of the individual consumer is assumed to be a function of his own aggregate consumption in current and future periods. The individual will allocate the marginal increments of resources to consumption in different time periods in the same proportion as total resources were allocated before the addiction.

In the simplest model, we assume that each household has initial wealth (A_0), lives for T periods, earns income from working in each period (y_t). Lifetime consumption utility of each household is defined as:

$$U = \sum_{t=1}^{T} u(c_t) \qquad \textbf{(4)}$$

where c_t is consumption at the period t; $u(.)$ is a lifetime utility function that is homogeneous with respect to consumption at different point of time; we assume $u'(.) > 0$ and $u''(.) < 0$ so that the marginal utility of consumption each period is positive and diminishing.

In addition, suppose that there is no uncertainty, lifetime income ($\sum_{t=1}^{T} y_t$) and initial wealth (A_0) are known and taken with certainty. Thus, the lifetime budget constraint is:

$$\sum_{t=1}^{T} c_t = A_0 + \sum_{t=1}^{T} y_t \qquad \textbf{(5)}$$

Equation (**5**) means that lifetime consumption should equal initial wealth plus lifetime income. We assume that during the lifetime, households can save (or borrow) in the period *t* so that they can consume less (or more) at the same period. Hence, households will consume more (or less) at some future periods in the lifetime. In other words, households can choose whether to save up today so that they can spend more in their future. In contrast, they can borrow to consume more today; and thus, reduce the consumption at some future periods in the lifetime. Therefore, there are economic trade-offs across time periods in this model.

At the end of life in period *T*, the household is assumed to have zero debts and zero assets. In addition, for simplicity, we assume no interest rate and thus, no discount of future consumption. Our objective is to find optimal consumption so that household can maximise his/her lifetime consumption utility in equation (**4**) with the lifetime budget constraint in equation (**5**). This can be solved by setting up the following Lagrangian:

$$\mathcal{L} = \sum_{t=1}^{T} u(c_t) + \lambda(A_0 + \sum_{t=1}^{T} y_t - \sum_{t=1}^{T} c_t)$$

$$\mathcal{L} = [u(c_1) + \cdots + u(c_T)] + \lambda[A_0 + y_1 + \cdots + y_T - (c_1 + \cdots + c_T)] \quad \textbf{(6)}$$

The first order condition for c_1 is:

$$\frac{\partial \mathcal{L}}{\partial c_1} = 0 : u'(c_1) - \lambda = 0 \quad \textbf{(7)}$$

Similarly, for any given c_t :

$$\frac{\partial \mathcal{L}}{\partial c_1} = 0 : u'(c_t) - \lambda = 0 \quad \textbf{(8)}$$

Since the utility function is assumed to be homogeneous with respect to consumption at different point of time, the first order condition is the same for each period. Thus, the marginal utility of consumption is constant and equal to λ each period. This result implies that the level of consumption is constant and equal in each period, otherwise the marginal utility of consumption varies over time. Therefore, we have:

$$c_1 = \cdots = c_T \quad \text{and} \quad \sum_{t=1}^{T} c_t = Tc_t \quad \textbf{(9)}$$

Replace (**9**) into (**5**), we get:

$$Tc_t = A_0 + \sum_{t=1}^{T} y_t$$

$$c_t = \frac{1}{T}[A_0 + \sum_{t=1}^{T} y_t] \quad \textbf{(10)}$$

And $s_t = y_t - c_t = y_t - \frac{1}{T}[A_0 + \sum_{t=1}^{T} y_t]$

$$s_t = y_t - \frac{1}{T}\sum_{t=1}^{T} y_t - \frac{1}{T}A_0 \quad \textbf{(11)}$$

There are some crucial findings from equation (**10**) and (**11**). *First*, the key implication from these equations is that current consumption (and saving) depends not only on current income, but on the lifetime income. This is different with the Absolute Income Hypothesis of Keynes (1936), and consistent with the Permanent Income Hypothesis of Friedman (1957). *Secondly*, these equations show that consumption (and thus, saving) of household will be the proportional to the lifetime budget constraints. *In addition*, the marginal propensity to consume (and to save) of any factors affecting the lifetime budget constraint tends to be the same. This finding implies that the marginal propensity to consume (and to save) of various income sources will be the same. This is most different result between the Permanent Income Hypothesis and the Life-cycle Theory, although both are constructed based on the framework of intertemporal allocation of consumption and saving, and the lifetime budget constraint of household's resources (Attanasio, 1995; Browning & Lusardi, 1996; Friedman, 1957; Hall, 1978; Modigliani & Brumberg, 1954).

Permanent Income Hypothesis (Friedman, 1957)

Agreeing with Modigliani & Brumberg (1954) about the dependency of consumption on long term income, the Permanent Income Hypothesis postulates that households tend to allocate their inter temporal consumption over their lives (Friedman, 1957). Mainly, people will spend money at a level consistent with their expected long-term average income. More formally, the long-term income (y) and long-term consumption (c) are divided into two components: a permanent component (p) and a non-permanent or transitory component (t). Therefore:

$$y = y_p + y_t \quad \textbf{(12)}$$

and $$c = c_p + c_t \quad \textbf{(13)}$$

where y and c are income and consumption for some time period; y_p and c_p are the permanent components of income and consumption; y_t and c_t are the transitory components of income and consumption, respectively.

The permanent component of income (y_p) in equation (**12**) is "*analogous to the "expected" value of a probability distribution*" (Friedman, 1957, p21) and can be interpreted as anticipated income. This component can be determined by the same factors determining earnings, such as the ownership of income-producing assets (the non-human wealth), personal abilities (training, ability, personality), and the characteristics of economic activity (occupation of earners, the location of

the economic activity). Besides, this component can also be estimated as a weighted average of current and past incomes, in which the weight of current year is more heavily than the weights of prior years.

On the contrary, the transitory income (y_t) is unexpected income due to "accidental" or "chance occurrences", and could be either positive or negative. For instance, due to unusually good/bad weather, farmers could receive more/less actual income than their anticipated income; hence, their transitory income would be positive/negative. However, this component also includes chance (random) errors of measurement and thus, there is in general no method to separate them from the transitory component as viewed by the consumer/household. As far as the econometrician considers group of consumers, the mean measured income of this group is likely to equal the mean permanent component, and thus, the mean transitory component would be zero.

The relative size of these two components determine how stable income is. On the one hand, if household income is stable, the permanent component tends to represent a large proportion of income. In contrast, if household income is unstable, the transitory component would be larger. Since the component of unstable income refers to risk, households with unstable income are more exposed to risk than those with stable income. Thus, an unstable income provides a motive for households to consume less and save more.

Likewise, consumption in equation (**13**) includes permanent consumption (c_p) and transitory consumption (c_t). On the one hand, permanent consumption (c_p) is stable and could be estimated by a function of permanent income (y_p) ($c_p = f(y_p)$). The proportionality factor of permanent consumption and permanent income depends on the ratio of nonhuman wealth to income, the rate of interest, and household's taste and preferences.

On the other hand, transitory consumption (c_t) pertains to accidental or chance occurrences of consumption, such as sickness and unexpected future risks, but it also includes chance and systematic errors of measurement. These could be positive or negative.

In this theory, the author assumed that "*the transitory components of income and consumption are uncorrelated with one another and with the corresponding permanent components*" (Friedman, 1957, p 26), hence:

$$\rho_{y_t y_p} = \rho_{c_t c_p} = \rho_{y_t c_t} = 0 \qquad \textbf{(14)}$$

The assumption in equation (**14**) implies that:

- transitory income is random with permanent income;

- transitory consumption is independent on permanent consumption;
- and transitory consumption is random with transitory income.

Since transitory consumption is random with transitory income, the marginal propensity to consume from transitory income is zero. This means that if a household receives more income than its permanent level, its permanent consumption will not be altered. In other words, this household will not use positive transitory income in their consumption. Instead, this household will save the additional income. Similarly, a household with an unexpected negative transitory income will not reduce its consumption; rather its savings tend to be declined. Hence, according to the author, the purchased of durable goods should be considered as investment rather than consumption, since households can use these goods to overcome as receiving a windfall income. In brief, an increase of permanent income will induce an increase in household consumption; in contrast, transitory income would lead to an increase of household savings.

Applying this theory in the United States for the period 1897-1949, Friedman (1957) showed that for aggregate data that fluctuations in disposable income tends to be dominated in the short run by the variance of temporary shocks, which would be averaged out in the long run. In addition, for any given income level, black families as a group of farmers are likely to have fewer permanent shocks and more temporary shocks than white households who usually work in non-farm and business. As a consequence, they consume less and save more at any income level than whites.

The Life-cycle Theory as well as the Permanent Income Hypothesis are in the most relevant theories this thesis refers to. *First*, as presented in chapter 2 and chapter 3, we assume that household saving behaviour does not only depend on household current income, but also on other factors affecting the long-term income potential, such as age, the presence of children or elderly members. Furthermore, we also add age squared in the model to allow for a non-linear relationship of savings with age. *In addition*, these theories are also used in chapter 4 to examine the impact of remittances on household consumption and savings. If, as postulated by the Permanent Income Hypothesis, remittances are part of a household's permanent income, households will use them mostly to finance consumption; if instead, they are transitory income, they will finance savings. In contrast, according to the Life-cycle Theory, remittances would finance both consumption and savings if households consider these receipts as any other source of income.

We also note some key assumptions of the Life-cycle Theory in its formulation by Modigliani and Brumberg (1994). *First*, the interest rate is zero in their analysis; thus, households do not discount future consumption, as well as do not accrue interest on their savings and wealth. *Secondly*, there

is no uncertainty about household's future income; hence their consumption behaviour during the lifetime is assumed to be homogeneous. If there is new information about lifetime income, household consumption may be changed. *Lastly*, this model assumes that households have access to the financial market, i.e., they can borrow any amount they desire. In other words, there is no liquidity constraint in the capital market. Hence, households can allocate intertemporally their consumption and savings during the lifetime. Particularly, when they have temporally low income, they can access funds from a lender without restriction for their consumption. However, according to Modigliani and Cao (2004), this assumption seems to be more appropriate for developed countries with high income. For the poor and developing countries, it is likely to be violated; thereby, saving is an important financial source which help households to overcome their obstacles and unexpected risks.

It has been shown that the Life-cycle Theory can still be applied when some of these assumptions are relaxed (Deaton, 1991; Jappelli & Pagano, 1994). We now turn to the discussion of some contributions in the literature that relax one or more of these assumptions.

Interest rate and saving behaviour

In most of previous literature, researchers relaxed the assumption of zero interest rate. Instead, they assumed that the capital markets were perfect and that the interest rate was constant over time. This meaned that households could save and borrow at the same interest rate. We consider here the simplest model with no uncertainty and two time periods, so that any household has zero assets at the end of second period.

Assume that a household has a utility consumption function:

$$U = U(c_1, c_2), \qquad \textbf{(15)}$$

where c_1 and c_2 are consumption in the first and second period, respectively.

The household's budget constraint for consumption in the first period is:

$$c_1 \leq A_0 + y_1, \qquad \textbf{(16)}$$

where c_1 and y_1 are respectively consumption and income in the first period; A_0 is initial wealth at the first period.

Equation (**16**) means that consumption in the first period should not exceed initial wealth plus income in this period. Savings in period 1 (s_1) are:

$$s_1 = y_1 - c_1 \quad \textbf{(17)}$$

Savings (s_1) can be negative or positive. *On the one hand*, if savings are positive, then the household receives the promised return on her savings in the second period. *On the other hand*, negative savings indicate that the household borrows for its consumption in first period; hence, the household has to pay back both the interests and the principal in the second period. Whether savings are positive or negative depends on household preferences and income.

Initial wealth in the second period is:

$$A_1 = (A_0 + s_1)(1 + r) = (A_0 + y_1 - c_1)(1 + r), \quad \textbf{(18)}$$

and, household's budget constraint for consumption in this period is:

$$c_2 \leq A_1 + y_2, \quad \textbf{(19)}$$

where c_2 and y_2 are respectively consumption and income in the second period; A_0 is the initial wealth in the second period.

Replacing (**18**) in (**19**) and assuming that the household has no debt and no assets at the end of the second period, we have:

$$c_2 = (A_0 + y_1 - c_1)(1 + r) + y_2 \quad \textbf{(20)}$$

The slope of the budget constraint is $\frac{\partial c_2}{\partial c_1} = -(1 + r)$. There are some crucial remarks about the slope of the budget constraint. *First*, a negative slope of the budget constraint indicates that you have to sacrifice consumption between the two periods. On the one hand, if you want to consume more in the future, you must be willing to consume less right now. On the other hand, if you want to consume more now, you will have to sacrifice consumption in the future. *Secondly*, an increase in the interest rate will cause the slope of the budget constraint to be steeper for any given initial wealth and income level. *Thirdly*, as far as we take into account the effect of an increase in the interest rate while income levels remain unchanged, there could be a substitution effect and an income effect. On the one hand, a higher interest rate can decrease consumption through the substitution effect, since households prefer to save more today in order to increase consumption in the future. On the other hand, a higher interest rate can raise consumption through the income effect, since households gain more interests on income initial wealth.

The results of this two-period model can be easily extended to multiple periods. In this thesis, we study one period of household saving behaviour which allows us to understand household saving

behaviour in the short run. In this case, the interest rate seems to have a relatively small effect on saving behaviour, in contrast to its effect in the long run.

Imperfect capital markets and savings

The existence of perfect capital markets is the most questioned among all the assumptions of the life-cycle model (Browning & Lusardi, 1996; Deaton, 1992b). This assumption postulates that there is a capital market with a unique interest rate at which households and customers can freely borrow or lend as much as they wish. However, this assumption could be violated in two common ways. *First*, households cannot lend and borrow at the same interest rate. The interest rate at which households borrow is usually higher than the rate at which they lend. *In addition*, interest rates often vary with the size of the transaction and the 'creditworthiness' of the borrower, which depends on her wealth (Appelbaum & Harris, 1978). *Finally*, interest rates are often not constant for neither lending nor borrowing. As a result, with the existence of imperfect capital markets, the difference between the two (marginal) discount rates is not constant over time due to changes in the initial wealth (Appelbaum & Harris, 1978). Therefore, the consumption and saving patterns can be non-monotonic during the lifetime (Appelbaum & Harris, 1978). Therefore, it is essential to study consumption and saving behaviours by the time series data as well as the cross sectional data. In this study, we use the cross sectional data to understand saving rates in the case of Vietnamese households. Besides, in previous literature, the assumption of perfect capital market can also be relaxed into a simply definition that there is a market for all assets covering all possible future contingencies, so that all risk can be insured against trading these assets. Hence, the Life-cycle model can be applied in most of the economics until nowsaday.

Liquidity constraints and saving

There is evidence that several households both in rich and poor countries face liquidity constraints; hence those households cannot borrow to finance their consumption as they wish (Deaton, 1991; Jappelli & Pagano, 1994). Various studies have attempted to investigate the impact of liquidity constraints on household savings for impatient customers, who prefer current consumption to future consumption. Interestingly, they find that people with liquidity constraint tend to have a precaution motive to consume less and save more (Browning & Lusardi, 1996; Deaton, 1991; Jappelli & Pagano, 1994). According to Jappelli and Pagano (1994), liquidity constraints can force the consumption of the young to be lower than the unconstrained level; besides, they also raise

their permanent income by fostering capital accumulation. Moreover, liquidity constraints are the matter of low-income households which urge them to have higher saving rate than high-income family (Hubbard et al., 1986).

In a model without liquidity constraints, households tend to set current consumption to equalise the expected marginal utility of consumption in short-run as well as the long-run. However, liquidity constraints could cause long-run and short-run behaviours different (Browning & Lusardi, 1996). Hence, it is necessary to investigate both long-run and short-run behaviours. In this thesis, we investigate Vietnam, a low-middle income country with liquidity constraints, especially for the poor and rural households and the rural families. Therefore, long-run and short-run savings in this country could be different. In this research, we focus on saving decision in the short run for Vietnamese households by using the dataset VHLSS 2010.

Risk sharing and saving behaviour

In developing countries, households often face uncertain income streams (such as income from agricultural activities) and expenditure needs; this increases their need to smooth income fluctuations. However, formal financial and insurance markets for common risks are often deficient due to the high transaction costs emanating from information and enforcement problems (Townsend, 1994). Hence, income uncertainty induces households to save more. According to Townsend (1994), in order to limit income uncertainty and consumption risks, households are likely to resort to informal schemes, such as risk sharing among households. Various studies focused on ethnicity and location as the determinants of the units of risk sharing in developing countries. There is some evidence that informal risk sharing (such as loans between households in the same ethnic, village, or country groups) works well: since group members know each other well, monitoring and enforcement costs are considerably diminished with respect to formal insurance schemes (Kazianga & Udry, 2006; Townsend, 1994). Following the previous empirical studies, we introduce living areas (urban/rural) and ethnicity as covariates. In interpreting the coefficients of these variables, one has to keep in mind that risk sharing agreements might be present among rural households.

Financial literacy and saving

In the standard life-cycle model, people are assumed to be rational and fully informed. As a consequence, they are able to project future income and interest rates and to discount them

appropriately (Jappelli & Padula, 2013). Nevertheless, these assumptions are usually violated in reality, especially so in developing countries. For instance, some individuals have little understanding and knowledge about basic financial concepts such as risk diversification, inflation and interest rate (Jappelli & Padula, 2013). In other words, these people have little financial literacy. Several empirical studies found that poor financial literacy is associated with poor risk diversification, inefficient portfolio allocations and low wealth accumulation (Ameriks et al., 2003; Jappelli & Padula, 2013; Mahdzan & Tabiani, 2013). Hence, one can expect a relationship between financial literacy and saving behaviour. Indeed, Ameriks et al. (2003) find that differences in the attitude and skills of financial planning are significant factors among similar households at different levels of wealth. Hence, becoming more financially literate can help households to increase savings and thus, become wealthier.

According to Jappelli and Padula (2013), financial literacy can be accumulated especially at the early stages of the life cycle. This accumulation has both costs and benefits. On the one hand, financial literacy can help households to access better investment opportunities and thus, allow households to become richer. On the other hand, investing in financial literacy costs time and monetary resources. Various attempts have been conducted to measure the degree and spread of financial literacy. In particular, financial literacy is determined by experience, expertise and person's need (Mahdzan & Tabiani, 2013). For example, people with a low level of education or females were found to have low levels of financial literacy (Lusardi & Mitchell, 2011). In this thesis, we take into account this matter by adding some variables such as gender, education to control for person's need as well as financial literacy when we investigate saving decision of Vietnamese households. Besides, we also keep in mind that financial literacy could cause the low savings at the early stage of the life cycle (young age) when we interpret the coefficients for age in the model of saving decision.

In sum, in this section, we review some literature which can applied to determine the individual determinants of consumption and saving decisions. This allows us to investigate the impact of socio-economic characteristics of households on their saving decisions directly (Abdelkhalek et al., 2010). In addition, using household data to analyse savings has the advantage of providing details on socioeconomic profile of each interviewed household (Bebczuk et al., 2015). Thus, the critical role of the heterogeneous characteristics in explaining household saving decisions could be estimated. Therefore, it would be useful for the government and policymakers to construct and implement the appropriate policies.

1.2.2 National savings from the macroeconomic perspective

The life-cycle model can be also applied to determine the determinants of national savings (Hammer, 1986; Mason, 1988). Results of previous empirical studies have been proved that the determinants of household savings are economic factors (such as income, interest rate, inflation, wealth, foreign saving, unemployment, etc.), and policies (such as fiscal policies, pension system, social security provisions, etc.). We also note that in the life-cycle model people have a motive to save for their retirement. Accordingly, savings have been found to be positive for the young and negative for the old (Modigliani & Brumberg, 1954). Thus, as far as national accounts are concerned, the population structure has an impact on the aggregate saving rates (Modigliani, 1966). This indicates that population growth is a key factor of the aggregate saving rates (Conroy, 1979; Mason, 1988).

In general, population growth can both encourage and discourage saving rates (Cook, 2005; Mason, 1988). On the one hand, rapid rates of balanced population growth can produce potential savers, and hence, induce higher saving rates. On the other hand, high population growth rates are also able to induce a higher proportion of dependent children, thereby reducing saving rates. Thus, depending on which effect dominates, the population growth rate can either impact positively or negatively the national saving rates.

However, population growth can also have a negative impact on national savings (Cook, 2005). Modigliani (1966) proposed a model to investigate the impact of population growth on the aggregate saving rates using the ratio between the working and non-working population. Indeed, the retired and those too young for regular employment are usually the non-working population; thus, they are considered as dependent. People in this group usually consume without producing an income; hence, they reduce national household saving rates. As a result, a country with a high population growth can face a high dependency; thus, its saving rates are likely to be low. This prediction is supported by the empirical study of Leff (1969). By using the cross-sectional datasets from 74 developed and underdeveloped countries, the author finds that lower population growth through fertility reduction leads to fewer dependent people in the population, and hence, it induces higher saving rates.

Considering this macroeconomic perspective allows researchers to study variations of household savings among countries with various structural features and institutional aspects (Athukorala & Tsai, 2003). This empirical research has been conducted for regions (Horioka & Wan, 2007), for whole countries (Athukorala & Tsai, 2003) and for groups of different countries (Aron &

Mihaescu, 2014; Loayza et al., 2000; Schmidt-Hebbel et al., 1992), both developed and developing ones.

In the following section, we document the trends of national savings relating to the changes of economic and social development in Vietnam during the periods 2010-2014. This will allow us to understand the impact of these changes on aggregate savings. However, since our objective in this thesis is to explain the heterogeneity of saving decisions caused by differences in household characteristics, using aggregate data is not appropriate, as it ignores household heterogeneity by assuming a representative household agent (Abdelkhalek et al., 2010).

1.3 Economic growth and social development in Vietnam

1.3.1 General picture of economics in Vietnam

Vietnam is a country in South East Asia that inherited serious social and economic problems from its past of colonisation, occupation, and dominance by foreign powers. Its history can be traced back to around 4,000 years ago with a long period for defence from other countries. Particularly, this country had approximately 1,000 years of Chinese domination, 100 years of French war and American war; besides, it also had many wars with the Khmers, the Chams and the Mongols. This has led to two important facts about ethnic composition in Vietnam. Firstly, there is a great deal of ethnic diversity, with 54 distinct ethnic groups in this country. The major ethnicity in Vietnam is the Kinh, with over 80% of population; the minorities are the Hoa (Chinese) (0.8%), the Khmer (1.4%), the Cham (0.2%). Besides, there are many other minorities such as Ede (0.4%), Tay (1.9%) inhabiting the highlands with disadvantages of income, education, language, and living conditions compared with the Kinh majority. There is a gap of living conditions between the majority and minorities in this country, especially in rural areas, according to the World Bank (2012). Secondly, the long Chinese domination heavily influenced the Vietnamese culture. There are many cultural similarities between the Kinh and the Hoa (Chinese). Among them, the attitudes toward women are one of crucial importance, especially in rural areas. Women had disadvantages in studying for higher education, taking care their health and finding a good job compared to male. President Ho Chi Minh, the founder of modern Vietnam, has exhorted his countrymen to discard "historical" prejudices and injustices against women. The first constitution of Vietnam in 1946 enshrined gender inequality in the broadest of terms. Since then, the political establishment has repeatedly affirmed gender equality as a central development goal including the recent Decision of the Prime

Minister (19/2002/QD-TTg) approving the National Strategy for the improvement of women conditions in Vietnam to the year 2010.

Concerning the economy, after the French war, Vietnam was divided in two political and ideological regions from 1958 to 1975: the communist in the North and the capitalist supported by America in the South. In 1975, these two regions were merged under the sole leadership of the communist party. However, after the reunification and economic integration, Vietnam faced a lack of appropriate government policies to promote economic development. For many years, the economy stagnated, experiencing low rates of economic growth and social development. In this period, the central planned economy was one of the reasons of underdevelopment in Vietnam. This country was one of the poorest in the world. By the mid-1980s, per capita GDP was stuck between $200 and $300.

Since 1986, Vietnam has attained better economic achievements after the economic reform named as "Doi Moi"[2], which referred to the structural transformation from a "centrally planned economy" to a "market-based economy". The key idea of the reform aimed at promoting socio-economic development and integrating the economy of the country into the world economy. Various economic development policies were introduced with the following main targets:

- To encourage a diversified development of economic ownerships (mainly private, foreign investment).
- To recognise the right of long-term use of land to household (i.e., the Land Law, approved in 1993).
- To stimulate trade by permitting exchange and transport of goods across provinces or regions, the possibility for farmers to sell their products in markets rather than to cooperatives at the fixed prices.
- To invest into agriculture and rural development such as investments in irrigation, in agricultural extension activity, providing credit to farmers, etc.
- To reinforce public infrastructure and facilities such as schools, health services, communication, road, and etc.

Apart from internal economic renovation, the government of Vietnam implemented a series of the trade liberalisation ("opened door") policies. By 1990, Vietnam reconnected with the International Monetary Fund and the World Bank and had resumed and normalised international relations with many nations. In 2007, Vietnam joined the WTO.

[2] "Doi Moi" in Vietnam means renovation.

Over 20 years of economic reforms, a remarkable progress has been made in reducing poverty and improving living conditions. Vietnam has been presented by the World Bank as a model country for development success, especially in terms of poverty reduction (Cling et al., 2009). In particular, the national poverty rate measured by a "basic needs" poverty line adjusted for inflation declined from 58 percent in 1993 to around 17 percent in 2012 (IMF, 2014). Additionally, from one of the poorest countries that used to have serious shortage in all kinds of commodities, Vietnam became a developing country. Domestic production has met most of domestic manufacturing and consumption demand. Export is increasing. Life quality of people in the country has been remarkably improved by the increases of GDP per capita and monthly income per capita at the current price (see **Table 1.1**). Despite the worldwide economic crisis in 2008 and 2009, Vietnam has stood as a model of development with a GDP growth rate at least 5% annually in the recent years (see **Figure 1.1**) and was among the better performers in Asia, according to a 2010 IMF report.

Figure 1.1 GDP growth rate of Vietnam and other economies

Source: Data from the World Bank

Table 1.1 GDP per capita and monthly income per capita (at the current price)

Indicator	Unit	1990	2010	2012	2014
GDP per capita in VND	VND 1,000	618.09	24,530	36,139.52	42,935.98
GDP per capita in USD	USD	68	1,331	1,748	2,052
Monthly income per capita	VND 1,000	-	1,387	2,000	2,637
- Urban	VND 1,000	-	2,130	2,989	3,964
- Rural	VND 1,000	-	1,070	1,579	2,038

Source: Data from the Vietnam General Statistics Office (VGSO)

GDP's structure presented in **Table 1.2** shows the economic growth of Vietnam on agriculture, industry and construction, and services in the period 2010-2014. In the following, we focus on the key fundamental strategies which have been applied during the period to understand the growth of these sectors.

1.3.2 Fundamental strategies and achievements of some economic sectors in Vietnam since "Doi moi" reform

Agriculture

In the first period of "Doi moi", Vietnam was known as an agricultural country with little mechanization; this led to a high rate of loss in quantity and low rate of quality of the harvest (Takeshima et al., 2018). The country was always short of food although most of GDP comes from agricultural sector (World Bank, 2012).

The "Doi moi" process has gradually changed the situation. The level of mechanization, the food grain production development, the agricultural restructuring towards developing high-value industrial and fruit trees like coffee, rubber, cashew, litchi, longan, etc, as well as a strong development of agriculture, including domestic animals, fowls and forestry have been paid more attention to in Vietnam. As a result, GDP from agriculture has increased from 41.955 VND million in 1990 to 3.039.856 VND million in 2014 (see **Table 1.2**), not only ensuring national food security, but also allowing Vietnam to become a food exporter. In the recent years, Vietnam has been the world's second biggest rice exporter (right behind Thailand), one of the big exporter of peppercorn, coffee and rubber, and the EU's 17th trade in good partners[3]. Hence, it is not exaggerated to conclude that strategies of agricultural reformation are the most significant reasons for economic development and poverty reduction of Vietnam. Some key strategies producing the motivation for the growth of this sector are:

- The allocation of land to farmers and the transformation of agricultural cooperatives and state-owned farms into household enterprises, making the agricultural sector most privatized in Vietnam economy.
- The encouragement of gathering cultivated land to develop households' camps, farms and agricultural enterprises that are suitable with the land, the water and the weather of each region.

[3] https://ec.europa.eu/trade/policy/countries-and-regions/countries/vietnam/

- The development of irrigation and adequate provision of inputs for agriculture like machines, insecticide, and chemical fertilizers.
- The application of advanced biology achievements to diversify the plants and the fruits in order to raise their productivities and quality.
- Trade liberalization and export promotion.

Consistently with the fact that the key aim of "Doi moi" economic reforms introduced in Vietnam was to restructure the economy from a primarily traditional agricultural economy with low productivity to a more modern economy with strong manufacturing and services sectors, we observe a shift of employment from agricultural to non-agricultural activities (see **Table 1.3**).

Table 1.2 Economic structure of Vietnam (at current prices)

Indicator	1990	2010	2011	2012	2013	2014
GDP (VND million)	**41,955**	**2,157,828**	**2,779,880**	**3,245,419**	**3,584,262**	**3,937,856**
Agriculture	16,252	396,576	543,960	623,815	643,862	696,969
Industry and construction	9,513	693,351	896,356	1,089,091	1,189,618	1,307,935
Service	16,190	797,155	1,021,126	1,209,464	1,388,407	1,537,197
Products taxes subsidies on production	-	270,746	318,438	323,049	362,375	395,755
GDP (%)	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Agriculture	38.74	18.38	19.57	19.22	17.96	17.70
Industry and construction	22.67	32.13	32.24	33.56	33.19	33.21
Service	38.59	36.94	36.73	37.27	38.74	39.04
Products taxes subsidies on production	-	12.55	11.46	9.85	10.11	10.05

Source: Data from the Vietnam General Statistics Office (VGSO)

Table 1.3 Change in annual employment

Annual employment	1990	2010	2011	2012	2013	2014
In person thousand	**-**	**49,048.50**	**50,352.00**	**51,422.40**	**52,207.80**	**52,744.50**
Agriculture	-	24,279.00	24,362.90	24,357.20	24,399.30	24,408.70
Non-agriculture		24,769.50	25,989.10	27,065.20	27,808.50	28,335.80
In %		**100**	**100**	**100**	**100**	**100**
Agriculture	-	49.50	48.39	47.37	46.73	46.28
Non-agriculture	-	50.50	51.61	52.63	53.27	53.72

The shift of employment from agricultural to non-agricultural activities is consistent with in the idea that the labour force needs to be reallocated from traditional low productivity sectors toward modern high productivity sectors in order to achieve high levels of aggregate productivity (McCaig & Pavcnik, 2017)
Source: Data from the Vietnam General Statistics Office (VGSO)

Industry and construction

After "Doi moi" in 1986, there has been a rapid industrialization, which is recognized as the most miraculous economic achievement of Vietnam (see **Table 1.2**). The proportion of this sector in GDP shifts from 22.67% in 1990 to 32.13% in 2010. This sector maintained the key role of GDP in the period 2010-2014 with over 30% in GDP. It suggests that that development of this sector is the reason for economic growth and macroeconomic stabilization. Some industries are given priorities on the expansion of size and innovation of equipment such as electricity, mine, petroleum, cement, steel, electronics, garment and textile, sugar, and etc. In the recent years, Vietnam's industry has not only met domestic demand but also used for export. Particularly, Vietnam has a large export to the EU on telephone sets, electric products, footwear, textiles and clothing[4]. The following are the main strategies which have been applied for the growth of this sector.

- Firstly, since 2000, most of the state-owned enterprises have been equitized to concentrate capital and labour from all sources of the country to develop industry. As a result, foreign direct investment in this sector is rather high, especially in construction. Indeed, Vietnam has witnessed a rapid urbanization (World Bank, 2012).
- Secondly, encouraging and creating conditions for investment from various sources such as private and foreign capitals is a strategic breakthrough and an important factor that fosters the process of restructuring the economy. For example, many plans in constructing roads, high speed railway of North-South route, and some seaports and airports meeting international standard as well as urban infrastructures in some large cities such as Hanoi, Ho Chi Minh, Danang, Cantho have been conducted using these capital sources. With this strategy, Vietnam has become one of the largest receivers of foreign investment in the world. Foreign investment thereby would bring more jobs, higher education, and increase income for workers in this country. Opening of foreign trade to increase the export of industrial goods and import of materials and machines, especially in developed countries in Europe and the United Stated (World Bank, 2012).
- Thirdly, the government has implemented appropriate plans and policies to develop fields of industries based on the strength and advantages of many areas of all over countries. For example, the delta areas have a strong advantage in construction, garment, textiles, and agriculture (such as rice, fruits); hence, concentrating in developing further building and construction, garment production, clothing manufacture, and food processing industries in

[4] https://ec.europa.eu/trade/policy/countries-and-regions/countries/vietnam/

these areas is an objective of the government. Investing on forestry production, industrial plants, and materials for processing and exporting industries are instead prioritized in the mountainous and midland areas.

- Lastly, since 2000, one of objectives of Vietnamese government has been to build the industrial areas in large cities such as Hanoi, Ho Chi Minh, Danang and Cantho. This will create more employment opportunities with higher income in these cities; and hence, there is a large migration from rural to urban for works. According to VGSO, in 2010, approximately 25 to 30 percent of people in the large cities are migrants. After migration, income of people has been improved.

Services

The service sector plays a key role on the path to economic growth in all economies, especially in poverty alleviation and sustainable development of the poor countries. According to the World Bank (2012), economic development of Vietnam is linked to the rapid growth of service sector. Indeed, this sector has the biggest proportion in economic structure of the country (see **Table 1.2**). According to Ministry of Planning and Investment of Vietnam, trade, hospitality, restaurant, tourism, financial services, education, and road transportation have experienced a rapid development. In contrast, business services (professional and business support services) and communications – both foundational intermediate services – still have grown on average at a disappointing rate (lower than 1% annually). Some key policies of this sectors are:

- Firstly, in contrast to manufactured sector which often requires a large capital and labours, developing services provides opportunities for persons with limited resources. According to Ministry of Planning and Investment of Vietnam, in 2010, over half of the enterprises in this sector is small and micro-enterprises. People with very little capital can also become self-employed and suppliers. Policies to develop small and micro-enterprises (such as supporting in training and capital) will help the people to increase their income and thus to improve their quality life as well. However, the ability for households to access capital from financial institutions in rural areas is still limited.
- Besides, similar to other sectors, encouraging a diversified development of economic ownerships (mainly private, foreign investment) has also been implemented for the service enterprises, especially on education, health and transportation. As a result, many private and international schools as well as hospitals have been allowed to open. This is different

from the "closed" economy before, in which there were only state-owned schools and hospitals. As a result, educational level and health of Vietnamese people has been improved. In addition, improving human resources with international integration has create chance for Vietnamese people migrate to the other economies for studying and working. According to IOM's Global Migration Data Analysis Centre, there are around 450.000 residing abroad as temporary workers[5]. Migration would have effect on the economy through remittances (Acosta et al., 2007). Hence, with a huge migration, remittances become one of the key financial sources for family development and economic growth in Vietnam. In 2019, Vietnam became the ninth highest remittance-receiving country, with inflow estimated to be 16.68 billion USD, accounting for around 6.4% of GDP[6].

- Additionally, important policies concerning the financial sector have been applied in the "Doi moi" process. The structure, the regulation, and the operations of this sector have been changed to make domestic banking systems in Vietnam work like that in other developing economies. As a result, until 2020, the Vietnamese commercial bank system has developed with 4 state-owned commercial banks, 2 banks for social policies, 34 joint-stock commercial banks, 2 joint-venture banks, 61 branch offices of foreign banks and representative offices[7], compared with only 2 state-owned banks (the Bank for Foreign Trade of Vietnam and the Bank for Investment and Development of Vietnam) in 1988. Improvement of the financial sector could provide more opportunities to save for people and households in Vietnam. Hence, it could be recognized as a factor boosting savings.

With economic growth, social development and quality life of households have also improved since "Doi moi". Poverty rapidly decreased: the poverty rate measured by a "basic needs" poverty line adjusted for inflation declined from 58 percent in 1993 to around 17 percent in 2012 (IMF, 2014). Besides the increase of income mentioned before, living conditions have improved especially in rural areas, where many households can now access the usage of electricity and clean water (World Bank, 2012). "Doi moi" has changed education and healthcare from a centralised public system to a market-oriented system with participation of private and foreign investors (Pham, 2011). This resulted in a better of health-care development (as measure by the number of doctors per 10,000 inhabitants) and higher educational levels (in terms of average years of schooling) during the period 2010-2014 (see **Table 1.4**). As a result, from one of the poor countries at the last years of 80s, the Human Development Index of Vietnam, which was comparable to

[5] https://www.iom.int/countries/viet-nam
[6] https://theleader.vn/viet-nam-nhan-gan-17-ty-usd-kieu-hoi-nam-2019-1571794661088.htm
[7] https://nganhangviet.org/danh-sach-cac-ngan-hang-tai-viet-nam/

those of the poorest countries in the 80s, during the period 2010-2014 was comparable to that of the medium group of countries, with increasing trends for income, expenditure and savings, and with a high percentage of households accessing the usage of clean water and electricity. Moreover, according to VGSO, life-expectancy of Vietnamese has increased from 70 years old in 1990 to 75 years old in 2014.

Another achievement of Vietnam in the period 2010 -2014 is to improve the status of women and minor ethnicities in the society. These people have been encouraged to obtain higher educational level and to find better jobs. According to World Bank (2012), the equality on property ownership, gainful employment, political power and health outcomes between genders as well as ethnicities has been improved. Furthermore, population of Vietnam is on increasing trend with average growth around 8% in the period 2010-2014 (see **Table 1.4**). The growth of population has risen labour force for the economy both in absolute term and in percentage, and thus it seems to have a positive impact on economic development in the country.

Table 1.4 Indicators for demographic and social development

Indicator	Unit	2010	2012	2014
Social development				
Doctor per 10,000 inhabitants	person	7.10	7.30	7.90
Proportion of household having hygienic water	%	90.50	91.00	93.00
Proportion of household using electricity	%	97.20	97.60	98.30
Human Development Index (HDI)		0.65	0.66	0.68
Mean years of schooling	years	-	7.45	8.30
Monthly average income per capita at current price	VND 1,000	1,387	2,000	2,637
Monthly average expenditure per capita at current price	VND 1,000	1,211	1,603	1,888
Monthly average saving per capita at current price	VND 1,000	176	397	749
Population indicators				
Population	million persons	86.90	88.80	90.70
Population growth	%	1.07	1.08	1.08
Labour force at 15 years of age and above	millions persons	50.40	52.60	54.00
Proportion of labour force at 15 years of age and above	%	58.05	59.25	59.56

Source: Data from VGSO

1.3.3 The dataset Vietnam Household Living Standard Survey - VHLSS

With such changes of economic and demographic characteristics, both household and national savings have been influenced. **Table 1.5** shows that all indicators of national savings increase. The aim in this thesis is to investigate how household characteristics (mainlyy: age, gender, education, income, and dependency) affect the rate of household saving, which is the most important determinant of national savings. Our findings will not only help the government and policymakers in understanding household decisions but also to construct and implement appropriate policies aiming to further improve Vietnam's economic development.

To achieve our aim, we use the data from the Vietnam Household Living Standard Survey abbreviated VHLSS. This is the largest national representative survey on living standards in Vietnam. The VHLSS were implemented firstly in 1998 and once every two years, by Vietnam's General Statistical Office (GSO) with monitoring and assessing the implementation of the Comprehensive Poverty Reduction and Growth Strategy. It was funded by the United Nations Development Program (UNDP) and the Swedish International Development Agency (SIDA) and supported with technical assistance from the World Bank. The sample of the survey was a two-stage selected procedure and was randomly based on the 1999 Population Census enumeration areas. In the first stage, communes were selected. And then, three enumeration areas were opted from each commune in the second stage. The communes were stratified on province and urban/rural areas. In addition, the sample was allocated over strata proportional to the square root of the number of households.

This dataset includes main content reflecting living standard of households in the entire country of Vietnam which is used to evaluate the living standards for policy and socio-economic plan making of government. The data are organised into many sections, with each containing a certain subject, such as demographic traits, income and expenditure, education, health, employment, agricultural production, and communes of the whole family as well as each individual household's members.

Information from the survey is collected and used as basis for assessment of living standard, including poverty and the gap between the rich and the poor serving for policy making, planning and national targeted programs of the party and the State in order to continuously improve the living standard of population across the country, in all regions and localities.

The dataset VHLSS is a high-quality source of data to research a great variety of topics that has been widely used in social policy research in micro-economics. For instance, Fritzen (2002) used this dataset to review the growth, inequality and poverty reduction of Vietnam since "Doi moi".

In addition, Nguyen et al. (2007) carry out this survey in 1993 and 1998 to analyse the urban–rural inequality. Besides, Le (2014) used the survey VHLSS 2006 and 2010 to investigate the effect of trade openness on household welfare. Also, this dataset was used in the study of Nguyen (2013) to investigate the determinants of volume of savings and methods of saving of Vietnamese families.

Table 1.5 Saving in Vietnam (2010-2014) (at current prices)

Indicator	Unit	2010	2011	2012	2013	2014
Gross savings	VND billion	656.738,85	829.503,18	1.000.643,54	1.062.250,99	1.115.943,84
Gross savings	USD million	35.284,04	40.444,33	48.043,19	50.744,27	52.768,29
Consumption of fixed capital	USD million	13.429,27	15.291,17	17.692,09	19.552,84	21.480,03
Net savings	USD million	21.854,76	25.153,16	30.351,10	31.191,44	31.288,26

Source: Data from VGSO

1.4 Conclusion

In this chapter, we reviewed theories of savings and consumption, including the Absolute Income Hypothesis, the Permanent Income Hypothesis, and the Life-cycle Theory. These theories have been applied in numerous attempts to investigate consumption and saving behaviours with various assumptions such as: zero-interest rate, no uncertainty about future income, no liquidity constraints, etc. However, these assumptions are likely to be violated, especially in the context of a middle-income and developing country such as Vietnam. Hence, we have also examined how savings change if these assumptions are violated. Applying these theories, previous research found that savings are impacted by not only current income but also household characteristics, for instance, gender, ethnicity, living place (urban/rural), education, children, elderly, etc. However, how these characteristics impact savings is different in different countries.

We have also reviewed the recent economic and social developments of Vietnam, a developing agricultural country in Southeast Asia that has experienced in the recent years a high economic growth. By the mid-1980s, the central planned economy of this country was one of the poorest in the world with per capita GDP only around $200 and $300. Since 1986, the government has applied various policies for the economic structural transformation named as “Doi moi” to change

from a centrally planned economy to a market-based economy, such as focusing on the development of manufacturing and service industries, developing comprehensively agriculture towards the direction of modernity, effectiveness and sustainability, the expansion of the private sector, the encouragement of foreign investment and privatisation, and etc.

All these policies from “Doi moi” transformation had a positive effect on economic growth, demographics and social developments. Income of households has increased, while poverty has decreased. Life quality of people has been improved, especially in rural areas, where more households now can access the services of education and health. However, “Doi moi” transformation also has an effect the differences between urban and rural areas as well as between genders. Besides, a high economic growth led to a flow of migration especially from rural to urban for jobs. All these changes of Vietnam in turn could have an impact on household savings and saving rates. For this reason, in the next three chapters we study the effect of demographics on household saving rates both in urban and rural areas, which has not been investigated before.

Chapter 2 Applying quantile regression to determine the effects of household characteristics on household saving rates in Vietnam[8]

Abstract

Considering the possible heterogeneity of household saving propensity, we estimate the effects of household characteristics on Vietnamese household saving rates by means of a quantile regression approach on the dataset VHLSS 2010. Our results suggest that the way household characteristics influence saving rates is different for each quantile. Household characteristics tend to have stronger effects at lower quantiles of the household saving rate distribution. Particularly, the marginal propensity to save of households at low quantiles is higher than those at high quantiles. Analysing rural and urban households separately, we find evidence that household and household head characteristics have stronger significant effects for rural than for urban households. And last but least, as not as we expected, children and elderly members are not likely to be household dependency, since both of them increase household saving rates. Our research contributes to the literature on Vietnamese household saving behaviors, especially in the case of urban areas.

Keywords: Vietnam, households, saving behaviors, quantile regression.

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2.1 Introduction

The contribution of national saving in general, and household saving in particular, to economic growth of a country has been confirmed in various studies (Aron & Mihaescu, 2014; Deaton & Paxson, 2000). Therefore, understanding household saving behavior, specifically its determinants, has been the focus of a lot of empirical research. It is the main reason for us to investigate the effects of household characteristics on Vietnamese household saving rates. Our aim with this paper is to improve our understanding of the saving behavior of Vietnamese households.

Determinants of household savings are studied from both macro and microeconomic perspectives. On the one hand, household savings are influenced by economic growth, inflation, unemployment and interest rates in the context of macroeconomics (Aron & Mihaescu, 2014; Loayza et al., 2000). On the other, analysing the determinants of household savings based on individual household units allows us to dig deeper into household savings behavior from a microeconomic perpective (Abdelkhalek et al., 2010; Nguyen et al., 2013; Pan, 2016; Rehman et al., 2011). In our research we adopt a microeconomic empirical approach.

Following this approach, Klein (1951) using survey data identified the effects on household savings of a range of socioeconomic and demographic variables not just household income. The effects of these characteristics on household savings were then explained by the Relative Income Hypothesis (Duesenberry, 1949), Life Cycle Theory (Modigliani & Brumberg, 1954) and Permanent Income Hypothesis (Friedman, 1957). The relationship was also the subject of various empirical studies (Akhtar, 1987; Horioka & Wan, 2007; Horioka & Watanabe, 1997; Nalin, 2013; Nguyen et al., 2013; Schunk, 2009).

According to these studies, household characteristics frequently listed as affecting household saving behavior include living area, education, marital status and race or ethnicity of the household head, etc. Among them, residence or living area of households is the most commonly considered. Results suggest that saving behaviors in rural and urban areas are not homogenous (Bautista & Lamberte, 1990; Burney & Khan, 1992; Qian, 1988). Only a few papers have investigated the saving behavior in rural areas of Vietnam (Ha et al., 2015; Newman et al., 2014; Newman et al., 2008; Nguyen et al., 2013). The saving behavior of urban households in Vietnam still needs to be studied in detail.

The objective of this paper is to reveal the effects of household characteristics on Vietnamese household savings, for the whole country as well as for rural and urban areas separately. A conditional quantile regression approach is applied in order to take into account the heterogeneity

of household saving propensities. Our results may contribute to the formulation and implementation suitable policies with regard to household savings, and therefore to the promotion of economic growth and socioeconomic development in Vietnam.

This paper is structured in six sections. After the introduction, section 2 briefly reviews the empirical evidence and presents the arguments for our hypotheses concerning the effects of household characteristics on household savings. Section 3 introduces the dataset, the variables and the models which are used in the paper. Section 4 reports empirical findings and discussions. In section 5 we do a robustness check for the result. The final section provides the conclusion of the paper.

2.2 Empirical reviews and hypothesis development

In *The General Theory of Employment, Interest and Money* Keynes (1936: 74) stated eight saving motives (Precaution, Foresight, Calculation, Improvement, Independence, Enterprise, Pride and Avarice), and emphasised the effect of current income on consumption, which is now known as the Absolute Income Hypothesis. Subsequently, Duesenberry (1949) formulated the Relative Income Hypothesis; Modigliani & Brumberg (1954) the Life Cycle Theory and Friedman (1957) the Permanent Income Hypothesis to investigate consumption and saving behaviors.

Based on these theories, empirical researchers found that consumption and saving behaviors were not only determined by current income, but also by household characteristics such as living place, gender, educational level, ethinicity of household head and numbers of children and elderly household members. These relationships are reviewed as follows.

Living place of the household (Urban/Rural)

In *Income, Saving and the Theory of Consumer Behavior* Duesenberry (1949: 61) wrote: "It is well known that farm families have a higher propensity to save than city families." Friedman (1957) also affirmed the heterogeneity of saving behaviors between urban and rural households. Based on these theories, numeurous empirical studies supported this difference both in proportion of their income as well as in absolute value (Abdelkhalek et al., 2010; Akhtar, 1987; Deaton, 1992a; Nalin, 2013; Qian, 1988).

According to these studies, the heterogeneous saving behaviors between urban and rural households could be explained by the stabilities incomes and social benefits. On the one hand,

most urban residents are laborers with a fixed income and a fixed retirement age. On the other, households in rural areas are often farmers on their own land. Hence, their income is more volatile and less stable due to the risks of climate, the market and management of production. In addition, they also have limitations in reaching health care systems and insurance services. Faced with such risks, rural households would have an incentive to create a strong mechanism to smooth their consumption effectively to protect themselves. Thereby, they would have stronger saving motives and a higher saving rate, ceteris paribus.

Hypothesis 1: Rural households have higher saving rates than urban households, after controlling for income and other characteristics.

Gender of household head (Male/Female)

The gender of the household head is known to be a very common factor affecting household saving behavior (Abdelkhalek et al., 2010; Gries & Dung, 2014; Nguyen et al., 2013; Schunk, 2009). In many papers it is found that the saving behaviors of males and females are not homogeneous. It appears that males save less than females, as income and other factors are controlled. The differences in savings between males and females are explained by differences in life span, permanent income component and wealth. Particularly, due to lower age of retirement (Warren et al., 2001), higher unstable income (Fisher, 2010; Warren et al., 2001) and more responsibility for bearing children (Abdelkhalek et al., 2010), female household heads tend to have higher saving motives than male. As a result, they would save more than male household heads, ceteris paribus.

Hypothesis 2: Female household heads have higher saving rates than male household heads, after controlling for income and other characteristics.

Educational level of household head

The effect of education on household saving behavior is complex (Akhtar, 1987; Morisset & Revoredo, 1996). On the one hand, well educated household heads are wiser when it comes to making choices with regard to current and future expenditure and to choosing effective saving and investment methods. Hence, they can save more (Bersales & Mapa, 2006; Horioka & Watanabe, 1997; Morisset & Revoredo, 1996; Schunk, 2009). On the other, higher education also creates a motive for households to spend more, especially for the education of their children (Akhtar, 1987). As a result, this will restrict their savings. In the case of Vietnam, we expect that households with

high educational levels tend to have high consumption rates and therefore low saving rates, ceteris paribus, due to the following reasons. First, according to Morriset and Revoredo (1996), with higher educational levels, people have more chances to secure a good and stable job. Second, with higher educational levels, households more easily find the effective insurance and financial products to protect themselves and their family from unexpected shocks (Akhtar, 1987). Third, the negative effect of education levels on household savings can be explained by the preferences of parents towards their children's education (Aizenman et al., 2015; Akhtar, 1987; Rehman et al., 2011). Particularly, household heads with higher educational levels are willing to sacrifice all their current savings to the education of their children. We therefore expect that low educational levels would be associated with high saving rates, if other variables are controlled for.

Hypothesis 3: Household heads with higher educational levels have lower saving rates than household heads with lower educational levels, after controlling for income and other characteristics.

Ethnicity

Depending on their culture, language, habits etc, households with different race or ethnicity could have different consumption and saving behaviors (Banerjee et al., 2010; Borgo, 2019; Charron-Chénier et al., 2016; Friedman, 1957; Klein, 1951). Vietnam is a multiethnic country: it has 54 distinct ethnic groups and each of them has its own language, lifestyle and cultural heritage. We expect that the ethnic background has an effect on household saving behavior in Vietnam. As the largest ethnic group with over 80% of the total population, the Kinh may have wider social and family networks than other ethnicities. If so, in cases of emergency Kinh households could receive more extensive financial support from the networks of their family, relatives and friends than households from ethnic minorities (Newman et al., 2014). This could reduce their precautionary saving motive and therefore make their saving rate lower than that of ethnic minority households.

Hypothesis 4: Household heads with an ethnic minority background have higher saving rates than Kinh household heads, after controlling for income and other characteristics.

Children and elderly household members

As in the case of education, the influence of children and elderly household members on household saving is complicated. On the one hand, children and elderly members are usually treated as

indicators for household dependency (Akhtar, 1987; Burney & Khan, 1992; Curtis et al., 2015; Goldberger, 1973; Kelley, 1980; Khan et al., 1992; Schunk, 2009). Particularly, with more children, households usually spend more on care-taking and education. Additionally, households with more elderly members tend to spend more on health expenditure. As a result, with high dependency, households would spend more and save less of their income. On the other, dependency creates more precautionary and bequest saving motives for households (Curtis et al., 2015; Horioka & Watanabe, 1997; Schunk, 2009). Additionally, some elderly members could be treated as part of the labor force of the household (Nguyen et al., 2013). This may be the case in Vietnam, an agricultural country with a low-middle income level. Regardless of their age, Vietnamese household members are often involved in all economic activities of the household. This could induce households with a lot of members to have relatively high levels of saving.

Hypothesis 5: Children and elderly members have positive effects on the saving rates of Vietnamese households.

2.3 The dataset, theoretical model and variable measurement

2.3.1 Dataset

In this paper, the dataset Vietnam Household Living Standard Survey (VHLSS) 2010 is used. This dataset includes 9.399 households. Since the minium legal age to be a household head in Vietnam is 18 years, household heads below this age are not included in our sample. Due to missing data on some covariates, we end up with a final set of 8.760 households. We take into account the sample weights provided by the survey for all analysis in our paper.

2.3.2 Theoretical model and variable measurements

To achieve our objectives, the household saving rate (*RSAVE*), defined as the amount of savings divided by income, is used as the dependent variable. According to economic theory and empirical studies, household income is a crucial determinant of household savings. It will be the first independent variable in our model. Next, we add other independent variables including: living area of the household (*URBAN*), gender of the household head (*MALE*), age of the household head (*AGE*), ethnicity of the household head (*KINH_ETH*), educational level of the household head (*EDU1, EDU2, EDU3*), number of children under 6 years of age in the household (*CHILD1*), number of children between 6 and 14 years of age in the household (*CHILD2*), number of elderly

members in the household (*ELDERLY*), and household size (*HHSIZE*). We measure these variables as follows.

- Household income: Instead of the actual levels of income (*INCOME*) in 1.000 VND as in the dataset, we transform it into logarithm (*lnINCOME*) and this transformation is used to analyze in our paper.
- *URBAN* = 1 if the household lives in an urban area and 0 otherwise.
- *MALE* = 1 if the household head is male and 0 otherwise.
- *AGE*: number of years of age of the household head. According to the Life Cycle Theory (Modigliani & Brumberg, 1954), the relationship between savings and age is non-linear. Therefore, besides the age of the household head, we will also consider its square (*SAGE*).
- *KINH_ETH* =1 if the ethnicity of the household head is Kinh and 0 otherwise.
- Educational level of the household head: We consider four groups of educational attainment: (1) no degree, primary school, secondary and high school; (2) college degree; (3) university degree; (4) master, PhD and other higher educational level degree. Taking the last group as the reference category, we define the following three dummy variables:

  EDU1 = 1 if the household head has no degree, primary school, secondary and high school and *EDU1* = 0 otherwise.

  EDU2 = 1 if the household head has a college degree and *EDU2* = 0 otherwise.

  EDU3 = 1 if the household head has a university degree and *EDU3* = 0 otherwise.
- *CHILD1* = number of children under 6 years old in the household. Households with a lot of children in these years of age are expected to have high expenses related to care-taking and raising children.
- *CHILD2* = number of children between 6 to 14 years of age in the household. Households with a lot of children in this age bracket are expected to have high expenditures for the schooling of their children.
- *ELDERLY* = number of elderly members, i.e. who have years of age over 70, in the household. Although the age of retirement is 60 for men and 55 for women, men and women are usually still in good health at these ages. We suppose that men and women over the age of 70 are more frequently confronted with serious health problems. As a result, households with elderly members often have high healthcare expenditures.
- *HHSIZE* = number of household members.

In sum, the full model we investigate in this paper is the following:

$$\begin{aligned} RSAVE_i = {} & \alpha + \beta_1 \ln INCOME_i + \beta_2 URBAN_i + \beta_3 MALE_i + \beta_4 AGE_i + \beta_5 SAGE_i \\ & + \beta_6 EDU1_i + \beta_7 EDU2_i + \beta_8 EDU3_i + \beta_9 KINH_i \\ & + \beta_{10} CHILD1_i + \beta_{11} CHILD2_i + \beta_{13} ELDERLY_i + \varepsilon_i \end{aligned} \quad (\mathbf{1})$$

To check for the endogeneity of income in our model, we conduct the Hausman test (Halcoussis, 2005), with areas of land as instrumental variable (Abdelkhalek et al., 2010). We also take into account the correlation coefficients between the logarithm of income (*lnINCOME)* and the other regressors in our model. The result of the Hausman test in ***Appendix 2.1*** and the correlation coefficients of *lnINCOME* in ***Table 2.1*** show that household income is not an endogenous variable. Hence, endogeneity is not a problem in our model.

Table 2.1 Correlation matrix for the survey VHLSS 2010 (with N= 8,760 and sum of weight 20,959,043)

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
***1.* RSAVE**	1												
***2. ln*INCOME**	0.416	1											
***3.* KINH_ETH**	0.046	0.208	1										
***4.* URBAN**	0.082	0.374	0.136	1									
***5.* MALE**	-0.028	0.021	-0.094	-0.169	1								
***6.* AGE**	-0.0009	-0.048	0.131	0.056	-0.133	1							
***7.* EDU1**	-0.068	-0.298	-0.068	-0.273	0.040	0.021	1						
***8.* EDU2**	0.025	0.069	0.013	0.064	-0.044	-0.014	-0.308	1					
***9.* EDU3**	0.060	0.274	0.063	0.254	-0.028	-0.016	-0.850	-0.031	1				
***10.* HHSIZE**	0.012	0.335	-0.119	-0.045	0.224	-0.066	0.067	-0.040	-0.051	1			
***11.* CHILD1**	0.009	0.073	-0.059	-0.009	0.074	-0.242	-0.095	-0.017	0.016	0.398	1		
***12.* CHILD2**	-0.014	0.030	-0.101	-0.081	0.121	-0.269	0.059	-0.012	-0.057	0.418	-0.015	1	
***13.* ELDERLY**	-0.003	-0.086	0.026	-0.003	-0.010	0.489	0.019	0.008	-0.022	0.024	-0.089	-0.067	1

Note: Means, standard deviations and correlated coefficients are calculated by using weights provided in the survey

We also test whether the OLS assumptions to obtain reliable results are satisfied. First, we check for multicollinearity between exogenous variables. This assumption can be verified by inspection of the correlation matrix, using the threshold value of 0.9 (Asterious & Hall, 2016). As shown in ***Table 2.1***, none of the correlation coefficient exceeds this number. Additionally, an alternative precise test to detect multicollinearity can be done based on the Variance Inflation Factor (VIF). As a rule of thumb, multicollinearity occurs if the VIF value is greater than 10 (or if the tolerance value 1/VIF is lower than 0.1). As presented in ***Appendix 2.2***, except for age and educational levels of the household head, the maximum value of VIF of the other exogenous variables is 2,34 and not over the threshold value. As a result, the assumption of multicollinearity is not violated.

The three remaining assumptions relate to the error term of the OLS regression. While autocorrelation is not a serious problem, homocesdasticity and normal distribution of the error term are usually violated in the case of cross-sectional surveys (Hayashi, 2000). Indeed, as presented in ***Appendix 2.2***, our data violate the homocesdasticity and normal distribution assumptions. As far as the normal distribution assumption is concerned, its violation is not a big problem in the case of large sample sizes (Schmidt & Finan, 2018). With regard to homocesdasticity, we follow Hayashi (2000) and Koop (2008) and apply two methods to reduce its effect. The first consists of using the logarithm of household income. This transformation is a convenient way to alter a highly skewed variable, such as household income, into an approximately normally distributed variable. The second one is the application of sample weights in our model, which makes the standard error more robust. As a result, we are confident that OLS regression analysis gives reliable results.

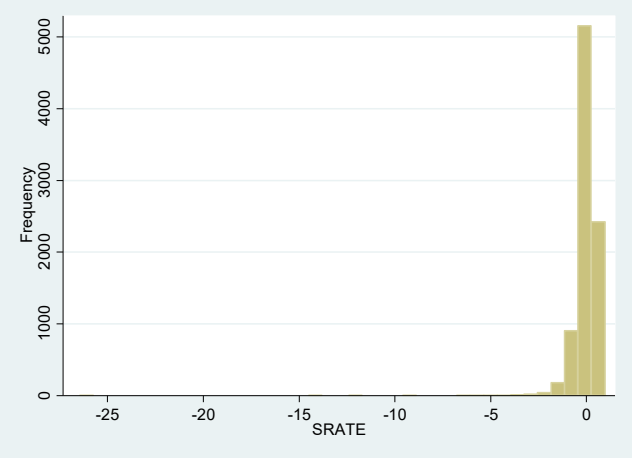
As an alternative approach we also apply conditional quantile regression as proposed by Koenker and Bassett (1978). This approach allows us to take into account the heterogeneity of saving propensities. While OLS regression considers the effect of household characteristics on household savings at the mean, quantile regression considers this relationship at different quantiles (denoted by q) of the distribution of the saving rate. Therefore, this approach provides a more comprehensive picture about the impact of household characteristics along the conditional distribution of household saving rates. Due to this reason, quantile regression is more and more applied in various empirical studies (Martins & Pereira, 2004; Melly, 2005). Our motivations for applying quantile regression as alternative approach in our paper are as follows.

First, while the OLS regression approach requires the assumptions of homocesdasticity and normal distribution of the error term, the quantile regression approach can be applied even when these assumptions are violated.

Second, as shown in ***Appendix 2.2***, there is evidence of outliers in our data. These outliers would cause the estimators of OLS regression to be biased. Quantile regression gives us robust results even in the presence of outliers (Koenker & Bassett, 1978).

Third, the mean and standard deviation of the saving rate presented in ***Table 2.2*** reveal that its distribution is characterized by a large variability. Indeed, as shown in ***Figure 2.1***, the household saving rate has a skewed distribution[9]. Hence, the mean and standard deviation are not good measures for the location and shape of the whole distribution. As a result, with only one regression, the OLS approach may not be representative.

Figure 2.1 The frequency graph of household saving rates



Fourth, as we know, household income is the most crucial determinant of household savings. Nevertheless, ***Figure 2.2*** shows that there is a lot of heterogeneity in the relation between the household saving rate and the logarithm of income. With only one regression, the OLS approach could provide poor estimators for the determinants of the household saving rate.

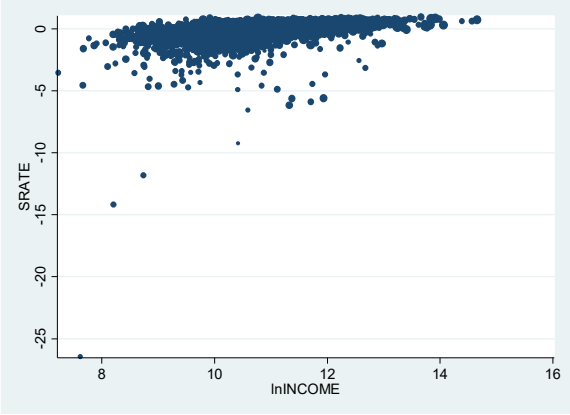
In sum, the above analysis indicates that the quantile regression approach may yield better results than the OLS approach. Therefore, we apply quantile regression as an alternative for the OLS approach to observe the effect of household characteristics on the household saving rate along the whole saving distribution. Particularly, we construct nine quantile regressions for the quantiles $q = 0.1; 0.2; ...; 0.9$. We follow Koenker and Bassett (1978) in constructing our quantile

[9] In addition, the median of household saving rate is 0.066

regressions. At each quantile q, the vector of quantile regression estimators β_q is determined so that the following objective function is minimized:

$$Q(\beta_q) = \sum_{i:y_i > x_i'\beta_q}^{N} q\left|y_i - x_i'\beta_q\right| + \sum_{i:y_i < x_i'\beta_q}^{N} (1-q)\left|y_i - x_i'\beta_q\right| \quad (2)$$

Figure 2.2 Scatter of household saving rates and household income



In the next section, we present empirical findings for the whole country (***Table 2.3***) as well as for urban households (***Table 2.4***) and rural households (***Table 2.5***) separately since result of Chow test in ***Appendix 2.3*** shows that the regressions of rural and urban households are not equivalent.

2.4 Empirical findings and discussions

This section consists of two parts. First, we provide a summary of descriptive statistics for the data. Second, we present the empirical findings obtained from the OLS and quantile regression approaches.

2.4.1 Descriptive statistics

The summary of descriptive statistics for our data is provided in ***Table 2.2***. As the result from this table, the Vietnamese household saving rate distribution is characterized by a low and even negative mean, and a large variability as indicated by the high value of the standard deviation. Nevertheless, the aggregate household saving rate defined as the mean of household saving levels

divided by the mean of household income levels is 17,45%[10]. This number shows that on the whole, the household sector still has positive savings and therefore contributes positively to the aggregate saving account of Vietnam. As a result, households play an important role in the economic growth and socioeconomic development of Vietnam.

Table 2.2 Descriptive statistics for households in the survey VHLSS 2010

Variables	*Obs*	*Weight*	*Mean*	*S.D*	*Min*	*Max*
RSAVE	8,760	20,959,043	-0.008	0.590	-26.448	0.960
lnINCOME	8,760	20,959,043	10.854	0.809	7.235	14.658
KINH_ETH	8,760	20,959,043	0.882	0.322	0	1
URBAN	8,760	20,959,043	0.313	0.464	0	1
MALE	8,760	20,959,043	0.752	0.432	0	1
AGE	8,760	20,959,043	48.242	13.824	18	98
EDU1	8,760	20,959,043	0.922	0.268	0	1
EDU2	8,760	20,959,043	0.015	0.122	0	1
EDU3	8,760	20,959,043	0.058	0.233	0	1
HHSIZE	8,760	20,959,043	3.865	1.516	1	15
CHILD1	8,760	20,959,043	0.363	0.604	0	4
CHILD2	8,760	20,959,043	0.543	0.772	0	6
ELDERLY	8,760	20,959,043	0.204	0.481	0	1

Note: Means and standard deviations are calculated by using weights provided in the survey

2.4.2 Empirical findings and discussions

In this section, we analyse the effect of household and household-head characteristics on the Vietnamese household saving rate in both OLS and quantile regressions. Results for the whole sample are in ***Table 2.3***, for urban households in ***Table 2.4*** and for rural ones in ***Table 2.5***. In each table, the OLS regression results are reported under the heading **Model OLS** and the nine quantile regression results under the headings **Model Q1** for $q = 0.1$, **Model Q2** for $q = 0.2$, etc.

We also use bivariate scatterplots to represent the results obtained from the two regression approaches in ***Figure 2.3*** for the whole sample, in ***Figure 2.4*** for urban households, and in ***Figure 2.5*** for the rural households. We have one bivariate scatterplot for each independent variable. The values of the horizontal axis of each plot indicate the quantiles of the household saving rate distribution. The values on the vertical axis represent the estimated values of the coefficients of

[10] In our data, the mean of household saving levels is 12.803,69 VND and that of household income levels 73.373,17 VND.

the independent variables. Each bivariate plot includes one solid curve which connects the estimated values of the nine quantile regression estimators, one dashed line which presents the OLS estimator of the conditional mean effect, two dotted lines which are the conventional 90 percent confidence intervals for the OLS estimator, and a shaded gray area which represents the 90 percent point wise confidence intervals for the quantile regression estimators.

In all three figures, the quantile regression estimators for some covariates, and especially for household income, often deviate significantly from the correponding OLS regression estimator. This again suggests that for our study, the quantile regression approach is more adequate than the OLS regression approach.

Next, we discuss the effect of the various household characteristics on the household saving rate.

Household income and household size

First, household income appears to be the most important factor affecting household saving rates, as indicated by economic theory. We find that current household income tends to have a positive effect on the saving rates of Vietnamese households. In other words, an increase of household income would lead to an increase of the household saving rate. Our findings support the evidence that current household income not only affects the level of household savings, but also the rate. The OLS regression results seem to be in line with the Absolute Income Hypothesis (Keynes, 1936) and be consistent with the results of empirical studies for other countries, such as Australia (Harris et al., 2002) and China (Pan, 2016; Qian, 1988).

Another interesting finding is that, as reported in ***Table 2.3***, the marginal propensity to save (MPS) is higher in low quantiles than it is in high quantiles. In other words, households with a low (i.e. negative) saving rates have higher a MPS than household with high saving rate. A 1% increase of household income tends to have a larger effect on the saving rates of households with low saving rates than on that of households with high saving rates. If economic growth were equally spread over all households, we could therefore expect that the saving rates of households in the lower quantiles will increase faster than those of households in the higher quantiles, and hence that the inequality in Vietnamese household saving rates will decrease over time. The decline of MPS happens for the whole sample as well as for urban and rural households separately. These declines are rather impressive and illustrated in the first scatterplots of ***Figure 2.3*** (the whole country), ***Figure 2.4*** (urban) and ***Figure 2.5*** (rural).

As far as household size is concerned, we find that it has a negative significant effect on the household saving rate for both OLS and quantile regression approaches. It means that households with more members would consume more and therefore lower their saving rate. Our result is in line with the empirical finding that large households tend to have both lower saving levels (Abdelkhalek et al., 2010) and lower saving rates. The effect decreases in magnitude as the saving quantile increases. It exists for urban households (***Table 2.4***) as well as for rural ones (***Table 2.5***).

Household living area

According to *Hypothesis 1*, we expect that rural households have higher saving rates than urban households, ceteris paribus. The results of ***Table 2.3*** seem to confirm our expectation. In both regression approaches, the negative sign of the coefficient of the *URBAN* dummy means that saving rates of rural households are significantly higher than those of urban households, with other conditions remaining the same. This indicates that rural households have stronger saving motives than urban households. Our results are consistent with numerous preceding empirical studies (Akhtar, 1987; Bautista & Lamberte, 1990; Duesenberry, 1949; Friedman, 1957; Nalin, 2013; Pan, 2016; Qian, 1988).

In fact, as we run the regressions for urban and rural households separately, it is easy to see that the MPS of rural households is higher than that of urban households (***Table 2.4*** and ***Table 2.5***). Additionally, the quantile regression results for the whole sample (***Table 2.3***) reveal that the MPS gap between rural and urban households is larger at low quantiles than at high quantiles, ceteris paribus. Hence, the effect of urbanization appears to be stronger at lower quantiles of the saving rate distribution. Moreover, at high quantiles, the quantile regression results differ significantly from the OLS regression results (***Figure 2.3***).

Gender of the household head

With regard to the effect of the gender of the household head on household saving rates, we find there is not much evidence for a significant difference between male and female household heads. Hence, there is little support for *Hypothesis 2*. This holds true for the whole sample (***Table 2.3***) as well as for urban (***Table 2.4***) and rural households (***Table 2.5***). Our results are consistent with the findings of Gries and Dung (2014) for rural Vietnam.

Educational levels of the household head

As we pointed out above, the effect of the educational level of the household head on household saving behavior is complex. Nevertheless, as we explained in *Hypothesis 3*, we expect that household heads with a low educational level have higher saving rates due to their stronger saving motives. Results in ***Table 2.3*** show that our expectation is confirmed by both regression approaches. The positive signs of the coefficients of the three dummy variables EDU1, EDU2 and EDU3 in all quantile regressions show that household heads with the highest educational level, the reference group, have the lowest saving rates. The magnitudes of the coefficients suggest that household heads with the lowest educational level have the highest saving rates and that increasing levels of education tend to be associated with lower saving rates if other variables are controlled. The results also indicate that this saving rate gap associated with the educational level of household heads decreases as quantiles increase, except for the lowest quantile. And in some quantiles, the gap is insignificant.

The negative effect of the educational level of the household head on the saving rate of Vietnamese households could be explained by the Relative Income Hypothesis. As shown in ***Appendix 2.4***, the mean household income of low educational level groups is lower than that of high educational level groups. As a result, household heads with a low educational level would consume less and could save more rate than others if other variables are controlled. Additionally, the research of Tran (2015) found that in Vietnam, well educated people often have a high and stable wage or income. As suggested by the Permanent Income Hypothesis (Friedman, 1957), they would consume more and save less ceteris paribus.

Looking at the results for urban and rural households separately, we find that the influence of the educational level of the household head on household saving rates is consistent in both cases. Nevertheless, according to the quantile regressions, the effect is larger for rural households (***Table 2.5***) than for urban households (***Table 2.4***). Additionally, within the group of urban households (***Table 2.4***), only the coefficients of the low educational level dummy are significant. By contrast, within the group of rural households, all educational level dummies seem to have a significant effect on household saving behavior **(*Table 2.5*)**.

Ethnicity of the household head

In accordance with our expectation expressed in *Hypothesis 4*, we find that for the whole sample and both regression approaches, households with a Kinh household head tend to have lower saving

rates than other households (***Table 2.3***). In ***Figure 2.3*** we notice that the solid curve represneting the quantile regression estimates of the coefficient of the *KINH_ETH* dummy lies above and is mostly significantly different from the dashed line representing the OLS estimate of the coefficient. The plot shows that the saving rate gap which is associated to ethnicticy declines from –0.131 at the lowest quantile to –0.077 at the highest quantile.

The effects of ethnicity on the household saving rates of urban and rural households are heterogenous. In the case of urban households, this covariate has a significant effect for the quantiles which are above the median (***Table 2.4***); in the case of rural households, the effect is significant for all quantiles (***Table 2.5***). Therefore, we conclude that households with minor-ethnicity head would have stronger saving motive.

Children and elderly members

Last but least we consider the effect of children and elderly members on household saving rate. *Hypothesis 5* stated that we expect children and elderly members to have a positive effect on household saving rates. Nevertheless, we also pointed out that the effect is complex. Our findings for the whole sample and for both urban and rural households show that Vietnamese households with more children and elderly members tend to have higher saving rates. This is consistent with the results of Minh et al. (2013) for Vietnam, of Curtis et al. (2015) for China, and of Akhtar (1987) for Parkistan. According to the quantile regressions, the effect seems stronger for households with a low saving rate than for those with a high saving rate. The positive effect of children and elderly members on household saving rates suggests that in low and middle income countries they should be treated as part of the labor force of households, whereas in high income countries they are dependent members.

Table 2.3 The effects of household and household head characteristics on Vietnamese household saving rates in 2010

Variables	Model OLS	Model Q1	Model Q2	Model Q3	Model Q4	Model Q5	Model Q6	Model Q7	Model Q8	Model Q9
lnINCOME	0.429***	0.517***	0.438***	0.385***	0.356***	0.335***	0.314***	0.298***	0.281***	0.254***
	(0.020)	(0.011)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)
KINH_ETH	-0.148***	-0.131***	-0.119***	-0.095***	-0.094***	-0.094***	-0.102***	-0.098***	-0.097***	-0.077***
	(0.019)	(0.030)	(0.020)	(0.015)	(0.016)	(0.015)	(0.012)	(0.011)	(0.010)	(0.013)
URBAN	-0.144***	-0.146***	-0.131***	-0.120***	-0.118***	-0.113***	-0.109***	-0.107***	-0.116***	-0.109***
	(0.019)	(0.021)	(0.014)	(0.011)	(0.010)	(0.009)	(0.009)	(0.008)	(0.008)	(0.010)
MALE	-0.027**	-0.009	-0.024*	-0.006	-0.006	-0.012	-0.009	-0.009	-0.010	-0.009
	(0.013)	(0.024)	(0.014)	(0.012)	(0.011)	(0.010)	(0.008)	(0.009)	(0.008)	(0.010)
EDU1	0.305***	0.316***	0.367**	0.324***	0.285***	0.282***	0.206*	0.215***	0.172	0.175***
	(0.059)	(0.044)	(0.184)	(0.030)	(0.088)	(0.047)	(0.107)	(0.049)	(0.143)	(0.013)
EDU2	0.213***	0.203***	0.278	0.267***	0.217**	0.214***	0.141	0.116**	0.098	0.136*
	(0.065)	(0.047)	(0.194)	(0.036)	(0.095)	(0.048)	(0.109)	(0.053)	(0.146)	(0.079)
EDU3	0.108*	0.062	0.184	0.150***	0.144	0.140***	0.074	0.089*	0.075	0.087***
	(0.060)	(0.071)	(0.185)	(0.033)	(0.089)	(0.049)	(0.108)	(0.089)	(0.144)	(0.017)
AGE	-0.004*	-0.014***	-0.009***	-0.006**	-0.006**	-0.005**	-0.004**	-0.002	-0.003	-0.002
	(0.002)	(0.000)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.0018)	(0.0018)	(0.0024)
SAGE	0.000**	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000**	0.000**	0.000
	(0.00002)	(0.00004)	(0.00003)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)
HHSIZE	-0.098***	-0.107***	-0.094***	-0.083***	-0.078***	-0.073***	-0.074***	-0.070***	-0.064***	-0.061***
	(0.007)	(0.009)	(0.006)	(0.0049)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
CHILD1	0.072***	0.064***	0.065***	0.056***	0.056***	0.051***	0.056***	0.054***	0.043***	0.046***
	(0.013)	(0.018)	(0.012)	(0.010)	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)	(0.009)
CHILD2	0.053***	0.045***	0.010***	0.048***	0.045***	0.042***	0.040***	0.037***	0.026***	0.028***
	(0.009)	(0.014)	(0.009)	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)	(0.007)
ELDERLY	0.039***	0.049	0.009	0.020	0.021	0.02*	0.024**	0.018**	0.021**	0.033***
	(0.013)	(0.018)	(0.017)	(0.013)	(0.013)	(0.011)	(0.010)	(0.0086)	(0.010)	(0.010)
Constant	-4.391***	-5.496***	-4.681***	-4.084***	-3.680***	-3.388***	-2.662***	-2.478***	-2.273***	-1.898***
	(0.220)	(0.163)	(0.207)	(0.09)	(0.12)	(0.071)	(0.063)	(0.059)	(0.060)	(0.079)
Model summary										
N	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760
R square (Pseudo R square)	0.223	0.1872	0.1791	0.1673	0.159	0.1579	0.1617	0.1662	0.1711	0.1698
Adjusted R square	0.222									

Notes: Weighted robust standard error are given in parentheses and *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Figure 2.3 Ordinary Least Squares Regression and Quantile Regression Estimates for Vietnamese household saving rate

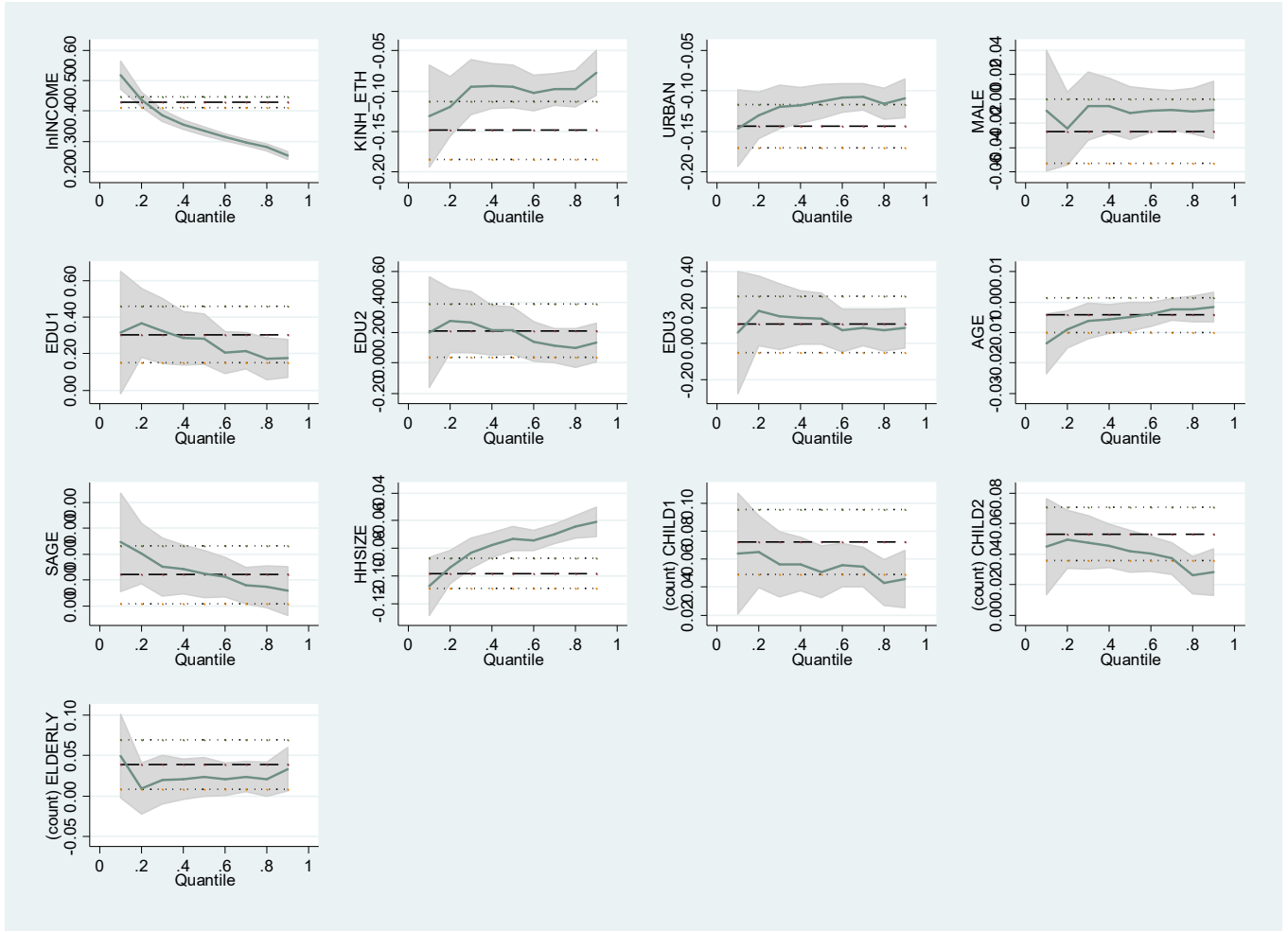


Table 2.4 The effects of household and household head characteristics on Vietnamese household saving rates for urban areas in 2010

Variables	Model OLS	Model Q1	Model Q2	Model Q3	Model Q4	Model Q5	Model Q6	Model Q7	Model Q8	Model Q9
lnINCOME	0.360***	0.411***	0.324***	0.299***	0.273***	0.261***	0.256***	0.250***	0.230***	0.210***
	(0.046)	(0.017)	(0.010)	(0.013)	(0.009)	(0.011)	(0.010)	(0.010)	(0.007)	(0.011)
KINH_ETH	-0.087**	0.018	-0.065***	-0.021	-0.012	-0.055	-0.057**	-0.059**	-0.033**	-0.040
	(0.038)	(0.077)	(0.018)	(0.037)	(0.031)	(0.044)	(0.026)	(0.025)	(0.019)	(0.043)
MALE	-0.019	-0.005	-0.009	-0.001	-0.002	-0.001	-0.004	-0.010	0.010	0.010
	(0.018)	(0.046)	(0.015)	(0.017)	(0.014)	(0.015)	(0.015)	(0.013)	(0.012)	(0.015)
EDU1	0.192***	0.154	0.183***	0.215***	0.152**	0.141**	0.174***	0.153***	0.125**	0.182***
	(0.060)	(0.148)	(0.024)	(0.037)	(0.064)	(0.056)	(0.060)	(0.057)	(0.052)	(0.026)
EDU2	0.119*	0.048	0.144	0.161**	0.167**	0.140**	0.152**	0.092	0.090*	0.156***
	(0.068)	(0.273)	(0.112)	(0.075)	(0.069)	(0.064)	(0.063)	(0.071)	(0.053)	(0.034)
EDU3	0.037	-0.039	0.004	0.090**	0.061	0.049	0.069	0.077	0.057	0.113***
	(0.052)	(0.152)	(0.028)	(0.045)	(0.065)	(0.057)	(0.060)	(0.058)	(0.055)	(0.026)
AGE	-0.006	-0.014	-0.016***	-0.009***	-0.006	-0.005	-0.003	-0.002	-0.003	-0.005
	(0.004)	(0.011)	(0.004)	(0.002)	(0.004)	(0.0035)	(0.003)	(0.003)	(0.003)	(0.005)
SAGE	0.000*	0.000	0.000***	0.000***	0.000*	0.000*	0.000	0.000**	0.000	0.000
	(0.00004)	(0.00011)	(0.00004)	(0.00003)	(0.00004)	(0.00004)	(0.00003)	(0.00003)	(0.00003)	(0.00005)
HHSIZE	-0.078***	-0.071***	-0.06***	-0.067***	-0.060***	-0.059***	-0.056***	-0.058***	-0.057***	-0.054***
	(0.012)	(0.016)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)	(0.007)
CHILD1	0.028	-0.002	0.024	0.034**	0.036***	0.026*	0.024*	0.035**	0.035***	0.024
	(0.025)	(0.035)	(0.016)	(0.017)	(0.014)	(0.014)	(0.015)	(0.014)	(0.012)	(0.015)
CHILD2	0.018	0.018	0.021	0.02	0.004	0.006	0.006	0.014	0.014	0.011
	(0.013)	(0.032)	(0.013)	(0.013)	(0.008)	(0.013)	(0.012)	(0.0097)	(0.010)	(0.010)
ELDERLY	0.02	-0.036	-0.032	0.042	0.026	0.033	0.024	0.024	0.023*	0.026
	(0.024)	(0.054)	(0.035)	(0.029)	(0.021)	(0.020)	(0.016)	(0.019)	(0.013)	(0.021)
Constant	-3.707***	-4.505***	-3.287***	-3.132***	-2.841***	-2.602***	-2.565***	-2.441***	-2.140***	-1.967***
	(0.548)	(0.364)	(0.149)	(0.147)	(0.158)	(0.158)	(0.144)	(0.142)	(0.124)	(0.181)
Model summary										
N	2,554	2,554	2,554	2,554	2,554	2,554	2,554	2,554	2,554	2,554
R square (Pseudo R square)	0.159	0.1486	0.1382	0.1344	0.1346	0.1394	0.1442	0.1568	0.1656	0.1688
Adjusted R square	0.155									

Notes: Weighted robust standard error are given in parentheses and *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Figure 2.4 Ordinary Least Squares Regression and Quantile Regression Estimates for Vietnamese household saving rate in urban areas

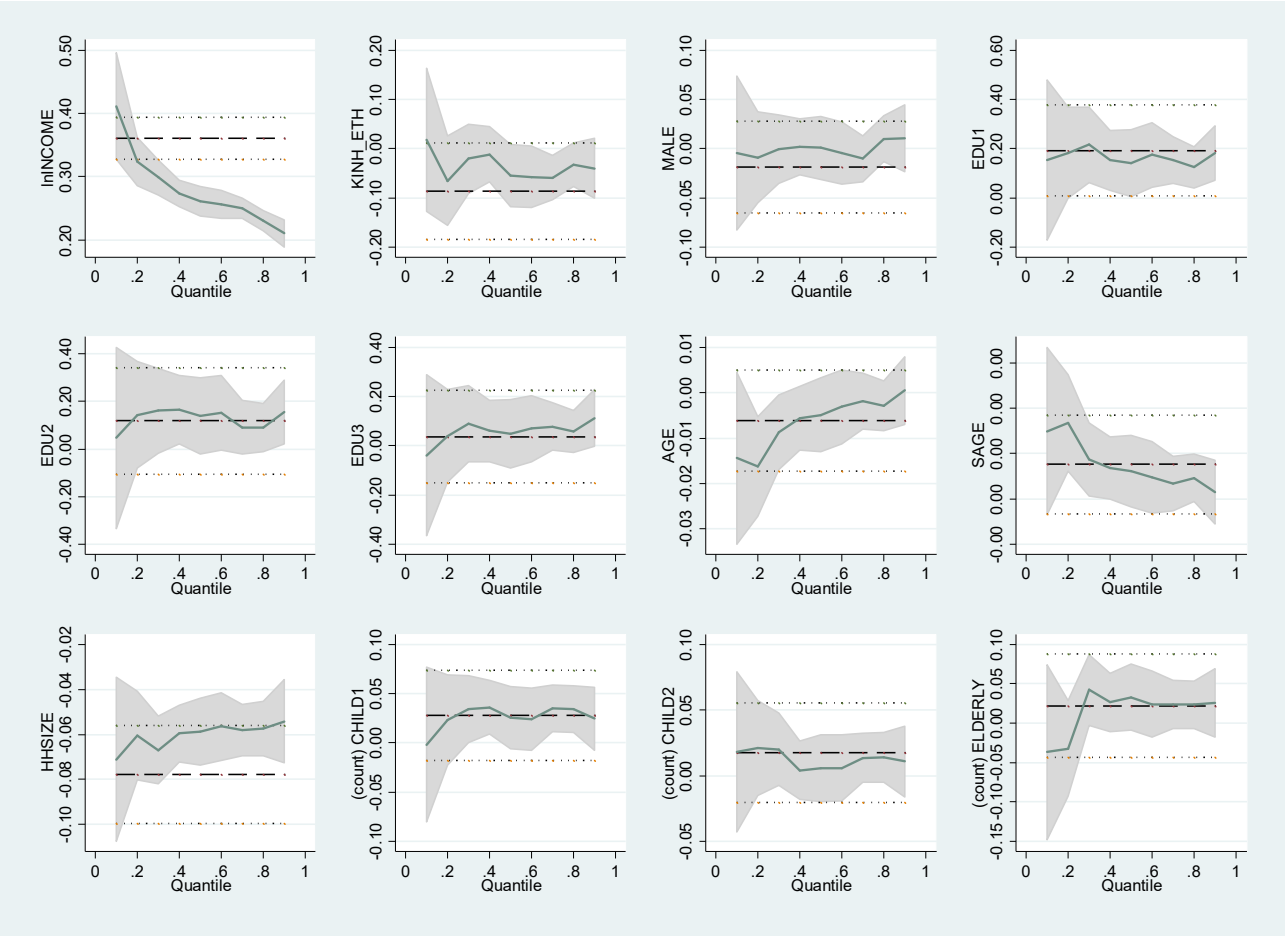
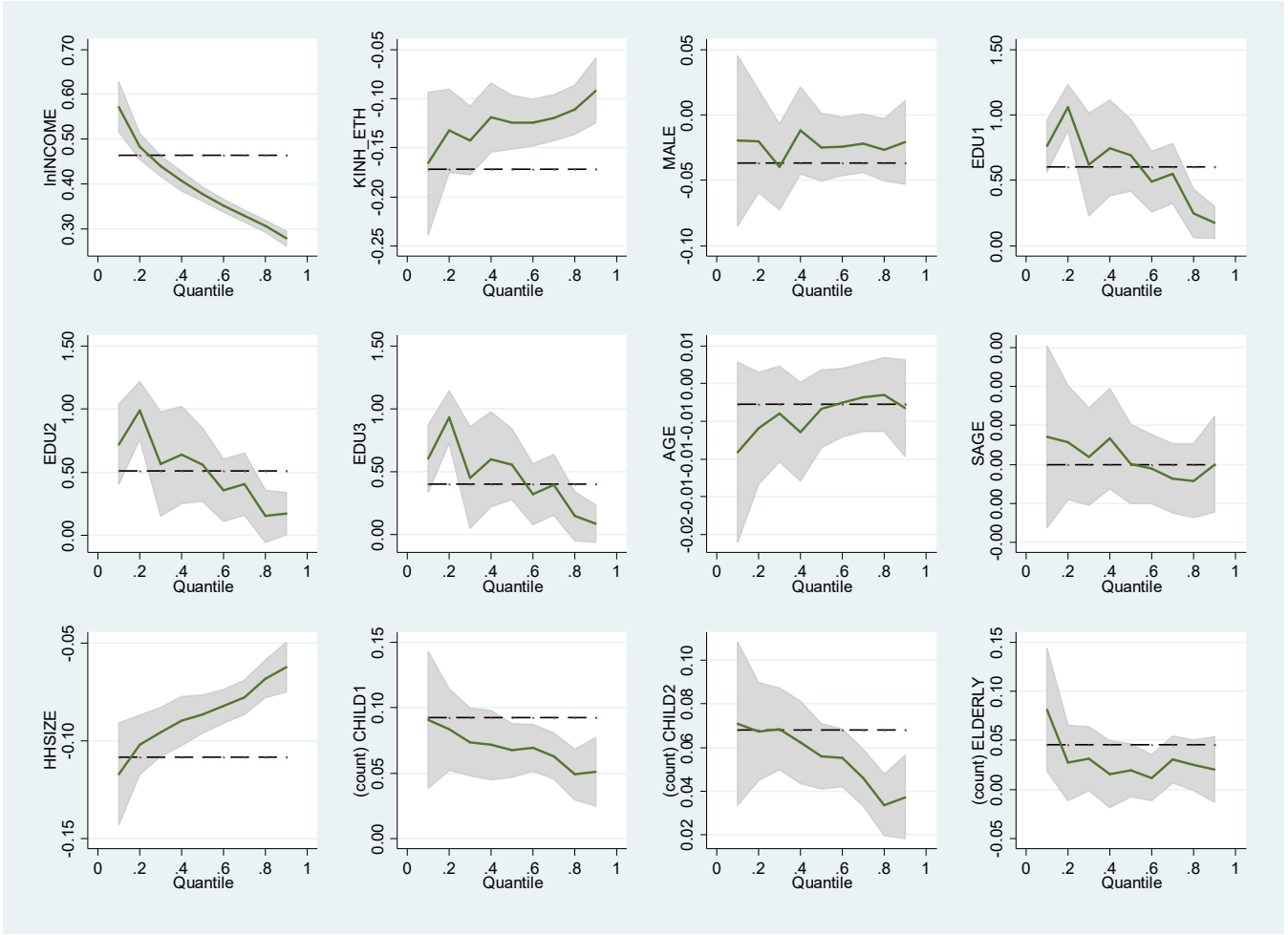


Table 2.5 The effects of household and household head characteristics on Vietnamese household saving rates for rural areas in 2010

Variables	Model OLS	Model Q1	Model Q2	Model Q3	Model Q4	Model Q5	Model Q6	Model Q7	Model Q8	Model Q9
lnINCOME	0.464***	0.572***	0.484***	0.440***	0.407***	0.379***	0.352***	0.329***	0.307***	0.279***
	(0.019)	(0.016)	(0.010)	(0.010)	(0.007)	(0.006)	(0.004)	(0.006)	(0.007)	(0.008)
KINH_ETH	-0.172***	-0.166***	-0.133***	-0.143***	-0.119***	-0.124***	-0.125***	-0.120***	-0.111***	-0.092***
	(0.020)	(0.033)	(0.022)	(0.019)	(0.014)	(0.015)	(0.013)	(0.013)	(0.013)	(0.014)
MALE	-0.037**	-0.002	-0.020	-0.040**	-0.012	-0.025**	-0.024**	-0.022*	-0.027**	-0.021
	(0.018)	(0.033)	(0.017)	(0.016)	(0.014)	(0.012)	(0.010)	(0.012)	(0.012)	(0.014)
EDU1	0.602***	0.763**	1.057***	0.619***	0.746***	0.692***	0.490	0.553***	0.246***	0.178
	(0.220)	(0.316)	(0.235)	(0.027)	(0.163)	(0.091)	(0.510)	(0.193)	(0.024)	(0.562)
EDU2	0.509**	0.721**	0.988***	0.565***	0.637***	0.558***	0.358	0.405**	0.153**	0.174
	(0.223)	(0.326)	(0.267)	(0.042)	(0.163)	(0.095)	(0.510)	(0.204)	(0.063)	(0.584)
EDU3	0.402*	0.607**	0.934***	0.454***	0.600***	0.558***	0.325	0.397*	0.148***	0.090
	(0.226)	(0.320)	(0.236)	(0.069)	(0.164)	(0.095)	(0.510)	(0.203)	(0.038)	(0.563)
AGE	-0.003	-0.009	-0.003	-0.004	-0.006**	-0.003*	-0.002	-0.002	-0.001	-0.003
	(0.003)	(0.008)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
SAGE	0.000	0.000	0.000**	0.000	0.000***	0.000***	0.000	0.000	0.000*	0.000
	(0.00003)	(0.00009)	(0.00004)	(0.00004)	(0.00003)	(0.00002)	(0.00003)	(0.00002)	(0.00003)	(0.00003)
HHSIZE	-0.108***	-0.117***	-0.102***	-0.096***	-0.090***	-0.084***	-0.082***	-0.078***	-0.069***	-0.062***
	(0.008)	(0.012)	(0.007)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)
CHILD1	0.092***	0.091***	0.083***	0.074***	0.072***	0.068***	0.069***	0.063***	0.050***	0.051***
	(0.015)	(0.024)	(0.014)	(0.014)	(0.011)	(0.010)	(0.009)	(0.009)	(0.010)	(0.013)
CHILD2	0.068***	0.071***	0.067***	0.069***	0.062***	0.056***	0.055***	0.046***	0.034***	0.037***
	(0.011)	(0.019)	(0.011)	(0.010)	(0.008)	(0.007)	(0.006)	(0.007)	(0.007)	(0.009)
ELDERLY	0.046***	0.081***	0.027	0.031*	0.15	0.019	0.012	0.030**	0.025**	0.020
	(0.016)	(0.028)	(0.020)	(0.018)	(0.014)	(0.013)	(0.012)	(0.013)	(0.012)	(0.014)
Constant	-5.056***	-6.608***	-5.941***	-4.944***	-4.617***	-4.239***	-3.719***	-3.490***	-2.899***	-2.447***
	(0.291)	(0.382)	(0.257)	(0.123)	(0.191)	(0.118)	(0.515)	(0.209)	(0.087)	(0.572)
Model summary										
N	6,206	6,206	6,206	6,206	6,206	6,206	6,206	6,206	6,206	6,206
R square (Pseudo R square)	0.253	0.1958	0.1854	0.1748	0.1644	0.1625	0.1653	0.1672	0.1711	0.1699
Adjusted R square	0.252									

Notes: Weighted robust standard error are given in parentheses and *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Figure 2.5 Ordinary Least Squares Regression and Quantile Regression Estimates for Vietnamese household saving rate in rural areas



2.5 Robustness analysis

In this section, we explore the robustness of the quantile regression results for the whole sample of Vietnam by performing three additional analyses. The results for the quantiles 0.3, 0.5 and 0.8 are reported in ***Table 2.6***.

First, we use the number of years of schooling of the household head as an alternative for the four educational levels. As the results in the three columns of Model 2 indicate, we find that as the number of years of schooling increases, the saving rate tends to decrease. This coincides with our finding in the previous section.

Secondly, we define household dependency as the household size minus the household laborers, rather than as the household size minus the number of children and elderly members. The results in the three columns of Model 3 show that there is a negative relationship between household dependency and the saving rate. Again, this is consistent with what we found by defining dependency in terms of the number of children and elderly members.

Lastly, we use the dataset VHLSS 2012 to test the robustness of our results. As presented in Model 4, the results of the two analyses are very similar.

Table 2.6 Robustness checks for the results of the quantile regression approach

	Result of VHLSS 2010 (Model 1)			Model 2			Model 3			Result of VHLSS 2012 (Model 4)		
Variables	**Model Q2**	**Model Q5**	**Model Q8**	**Model B2**	**Model B5**	**Model B8**	**Model C2**	**Model C5**	**Model C8**	**Model C2**	**Model C5**	**Model C8**
lnINCOME	0.438***	0.335***	0.281***	0.437***	0.343***	0.286***	0.423***	0.325***	0.272***	0.454***	0.337***	0.282***
	(0.006)	(0.005)	(0.004)	(0.009)	(0.003)	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.005)	(0.006)
KINH_ETH	-0.119***	-0.094***	-0.097***	-0.077***	-0.070***	-0.075***	-0.086***	-0.077***	-0.079***	-0.064***	-0.083***	-0.073***
	(0.020)	(0.015)	(0.010)	(0.019)	(0.016)	(0.010)	(0.021)	(0.015)	(0.011)	(0.025)	(0.016)	(0.015)
URBAN	-0.131***	-0.113***	-0.116***	-0.126***	-0.108***	-0.113***	-0.114***	-0.101***	-0.106***	-0.012***	-0.130***	-0.099***
	(0.014)	(0.009)	(0.008)	(0.015)	(0.009)	(0.009)	(0.017)	(0.010)	(0.009)	(0.012)	(0.008)	(0.009)
MALE	-0.024*	-0.012	-0.010	-0.008	0.004	-0.002	-0.027	-0.011	-0.015*	0.018	-0.000	-0.023**
	(0.014)	(0.010)	(0.008)	(0.015)	(0.009)	(0.009)	(0.016)	(0.010)	(0.009)	(0.013)	(0.010)	(0.010)
EDU1	0.367**	0.282***	0.172				0.311**	0.245***	0.194	0.268**	0.197***	0.052
	(0.184)	(0.047)	(0.143)				(0.138)	(0.037)	(0.165)	(0.134)	(0.067)	(0.104)
EDU2	0.278	0.214***	0.098				0.239	0.194***	0.124	0.268*	0.164**	0.025
	(0.194)	(0.048)	(0.146)				(0.157)	(0.046)	(0.166)	(0.142)	(0.075)	(0.128)
EDU3	0.184	0.140***	0.075				0.137	0.119***	0.103	0.114	0.084	-0.019
	(0.185)	(0.049)	(0.144)				(0.139)	(0.039)	(0.165)	(0.135)	(0.067	(0.104)
AGE	-0.009***	-0.005**	-0.003	-0.004	-0.000	0.000	-0.019***	-0.013***	-0.008***	-0.007***	-0.006***	-0.007***
	(0.003)	(0.002)	(0.0018)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
SAGE	0.000***	0.000***	0.000**	0.000	0.000	0.000	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.00003)	(0.00002)	(0.00002)	(0.00003)	(0.00002)	(0.00002)	(0.00003)	(0.00002)	(0.00002)	(0.00001)	(0.00002)	(0.00002)
HHSIZE	-0.094***	-0.073***	-0.064***	-0.089***	-0.078***	-0.066***	-0.038***	-0.037***	-0.039***	-0.091***	-0.073***	-0.061***
	(0.006)	(0.004)	(0.003)	(0.006)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
CHILD1	0.065***	0.051***	0.043***	0.057***	0.054***	0.045***				0.055***	0.045***	0.037***
	(0.012)	(0.008)	(0.007)	(0.013)	(0.009)	(0.008)				(0.009)	(0.008)	(0.008)
CHILD2	0.010***	0.042***	0.026***	0.047***	0.036***	0.026***				0.043***	0.035***	0.025***
	(0.009)	(0.006)	(0.005)	(0.010)	(0.007)	(0.006)				(0.007)	(0.006)	(0.006)
ELDERLY	0.009	0.02*	0.021**	0.022	0.032***	0.025**				0.023***	0.008	0.006
	(0.017)	(0.011)	(0.010)	(0.020)	(0.011)	(0.011)				(0.009)	(0.010)	(0.011)
Year_EDU[a]				-0.025***	-0.017***	-0.012***						
				(0.002)	(0.001)	(0.001)						
DEPEND[b]							-0.052***	-0.026***	-0.016***			
							(0.008)	(0.005)	(0.004)			
Constant	-4.681***	-3.388***	-2.273***	-4.272***	-3.183***	-2.421***	-4.305***	-3.114***	-2.382***	-4.985***	-3.37***	-2.434***
	(0.207)	(0.071)	(0.060)	(0.113)	(0.058)	(0.065)	(0.173)	(0.086)	(0.178)	(0.164)	(0.102)	(0.133)
R square	0.1791	0.1579	0.1711	0.1839	0.1626	0.1746	0.1793	0.1553	0.1688	0.192	0.1775	0.1868
Pseudo R square												
N	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,764	8,784	8,784

Notes: Weighted robust standard error are given in parentheses and *** p < 0.01; ** p < 0.05; * p < 0.1

Year_EDU[a] : number of educational years of household head and DEPEND[b]: number of household dependency members.

2.6 Conclusion

In this paper, we considered the effects of household characteristics on the household saving rates by means of data from VHLSS 2010. In order to take into account the possible heterogeneity of household saving propensities, we applied quantile regression as an alternative for OLS regression. The most important result from the quantile regression approach is that many household characteristics appear to have stronger effects on the saving rate at low quantiles. The main conclusions we obtained from the OLS and quantile regressions can be summarized as follows.

First, in line with economic theory, we found that higher incomes induce higher saving rates. In addition, households in low quantiles of the household saving rate distribution have higher marginal propensities to save than households in high quantiles. This holds for both urban and rural households.

Second, consistent with previous empirical studies, we found that the saving behaviors of urban and rural households are heterogeneous. Particularly, the marginal propensitiy to save of rural households rural is higher than that of urban households. This may be due to the fact that household incomes in rural areas are often more variable or unstable than those in urban areas. Additionally, the quantile regressions indicate that the effect of urbanization on households with a low saving rate is higher than that on households with a high saving rate.

Third, the gender of the household head does not seem to be a crucial factor in the saving behavior of Vietnamese households, especially for urban households.

Fourth, the ethnic background of the household head is an important determinant of saving rates for rural households. The influence is more pronounced for households with a low saving rate than for households with a high saving rate. Ethnicity is less crucial for urban areas.

Fifth, the educational level of the household head is also an important factor for household saving behavior. We found that households with a low educational level household head tend to have higher saving rates than households with a high educational level household head. The effect appears to be stronger at low quantiles of the household saving rate distribution than at high quantiles.

Last but not least, our empirical evidence revealed that children and elderly members have a positive effect on household saving rates. The effect of children is more important than that of the elderly. This suggests they should not be treated as household dependency as in previous studies

in developed countries. The effects of these variables are somewhat different for urban and rural households.

APPENDICES

Appendix 2.1 Result of Hausman test for endogeneity of household income

Following the research of Abdelkhalek (2010), by using the areas of land (LAND) as instrument variable, we apply the method of Halcoussis (2005) to conduct the Hausman test to examine whether household income is endogenous.

Variables	**Result of Hausman test**	
	Model A (*lnINCOME is DP*)	**Model B** (*RSAVE is DP*)
lnINCOME		0.338*
AGE	0.053***	0.0006
SAGE	-0.001***	$9.8x10^{-6}$
HHSIZE		-0.0981***
KINH_ETH	0.403***	-0.112
URBAN	0.543***	-0.094
MALE	0.146***	-0.013
EDU1	-0.836***	0.229
EDU2	-0.453***	0.172
EDU3	-0.183	0.091
CHILD1		0.072***
CHILD2		0.053***
ELDERLY		0.039***
LAND	$7.14x10^{-6}$**	
e_hat		0.091
Intercept	9.839***	-3.497*
N	**8,760**	**8,760**
Sig F	**0.000**	**0.000**
R squared (%)	**25.02**	**22.32**

Note: Significant level at *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

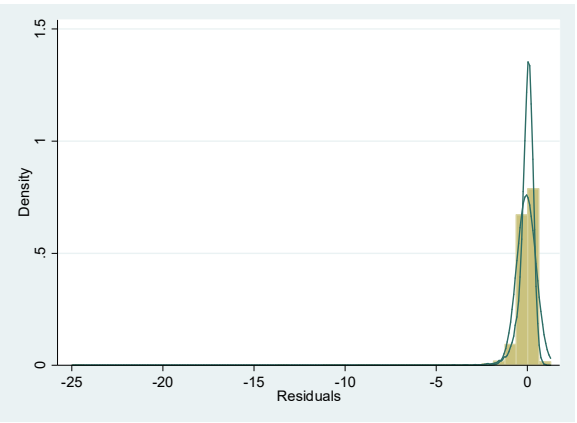
As presented in the following table, the coefficient for the error term in **Model B** is not significant in our case. Additionally, the value of R squared in **Model A** is not high. Hence, household income does not cause endogeneity in our model. As a result, OLS estimator is still consistent.

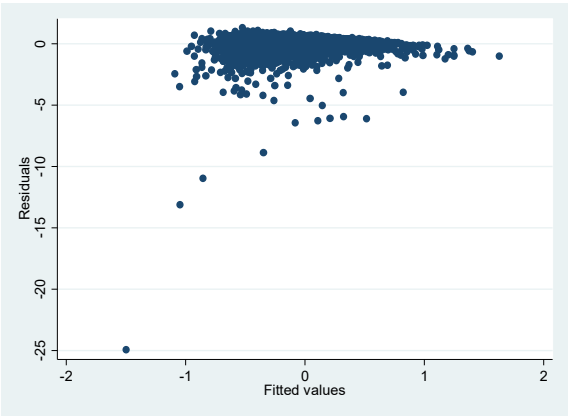
Appendix 2.2 Results for tests of OLS assumptions

a. Multicollinearity

Variable	VIF	1/VIF
SAGE	55.00	0.0182
AGE	52.14	0.0192
EDU1	14.07	0.0710
EDU3	11.27	0.0890
EDU2	3.85	0.2600
HHSIZE	2.34	0.4270
ELDERLY	1.81	0.5520
CHILD1	1.64	0.6100
lnINCOME	1.64	0.6110
CHILD2	1.52	0.6560
URBAN	1.28	0.7830
KINH_ETH	1.12	0.8900
MALE	1.11	0.9040
Mean VIF	**11.45**	

b. Homocedasticity



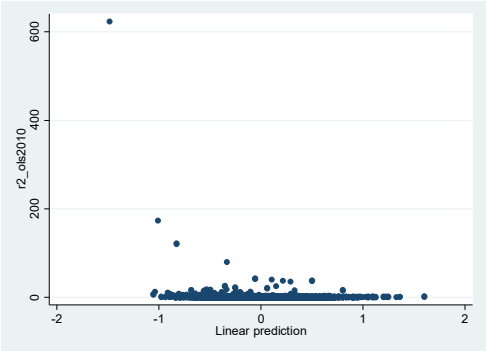


c. Normality of error term

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	joint adj chi2(2)	joint Prob>chi2
resi	8,760	0.0000	0.0000	.	.

d. Outliers



Appendix 2.3 Stata result of the Chow test

Dependent variable: Household saving rate (RSAVE)

Variables	Coef.	Std. Err.	t	P > |t|
URBAN	1.349	0.620	2.18	0.029
lnINCOME	0.464	0.019	24.60	0.000
KINH_ETH	-0.172	0.020	-8.68	0.000
MALE	-0.037	0.018	-2.02	0.044
EDU1	0.602	0.220	2.74	0.006
EDU2	0.509	0.224	2.27	0.023
EDU3	0.402	0.226	1.78	0.075
AGE	-0.003	0.003	-0.89	0.374
SAGE	0.00005	0.00003	1.61	0.107
HHSIZE	-0.108	0.008	-14.17	0.000
CHILD1	0.092	0.015	6.15	0.000
CHILD2	0.068	0.011	6.33	0.000
ELDERLY	0.046	0.016	2.90	0.004
URBAN#lnINCOME	-0.104	0.050	-2.10	0.036
URBAN#KINH_ETH	0.085	0.043	2.00	0.046
URBAN#MALE	0.018	0.026	0.70	0.485
URBAN#EDU1	-0.410	0.228	-1.80	0.072
URBAN#EDU2	-0.389	0.234	-1.67	0.096
URBAN#EDU3	-0.369	0.232	-1.57	0.115
URBAN#AGE	-0.003	0.005	-0.64	0.521
URBAN#SAGE	0.00003	0.00005	0.53	0.596
URBAN#HHSIZE	0.0305	0.015	2.10	0.036
URBAN#CHILD1	-0.064	0.029	-2.23	0.026
URBAN#CHILD2	-0.050	0.017	-2.98	0.003
URBAN#ELDERLY	-0.024	0.029	-0.82	0.410
Constant	-5.056	0.291	-17.40	0.000
N = 8,760				
R square = 22.69%				
F = 40.34				

Result of Chow test for the equivalence of urban and rural household saving rate regressions

F(13; 8,734) = 59.07
Prob > F = 0.0000

Appendix 2.4 Summary statistics of household saving rate, household income level and household expenditure by categorical variables for the survey VHLSS 2010

Variables	N	W	Saving rate		Household income level		Household expenditure	
			Mean	Std, Dev	Mean	Std, Dev	Mean	Std, Dev
By EDU group								
EDU 1	8,165	19,322,079	-0.0196	0.599	66,062.41	79,265.31	55,498.09	51,434.48
EDU 2	124	318,093	0.1086	0.372	104,987.38	89,167.25	80,836.57	62,095.62
EDU 3	436	1,208,420	0.1347	0.478	166,759.18	160,243.98	126,350.06	116,192.06
EDU 4	35	110,451	0.1334	0.398	239,540.78	233,121.53	169,690.46	138,311.64
By ethnicity								
Kinh	7,427	18,492,178	0.00194	0.5964	77,567.54	95,741.86	63,545.81	63,621.4
Minorities	1,333	2,466,865	-0.08228	0.5333	41,931.23	36,991.92	38,258.28	25,446.34
By gender								
Male	6,693	15,762,802	-0.0175	0.6053	71,708.82	89,717.80	59,925.82	58,752.28
Female	2,067	5,196,241	0.0210	0.540	78,422	96,720.52	62,522.05	67,121.93
By urbanization								
Urban	2,554	6,568,242	0.064	0.609	112.374,3	129,736	87,990.72	82,231.5
Rural	6,206	14,390,801	-0.041	0.5783	55.572,31	59,279.8	48,053.9	42,703.06
Total	**8,760**	**20,959,043**	**-0.0080**	**0.590**	**73.373,17**	**91,543.98**	**60,569.49**	**60,940.76**

Note: Means and standard deviations are calculated by using weights provided in the survey

Chapter 3 Applying unconditional quantile regressions and Oaxaca-Blinder decomposition to explain the impact of household characteristics on the urban-rural saving rate difference[11]

Abstract

The objective of this paper is to determine whether differences in household characteristics can help urban households to save more. Following the previous chapter, we focus on household income, gender, ethnicity, education, children, and the elderly. To achieve our objective, we study on the endowment effect of the Oaxaca-Blinder decomposition approach which are allowed us to decompose the differences in saving rate between urban and rural households at the mean and unconditional quantiles by using the results from OLS and unconditional quantile regressions (UQR). The aggregate results show that the endowment effect increases the urban-rural saving rate difference. Along the distribution, most of the saving rate difference at the low quantiles can be explained by the endowment effect (the differences in household characteristics). However, at the high quantiles, the endowment effect tends to be compensated by the unexplained effect. Thus, we observe that the urban-rural saving rate differences are low at those quantiles. Moreover, results of the detailed decomposition prove that the higher income and smaller size of urban households helps them to save more compared with rural families. In contrast, the differences in ethnic structure and education between the two areas tend to reduce the urban-rural saving rate difference.

Keywords: household saving rate, urban-rural difference, Oaxaca-Blinder decomposition, UQR, Vietnam.

[11] This chapter is written by Hua Thanh Xuan and Professor Guido Erreyers.

3.1 Introduction

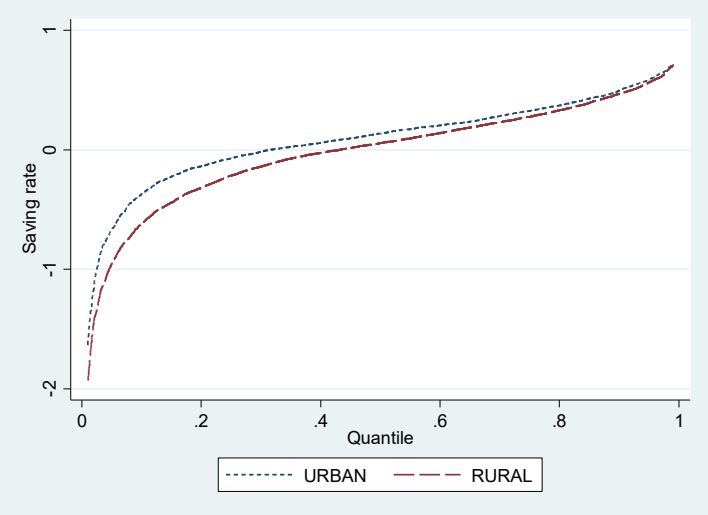
Since 1986, the Government of Vietnam has applied a comprehensive programme of socioeconomic policies relating to structural transformation with the aim of transforming the country from a 'centrally-planned economy' into a 'market-based economy'. After the transformation, the country has attained remarkable economic growth and social development. Poverty has declined, and welfare and literacy have increased progressively (World Bank, 2012). Despite the global economic crisis in 2008, the country has attained stable economic growth and become one of the better performers in developing countries in Asia (IMF, 2010). In addition, while in 1985 Vietnam was one of the world's poorest nations, in 2010 it was recognised as a low-middle income country[12]. According to the 2019 Human Development Report published by the United Nations Development Program (UNDP), the human development index (HDI) of Vietnam has risen from 0.475 in 1990 to the middle category, with a rating of 0.666 in 2014, and of 0.693 in 2018. With an average annual HDI growth of 1.36% from 1990 to 2018, this country has become the 20th best rate of other countries in the world. Progress has also been substantial in other dimensions of well-being, including primary school enrolments, improvements in health status, and reduced morbidity and mortality (Oxfam, 2018).

As a result of the high growth and development, Vietnam has experienced rapid urbanisation (World Bank, 2012) . According to the General Statistics Office, the proportion of the population in rural areas has decreased from 76% in 2000 by 65% in 2017; in addition, the share of the agricultural sector in GDP and employment has decreased compared with other sectors. Various evidence has shown that there are differences in income, consumption and welfare between urban and rural households in this country (Epprecht et al., 2011; Liddle, 2017). In the previous chapter, we found that saving behaviours of urban and rural households are not uniform. Using the same dataset VHLSS 2010 as in the previous chapter, saving rates of urban households have been proved higher than those of rural families at all quantiles (see **Figure 3.1**)[13]. Furthermore, along the distribution, the urban-rural saving rate differences at the lower percentiles are larger than those at the upper percentiles (see **Figure 3.2**). Understanding the urban-rural saving rate differences along the distribution is the main objective in this paper.

[12] https://www.vn.undp.org/content/vietnam/en/home/countryinfo.html

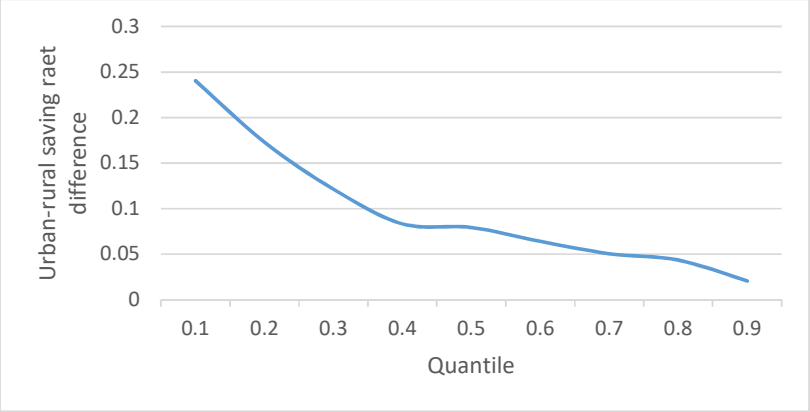
[13] In Chapter 2, we found that living in an urban area was likely to have a negative effect on saving rates, ceteris paribus. This means that if other factors are controlled, urban households are likely to have lower saving sates than rural families. In fact, Figure 3.1 shows that saving rates of urban households tend to be higher than those of rural families. The higher saving rates of urban households are likely due to the diffences in many factors between the two areas. Focusing on the difference in household characteristics in explaining the higher saving rates of urban households is the main objective of this chapter.

Figure 3.1 Empirical cumulative distribution function of saving rates for urban and rural households in Vietnam



Source: VHLSS 2010

Figure 3.2 Saving rate difference between urban and rural households in Vietnam



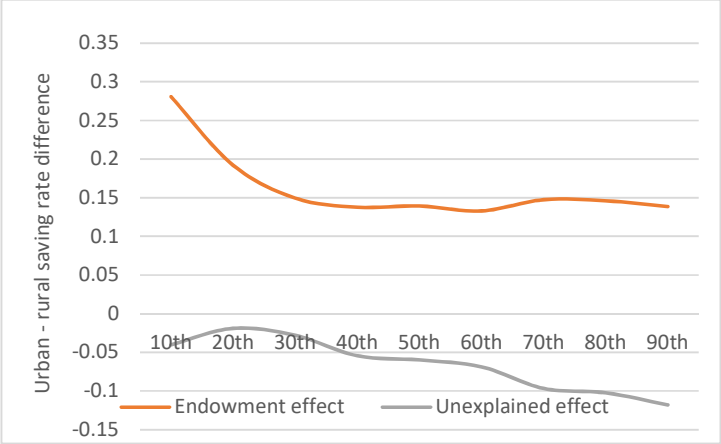
Source: VHLSS 2010

Following the previous chapter, we here consider the role of household characteristics, including income, gender, age, education, ethnicity, and dependency in explaining the urban-rural saving rate difference for various groups of households according to the quantiles of saving rate. Although there are various attempts to study household saving behaviours of urban and rural household separately, few papers investigate whether the differences in household characteristics between urban and rural households help to explain urban-rural saving differences. This study fills and

contributes to the literature gap with the objective of understanding whether differences in household characteristics explain the higher saving rate of urban households. With our findings in the previous chapter, results in this study provide a comprehensive picture of saving behaviours for urban and rural households in Vietnam.

To achieve our objective, we apply the Oaxaca-Blinder decomposition approach in the VHLSS 2010 dataset to divide the urban-rural saving rate differences in means and quantiles into the endowment effect and the unexplained effect. While the endowment effect is the impact of the differences in observed characteristics on the urban-rural saving rate differences, the unexplained effect is the disparity which cannot be explained by the differences in observed characteristics. The positive values of the endowment effect indicate that this component induces urban-rural saving rate differences; the unexplained effect in contrast reduces these gaps by its negative values (see **Figure 3.3)**. This finding will help government and policymakers understand the role of household characteristics in explaining the higher saving rate of urban households.

Figure 3.3 Components of urban-rural saving rate differences at unconditional quantiles



Source: VHLSS 2010

We also note that in this chapter we apply the unconditional quantile regression proposed by Firpo et al. (2009) rather than the conditional quantile regression by Koenker and Bassett (1978) in the previous chapter. According to Koenker and Bassett (1978), the estimators in conditional quantile regression allow us to estimate the impact of an observed covariate on the outcome quantile, conditioned on the mean values of observed covariates. Hence, the estimated outcome quantiles obtained from conditional quantile regression follow a distribution conditioned on the mean values

of observed covariates. These quantiles are different from the unconditional quantiles of the outcome. Hence, the difference in these quantiles between two groups cannot be analysed by applying Oaxaca-Blinder decomposition; instead, this disparity can be done by using the Machado-Mata decomposition approach which is constructed by using on the joint density of all covariates in conditional quantile regression. However, since the Machado-Mata approach uses the joint density of all covariates, it does not allow us to isolate the impact of separate covariates as in the detailed decomposition of Oxaca-Blinder approach. This is the limitation of the Machado-Mata decomposition approach in comparison to the Oaxaca-Blinder approach. In this paper, we apply unconditional quantile regression to estimate the impact of observed covariates on unconditional quantiles. The differences in these quantiles can be applied directly by the Oaxaca-Blinder approach (Firpo et al., 2009; Fortin et al., 2011). Therefore, we can isolate the impact of separate covariates. By this way, the constraint of Machado-Mata approach is surmounted.

The remainder of this chapter is structured as follows: section 2 presents the theory of the decomposition approach applied in this paper; section 3 reviews the former urban-rural gap studies in Vietnam; section 4 introduces the dataset and variables which are used in this chapter; section 5 discusses the empirical findings; section 6 is the check for robustness; and finally, the chapter ends with the conclusion.

3.2 The Oaxaca-Blinder decomposition approach

In this section, we summarise the literature on the decomposition approach that we apply to achieve our objective. To understand the higher saving rate of urban households, we briefly outline the approach with rural households as the base group. The notation used in this part is similar to that used in the study by Fortin et al. (2011).

We have organised this section into two parts. The first relates to the framework of the Oaxaca-Blinder decomposition for the difference in means by using results obtained from OLS regressions. The second is the application of this decomposition to the differences in unconditional quantiles by using coefficients obtained from the unconditional quantile regressions.

3.2.1 Oaxaca-Blinder decomposition for the difference in means

The Oaxaca-Blinder decomposition approach constructed by Oaxaca (1973) and Blinder (1973) is applied very commonly to analyse the differences in means between two groups by using the

coefficients from OLS regressions. Assume that we have the OLS regression for the determinants of the saving rate (y) based on household characteristics (x):

$$y_i = x_i'\beta + v_i \quad \textbf{(1)}$$

With y_i the saving rate of household *i,* x_i the characteristics of household *i,* and v_i the error term.

From equation (1), we have two subsets for urban (U) and rural (R) households:

$$y_{Ui} = x_{Ui}'\beta_U + v_{Ui} \quad \textbf{(2)}$$

and

$$y_{Ri} = x_{Ri}'\beta_R + v_{Ri} \quad \textbf{(3)}$$

As an assumption of OLS regression, in equation (**1**) we have: $E[v_i|x_i] = 0$.

Similarly, $E[v_{Ui}|x_{Ui}] = 0$ in equation (**2**) and $E[v_{Ri}|x_{Ri}] = 0$ in equation (**3**).

To understand the higher saving rate of urban households, we decompose the difference in means of the saving rate between urban and rural households. The estimated gap is equal to:

$$\hat{\Delta}_0^{\mu} = \bar{y}_U - \bar{y}_R \quad \textbf{(4)}$$

with $\bar{y}_U$ and $\bar{y}_R$ respectively the average saving rate of urban and rural households;

Since $\bar{y}_U = \bar{x}_U'\beta_U + \bar{v}_U$ and $\bar{y}_R = \bar{x}_R'\beta_R + \bar{v}_R$

where $\bar{v}_U$ and $\bar{v}_R$ are zero, equation (**4**) can be written as:

$$\hat{\Delta}_0^{\mu} = \bar{x}_U'\beta_U - \bar{x}_R'\beta_R \quad \textbf{(5)}$$

To decompose the difference in means ($\hat{\Delta}_0^{\mu}$) into two components, Oaxaca (1973) and Blinder (1973) suggested using a counterfactual. According to Jann (2008), the counterfactual in the Oaxaca-Blinder decomposition should be based on the characteristics of the group that has the lower mean. Hence, we construct the counterfactual with characteristics of rural households and coefficients obtained from OLS regression of urban families.

Thus, the counterfactual would be: $\bar{x}_R'\beta_U$

Next, adding and subtracting this counterfactual from equation (**5**), we have:

$$\hat{\Delta}_0^{\mu} = \bar{x}_U'\beta_U - \bar{x}_R'\beta_U + \bar{x}_R'\beta_U - \bar{x}_R'\beta_R$$

$$\hat{\Delta}_0^{\mu} = (\bar{x}_U - \bar{x}_R)'\beta_U - \bar{x}_R'(\beta_U - \beta_R)$$

$$\hat{\Delta}_0 = \hat{\Delta}_X + \hat{\Delta}_S \quad \textbf{(6)}$$

with $\hat{\Delta}_X = (\bar{x}_U - \bar{x}_R)'\beta_U$ (**6a**)

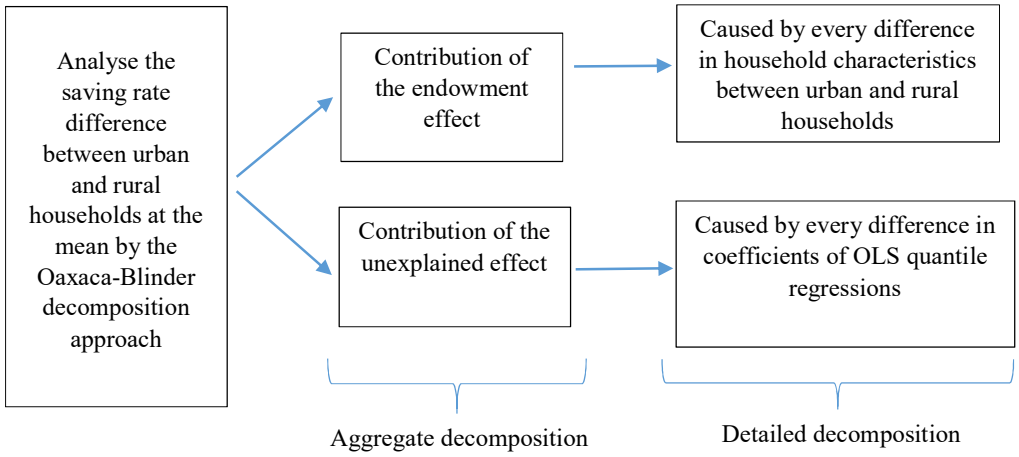
and $\hat{\Delta}_S = \bar{x}_R'(\beta_U - \beta_R)$ (**6b**)

Equation (**6**) shows us the two components of the aggregate decomposition. The first term - $\hat{\Delta}_X$ - is the endowment effect or explained effect. It is the urban-rural saving rate difference caused by the differences in household characteristics between urban and rural areas. In other words, the explained effect is the higher saving rate of urban households compared with rural households, that can be explained by the differences in household characteristics. As in the previous chapter, we here consider household and household-head characteristics, including income, gender, age, ethnicity, education, and dependency, as the covariates affecting the household saving rate. Therefore, the endowment effect is the part of the difference in saving rates produced by the differences in the selected characteristics of urban and rural households.

The second term in equation (**6**) - $\hat{\Delta}_S$ - is the unexplained effect. It is determined by the differences in the coefficients of household characteristics obtained from the two OLS regressions. Thus, it is the part of the difference in saving rates which is not explained by the differences in the selected household characteristics.

The results of the detailed decomposition presented in equation (**6a**) and (**6b**) are obtained by subdividing every component into the respective contribution of each household characteristic. In other words, the detailed decomposition approach allows us to isolate the contribution of separate characteristics in the higher saving rate of urban households. We summarise the framework of the Oaxaca-Blinder decomposition approach in **Figure 3.4**.

Figure 3.4 Framework of Oaxaca-Blinder decomposition approach at the mean



As a modern technique in economic analysis, the standard Oaxaca-Blinder decomposition has become a prevalent method in inequality studies (Baldwin & Johnson, 1994; Blinder, 1973; Cunningham & Zalokar, 1992; Jann, 2005; Oaxaca, 1973). Nevertheless, according to Oaxaca and Ransom (1999) (Oaxaca & Ransom, 1999), with respect to categorical variables, the results of the unexplained effect for each category are not invariant to the choice of the omitted group in the detailed decomposition. By contrast, the results of the endowment effect are not impacted in that case (Oaxaca & Ransom, 1999), and since our objective in this paper is to analyse the endowment effect, the problem of the unexplained effect does not influence our findings.

3.2.2 Oaxaca-Blinder decomposition for the differences in quantiles

Besides analysing the difference in means, we also study the differences in quantiles of urban and rural households by using unconditional quantile regression, hereafter referred to as UQR (Firpo et al., 2009), instead of conditional quantile regression (CQR) (Koenker & Bassett, 1978) used in the previous chapter. We explain our choice as follows.

As presented in the previous chapter, the CQR by Koenker and Bassett (1978) allows us to estimate the impact of observed covariates on the quantile, conditioned on the mean values of observed covariates[14]. It implies that quantile in the CQR follow the conditional distribution of the

[14] The vector of quantile regression estimators (β_τ) in conditional quantile regression is determined so that the following objective function is minimised:

dependent variable, which is shortly known as the conditional quantile. Since the conditional quantile is different with the unconditional quantile (quantile of the unconditional distribution), the Oaxaca-Blinder decomposition used for the difference in unconditional quantiles cannot be applied for the difference in conditional quantiles between two groups (Machado & Mata, 2005).

Instead, Machado and Mata (2005) proposed a technique enable us to analyse the differences in conditional quantiles. Particularly, this approach based on the joint density distribution of observed covariates uses results from the CQR with formula:

$$y^*_{U\tau} - y^*_{R\tau} = (y^*_{U\tau} - y^*_{C\tau}) + (y^*_{C\tau} - y^*_{R\tau}) \quad (7)$$

In which: $y^*_{U\tau}$, $y^*_{R\tau}$ and $y^*_{C\tau}$ are saving rates of urban households, rural households, counterfactual saving rate at quantile τ , which are estimated from the joint density distribution of all observed covariates and by results from the CQR. The procedure for estimating these values are presented in **Appendix 3.1**.

Since the Machado-Mata decomposition is basically conducted by using the joint density of all covariates in the CQR instead of separate covariates as in the OLS, we can only determine the aggregate decomposition results. Hence, we cannot isolate the contribution of household characteristics to the differences. This is the limitation of the Machado-Mata decomposition approach in comparison to the Oaxaca-Blinder approach.

In contrast, Firpo et al. (2009) proposed unconditional quantile regression (UQR) to estimate the effects of covariates on the unconditional quantiles of the outcome by using an OLS regression approach based on the concept of the influence function (*IF*) and the recentred influence function (*RIF*). Since UQR is conducted using OLS regression, we can apply the Oaxaca-Blinder approach to decompose the difference in the unconditional quantiles. With this approach, both aggregate and detailed decomposition can be determined.

According to the authors, the influence function (*IF*) is an analytical tool that can be used to assess the effect (or 'influence') of removing or adding an observation on the value of a statistic $v(F)$, without having to recalculate that statistic.

$$\widehat{\beta_\tau} = \sum_{i:y_i > x_i'\beta_\tau}^{N} \tau|y_i - x_i'\beta_\tau| + \sum_{i:y_i < x_i'\beta_\tau}^{N} (1-\tau)|y_i - x_i'\beta_\tau|$$

Thus, the coefficients (β_τ) represent the marginal (for continuous covariates) or partial effects (for binary covariates) of the covariates on the quantile of the outcome distribution, conditioned on the mean values of the covariates. Therefore, the quantiles estimated from conditional quantile regression are the quantiles conditioned on observed covariates.

It is defined as:

$$IF\big(y_i; v(F)\big) = \lim_{\varepsilon \to 0} \frac{\Big(v\big((1-\varepsilon).F + \varepsilon\delta_y\big) - v(F)\Big)}{\varepsilon}, \;\; 0 \leq \varepsilon \leq 1 \qquad \textbf{(8)}$$

where F represents the cumulative distribution function for variable y and δ_y is a distribution that puts mass 1 at the value of y_i.

Then, the *RIF* is obtained by adding the statistic to its *IF*:

$$RIF(y_i; v) = v(F) + IF(y_i; v) \qquad \textbf{(9)}$$

Firpo et al. (2009) proved that the expectation of the influence function is zero. Therefore, the expectation of the recentred influence function is equal to the expectation of the statistic itself.

For example, assume the statistic of interest is the mean, that is $v(F) = \mu$; then the *IF* and *RIF* would be:

$$IF(y_i; \mu) = \lim_{\varepsilon \to 0} \frac{[((1-\varepsilon).\mu + \varepsilon.y) - \mu]}{\varepsilon} = y_i - \mu \quad \text{and} \quad RIF(y_i; \mu) = \mu + (y_i - \mu) = y_i$$

Hence, regression of the *RIF* for the mean on *x* would yield the same coefficients as the standard OLS regression.

Similarly, for the τth quantile, the influence function $IF(y_i; q_\tau)$ would be:

$$IF(y_i; q_\tau) = \frac{\tau - I\{y_i \leq q_\tau\}}{f_{y_i}(q_\tau)} \qquad \textbf{(10)}$$

In which q_τ refers to the value of τ quantile of the unconditional saving rate distribution, hereafter shortly the value of τ unconditional quantile; $I\{y_i \leq q_\tau\}$ is an indicator variable to denote whether an outcome value is less than q_τ or not; and $f_{y_i}(q_\tau)$ is the probability density function of y_i evaluated at the value of τ unconditional quantile q_τ.

The value of *IF* shows how the household saving rate at τ quantile would change if we added or removed household saving rate y_i. Then, the recentered influence function of the household saving rate (y_i) at the value of τ quantile (q_τ) would be:

$$RIF(y_i; q_\tau) = q_\tau + IF(y_i; q_\tau) \qquad \textbf{(11)}$$

According to Firpo et al. (2009), the expectation of the influence function is zero, therefore:

$$E\big(RIF(y_i; q_\tau)\big) = E(q_\tau) = q_\tau \qquad \textbf{(12)}$$

Equation (**12**) shows that the mean of RIF(y_i; q_τ) equals the value of the τ unconditional quantile q_τ.

Following Firpo et al. (2009), we can also model the conditional expectation of $RIF(y_i; q_\tau)$ as a linear function of the covariates. This relationship can readily be estimated by simple OLS:

$$E(RIF(y_i; q_\tau)|x_i) = x_i'\beta_\tau \quad (\mathbf{13})$$

By iterating expectations of x on both side of equation (**13**), we have:

$$E[E(RIF(y_i; q_\tau)|x_i)] = E(x_i'\beta_\tau)$$

Hence:

$$E\big(RIF(y_i; q_\tau)\big) = E(x_i') \quad (\mathbf{14})$$

Combining equation (**12**) and (**14**), we get:

$$E\big(RIF(y_i; q_\tau)\big) = E(q_\tau) = E(x_i')\beta_\tau \quad (\mathbf{15})$$

The estimators (β_τ) of the UQR measure the effects of household characteristics on the τ quantile of the unconditional distribution q_τ. And, similar to the classical OLS regression, β_τ can be estimated by:

$$\widehat{\beta_\tau} = (x'x)^{-1}x'RIF \quad (\mathbf{16})$$

where x is the matrix of household characteristics and RIF the vector of recentered influence function.

We remember that the estimators $\hat{\beta}$ for in the classical OLS regression are:

$$\hat{\beta} = (x'x)^{-1}x'y \quad (\mathbf{17})$$

where x is the matrix of observed covariates and y the vector of dependent variable in the sample.

Thus, the estimators (β_τ) in the UQR of equation (**16**) are simply estimated by replacing $RIF(y_i; q_\tau)$ as a new dependent variable, instead of variable y as in the classical OLS regression in equation (**17**). Therefore, the estimators in the classical OLS regression $\hat{\beta}$ reflect the impact of the observed covariates on the mean of y, while the estimators $\widehat{\beta_\tau}$ in the UQR show the impact of these covariates on the τ quantile of the unconditional distribution of y (q_τ). This is the way the Oaxaca-Blinder approach can be applied in the UQR regression. Consistent with the Oaxaca-Blinder decomposition for the mean in the previous section, we consider rural households as the base group with the counterfactual saving rate $\hat{\beta}_{U\tau}\bar{x}_R$. The Oaxaca-Blinder decomposition for the

saving rate difference at the τ quantile of the unconditional distribution of the household saving rate (q_τ), would be:

$$q_{U\tau} - q_{R\tau} = \overline{RIF}(y_{Ui}; q_{U\tau}) - \overline{RIF}(y_{Ri}; q_{R\tau})$$

$$q_{U\tau} - q_{R\tau} = \bar{x}'_U\hat{\beta}_{U\tau} - \bar{x}'_R\hat{\beta}_{U\tau} + \bar{x}'_R\hat{\beta}_{U\tau} - \bar{x}'_R\hat{\beta}_{R\tau}$$

$$q_{U\tau} - q_{R\tau} = (\bar{x}_U - \bar{x}_R)'\hat{\beta}_{U\tau} + \bar{x}'_R(\hat{\beta}_{U\tau} - \hat{\beta}_{R\tau}) \quad (\mathbf{18})$$

where $q_{U\tau}$ and $q_{R\tau}$ are respectively the empirical saving rate of urban and rural households at the τ unconditional quantile; and $\hat{\beta}_{U\tau}$ and $\hat{\beta}_{R\tau}$ the coefficients determined by the UQR regressions at the τ quantile for urban and rural households.

3.3 Literature review on the impact of household characteristics on the urban-rural differences in saving in Vietnam

There have been only a small number of attempts to study the urban-rural differences in expenditure in Vietnam; for instance, the research of Nguyen et al. (2007), and Le and Booth (2014). However, we notice that none of them directly investigates the urban-rural disparities of saving. Hence, a study on the urban-rural difference in saving is still missing, although household saving plays a crucial role in helping households to overcome difficulties, and government to increase economic growth and social development.

First is the study by Nguyen et al. (2007), who analysed the difference in per capita expenditure between urban and rural areas in Vietnam. To achieve this objective, the authors applied the Machado-Mata decomposition method on datasets from the Vietnam Living Standard Surveys (VLSS) of 1993 and 1998. Different conclusions were found for the two datasets. For the survey in 1993, the authors found that, across the entire distribution, the difference in per capita expenditure between urban and rural households was due to the endowment effect. However, for the later survey in 1998, the contribution of the endowment effect was only significant at the low quantiles. At the high quantiles, the difference in return to these characteristics or the unexplained effect was the main factor causing the gap.

Moreover, Le and Booth (2014) used the same VLSS surveys, but for the years 1993 and 2006, to analyse the difference in per capita expenditure between urban and rural households. In that study, the authors applied the Oaxaca-Blinder decomposition approach by using the results of OLS and UQR regressions. Hence, they could isolate the impact of household characteristics on the

difference. They found that expenditure per capita of urban households was consistently twice that of rural households. The aggregate decomposition showed that the urban-rural gap monotonically increased from the low to the high quantiles. Moreover, the detailed decomposition result proved that the urban-rural difference was determined by endowment factors such as education, household age structure, labour market activities.

3.4 Dataset, variable measurement and descriptive statistics

3.4.1 Dataset

The aims in this paper are achieved using the same survey – the Vietnam Household Living Standard Survey (VHLSS) 2010 – as in the previous chapter. By using the same dataset, we expect that the results obtained from both chapters will provide a comprehensive picture of household saving behaviours in both urban and rural areas. Also, we can compare the findings from the UCQ in this chapter with those from CQR in the previous one. This cannot be done if another dataset is used.

This dataset includes 9,399 households. We drop two observations for illegal household-head age[15] and 638 households for missing educational information. According to Pan (2016), collecting data by survey could have a response bias induced by misreporting. Thus, it would lead to outliers or unreasonable saving rates for some observations in the dataset (see **Appendix 3.2**). Thus, to avoid the impact of these outliers and attain reliable decomposition results, we follow Pan (2016) and drop observations of one percentile in the top and one percentile in the bottom of both urban and rural samples. Hence, 22 and 31 urban households at the top and bottom of the distribution are excluded. Similar is the deleting of 58 and 62 families in rural areas. Finally, the sample size used for the analysis is 8,587 households; including 6,086 rural households and 2,501 urban households. The cumulative distribution functions of saving rates for urban and rural households are presented in **Figure 3.1** in the introduction section.

[15] Age of household-head younger than 18 is illegal.

3.4.2 Variable measurement

Regarding the model, as mentioned before, we apply the Oaxaca-Blinder decomposition approach by using the results obtained from OLS and UQR regressions to achieve our objectives. The following is the regression model applied to urban and rural households separately in this paper:

$$\begin{aligned} RSAVE_i = {} & \alpha + \beta_1 \ln INCOME_i + \beta_2 URBAN_i + \beta_3 MALE_i + \beta_4 AGE_i + \beta_5 SAGE_i \\ & + \beta_6 EDU1_i + \beta_7 EDU2_i + \beta_8 EDU3_i + \beta_9 KINH_i \\ & + \beta_{10} CHILD1_i + \beta_{11} CHILD2_i + \beta_{13} ELDERLY_i + \varepsilon_i \end{aligned} \quad (\mathbf{19})$$

Consistent with the previous chapter, the variables in equation (**19**) are as follows:

- *RSATE* is the household saving rate defined as the amount of savings divided by total household income.
- ln*INCOME* is the transformation in log of total household income.
- *URBAN* = 1 if the household lives in an urban area, and 0 otherwise.
- *MALE* = 1 if the household-head is male, and 0 otherwise.
- *AGE* is the number of years of age of the household-head. According to the Life-Cycle Theory (Modigliani & Brumberg, 1954), the relationship between saving and age is non-linear. Therefore, besides the age of the household-head, we will also consider its square (*SAGE*).
- *KINH_ETH* = 1 if the ethnicity of the household-head is Kinh, and 0 otherwise.
- The educational level of the household-head. We consider four groups of educational attainment: (1) no degree, primary school, secondary and high school; (2) college degree; (3) university degree; (4) master, PhD and other higher educational level degree. Taking the last group as the reference category, we define the following three dummy variables:

  EDU1 = 1 if the household-head has no degree, primary school, secondary and high school, and *EDU1* = 0 otherwise.

  EDU2 = 1 if the household-head has a college degree, and *EDU2* = 0 otherwise.

  EDU3 = 1 if the household-head has a university degree, and *EDU3* = 0 otherwise.
- *CHILD1* = number of children under 6 years old in the household. Households with many children in these years of age are expected to have high expenses related to care-taking and raising children.

- *CHILD2* = number of children between 6 to 14 years of age in the household. Households with more children in this age bracket are expected to have high expenditure for the schooling of their children.
- *ELDERLY* = number of elderly members, i.e. those in the household of 70 years of age and older. Although the age of retirement is 60 for men and 55 for women, men and women are usually still in good health at these ages. We have assumed that men and women over the age of 70 are more frequently confronted with severe health problems, with the result that households with elderly members often have high healthcare expenditure.
- *HHSIZE* = number of household members.

The expected sign and meaning of the coefficients in equation (**19**) are described in **Table 3.1**. Then, the Oaxaca-Blinder decomposition approach for OLS regression and unconditional quantile regressions is applied, as presented in section 3.2. To understand the saving rate difference between urban and rural households for the entire distribution, nine UQRs for urban and rural households separately are constructed with the quantiles going from 0.1 to 0.9, and the difference between successive quantiles equal to 0.1.

We use Stata to get results from these approaches. In particular, we use:

- the command 'reg' to estimate OLS regressions for household saving rates in urban and rural areas separately;
- the command 'rifreg' to estimate UQR regressions for household saving rates in urban and rural areas separately;
- the command "oaxaca8' for the Oaxaca-Blinder decomposition at the means and unconditional quantiles of urban and rural households.

Table 3.1 List of variables used in this study

Name of variable	Role in the model	Expected sign	Meaning
Household saving rate (*RSAVE*)	Dependent variable		
Log of household income (*lnINCOME*)	Independent variable	+	Increased household income has a positive effect on Vietnamese household saving rate
Gender of household-head (*MALE=1 if household-head is male*)	Independent variable	-	Male household-head has less saving rate than the female
Age of household-head (*AGE*)[16]	Independent variable	+	Years of age of household-head has a positive effect on saving rate
Education level of household-head[17] (*EDU1, EDU2, EDU3*).	Independent variable	+	Low educational levels increase saving motives of household; therefore saving rate should be high; ceteris paribus
Ethnic minority of household-head (*KINH_ETH=1 if household-head is KINH*)	Independent variable	-	Household-heads with Kinh ethnicity have less saving rate than other minority ethnicities.
Household size (*HHSIZE*)	Independent variable	-	Increase to household members should decrease household saving rate
Numbers of children under 6 years old in the household (*CHILD1*)	Independent variable	+	Children would increase the household saving rate
Number of children from 6 to 14-years-old in the household (*CHILD2*)	Independent variable	+	Children would increase the household saving rate
Number of elderly members in the household (*ELDERLY*)	Independent variable	+	Elderly members would increase the saving rate of households

[16] We also add age square (*SAGE*) as an independent variable in the model to observe the non-linear relationship between savings and age as in the Life Cycle Theory (Modigliani & Brumberg, 1954).

[17] Educational level of household-head is divided into four groups: no degree, primary school, secondary and high school (*EDU1*); college degree (*EDU2*); university degree (*EDU3*) and master, PhD and other higher educational level degrees (*EDU4*). In this study, three dummy variables are used with the reference omitted category as master, PhD and other high educational level.

3.4.3 Descriptive statistics

Table 3.2 provides results of descriptive statistics using sampling weights, including the mean, standard deviation, minimum and maximum values of all covariates for urban and rural households separately. We also conduct t-tests for the differences in household characteristics between urban and rural areas. The results presented in the last column of **Table 3.2** show that most of the characteristic differences are statistically significant, except those for children below six years old and elderly members. We present the crucial findings in the following.

Firstly, the saving rate of urban households has a higher mean and less variability than that of rural households. *In addition*, we observe that the mean of the household saving rate in urban areas is positive, while that of rural households is negative. These numbers show that, on average, urban households can save after consumption while rural households need to find other capital sources to cover their expenditure. Not only for the mean but also for the whole distribution, the higher saving rate of urban households is confirmed by looking at the **Figure 3.2**. *Furthermore*, as far as we consider the urban-rural saving rate difference, we find that the magnitude of difference narrows when moving up and tends to be very small at the higher percentiles. It means that urban-rural saving rate differences along the distribution are unequal.

Next, we find significantly higher income of urban households compared to rural households. In particular, the back-transformed means from the log transformation for urban and rural household income is approximately 80.8 million and 42 million VND, respectively. These numbers imply that the income of urban households is almost twice the income of rural families. In addition, we also find in the dataset that incomes per capita in urban and rural areas are approximately 30.7 million and 14.7 million VND, respectively. Hence, there is a large difference in income between urban and rural areas. This finding is consistent with the results of various former studies in other economies (Abdelkhalek et al., 2010; Nalin, 2013; Sicular et al., 2008). Since income has a positive relationship with saving, we expect that the higher income of urban households will enlarge the saving rate difference between urban and rural areas (Bozio et al., 2017; Dynan et al., 2004; Friedman, 1957; Keynes, 1936; Modigliani & Brumberg, 1954).

There are various possible reasons to explain the higher income of urban households in Vietnam. Firstly, the difference in income between urban and rural households is due to the difference in economic structure between the two regions (World Bank, 2012). The income of rural households is often from agricultural activities such as crops, husbandry, aquaculture, etc. In contrast, the income of urban households is mostly derived from non-agriculture activities such as salaries,

business, services, etc. We note that in Vietnam income from agricultural activities is much lower than that from non-agricultural activities (Oxfam, 2017, 2018). In deed, the lower income of rural households and agricultural sector is also proved in the data from VGSO (see Appendix 3.3). Moreover, urbanisation concerning the physical, human, and economic development of cities has results in development of population, migration, as well as economic, social and technologies (Gotham, 2012). Therefore, income is often higher for urban jobs than for rural work (Ha et al., 2019). In addition, according to Ye et al. (2018) urbanisation also leads to an increase in banks and other financial institutions in urban areas. Hence, urban households have more opportunity to increase their income by investment or saving in a financial account compared to rural families. These reasons help us to understand why income of urban households are likely to be higher and more stable than rural families.

With regard to the ethnicity of the household-head, we find that the proportion of the Kinh majority is 94.7% and 85.2% in urban and rural areas, respectively. These numbers prove that minorities tend to live in rural areas. This finding implies that the ethnic structure between urban and rural areas is different. Empirical evidence indicates that in Vietnam, ethnic minorities tend to be disadvantaged in urbanisation, economic, and social networks in comparison with the Kinh majority (Nguyen et al., 2020), and live in remote rural areas with higher concentration of poverty (Van de Walle & Gunewardena, 2001). Ethnic minorities have lagged behind the Kinh ethnic majority: they account for most of the poor in Vietnam (Nguyen et al., 2020), attain lower education, and are faced with inequality in finding good jobs compared with the Kinh majority (World Bank, 2012). Thus, the higher proportion of Kinh majority and lower proportion of the minorities in urban areas imply that these areas have a more favourable ethnic structure than rural areas.

As far as education is concerned, we use four dummy categorical variables, with *EDU1* as the lowest level and *EDU4* as the highest level, to observe the education of the household-head. **Table 3.2** shows the percentage of each level in urban and rural areas. A low proportion of *EDU1* and a high proportion of other categories in urban areas, indicate that urban household-heads achieve higher education level compared to rural household-heads.

In addition, the gender of the household-head in urban and rural areas is significantly different, with 64.3% and 80.1% male household-heads in urban and rural areas, respectively. Since the household-head often plays an important role in making a decision for household activities, a high proportion of male household-heads indicates that men tend to play a more important role in a family than women. This is considered as a matter of gender discrimination or gender inequality.

Therefore, with 80.1% male household-heads, gender discrimination in rural areas seems to be more serious than in urban areas, where the figure is only 64.3%. For the other characteristics, households in urban areas tend to be of smaller size, with fewer children and fewer elderly members. In summary; all these results obtained from descriptive statistics imply that urban households are likely to be described with more favourable characteristics than rural families.

Table 3.2 Descriptive statistics of Vietnamese household saving rate in the year 2010

Variables	Urban households (N = 2.501; Weight = 6.436.370)				Rural households (N = 6.086; Weight = 14.102.324)				H0: No difference between urban and rural
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Saving rate – *RSAVE*	0.090	0.354	-1.635	0.726	-0.016	0.431	-1.931	0.707	Rejected ***
Log transformation of income - *lnINCOME*	11.300	0.758	8.311	14.386	10.645	0.709	7.676	14.566	Rejected ***
Household-head is male – *MALE*	0.643	0.479	0.000	1.000	0.801	0.399	0.000	1.000	Rejected ***
Household-head is Kinh ethnicity -	0.947	0.225	0.000	1.000	0.852	0.355	0.000	1.000	Rejected ***
Educational level 1 - *EDU1*	0.812	0.391	0.000	1.000	0.972	0.165	0.000	1.000	Rejected ***
Educational level 2 - *EDU2*	0.027	0.162	0.000	1.000	0.010	0.100	0.000	1.000	Rejected ***
Educational level 3 - *EDU3*	0.146	0.353	0.000	1.000	0.017	0.129	0.000	1.000	Rejected ***
Educational level 4 - *EDU4*	0.015	0.121	0.000	1.000	0.001	0.031	0.000	1.000	Rejected ***
Age of household-head – *AGE*	49.363	13.947	18.000	92.000	47.702	13.736	18.000	98.000	Rejected ***
Household size – *HHSIZE*	3.768	1.472	1.000	13.000	3.911	1.530	1.000	15.000	Rejected ***
Children below 6 years old - *CHILD1*	0.359	0.596	0.000	3.000	0.367	0.609	0.000	4.000	Cannot be rejected
Children from 6 to 14 years old - *CHILD2*	0.448	0.674	0.000	4.000	0.585	0.806	0.000	6.000	Rejected ***
Elderly members over 70 years old - *ELDERLY*	0.189	0.473	0.000	3.000	0.195	0.482	0.000	3.000	Cannot be rejected

Note: Descriptive statistics are calculated by using sampling weights provided in the survey.
In the last column, we test for the null hypothesis that there is not difference between urban and rural households;
And this hypothesis is rejected at *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$, respectively.

3.5 Empirical findings and discussions

In this section, we present and discuss our application of the Oaxaca-Blinder approach to decompose the higher saving rate of urban households into two contributions: the endowment effect, and the unexplained effect. We structure this part into three subsections. First is the summary of the estimated RIF values which will be employed in the UQR regressions. Then, in the second part, we discuss the findings of the OLS and UQR regressions, which will be used in the Oaxaca-Blinder decomposition. In the final subsection, the results of the Oaxaca-Blinder decomposition at the mean and unconditional quantiles are presented.

3.5.1 Description of the estimated RIF values

As stated in section 3.2.2, the UQR is constructed based on the estimated RIF value. In **Table 3.3** we provide the mean, standard deviation as well as minimum and maximum of the RIF values for both urban and rural households. We attain some findings from this table as follows.

Firstly, the mean of RIF indicates the unconditional quantiles of the household saving rate distribution. The results in this table show that urban households in the first three quantiles have a negative saving rate. This number indicates that over 30% of urban households cannot save after consumption. Similarly, we find that 40% of rural households with negative saving rate have to find other capital sources to cover their consumption. These numbers confirm our finding that a large proportion of households in Vietnam are unable to save, especially in rural areas.

Secondly, urban households tend to have higher saving rates than rural households at all unconditional quantiles, since the means of RIF values for urban families are higher than those for rural households.

Unfortunately, the high standard deviations of RIF in both areas, especially at the low quantiles, indicate the high variability of estimated RIF values. This can be explained by the high variability of the saving rate in Vietnam.

Table 3.3 Estimating of RIF at the quantiles

Variables	Urban households (N = 2.501; Weight = 6.436.370)				Rural households (N = 6.086; Weight = 14.102.324)				H0: No difference in means between urban and rural
	Mean	SD	Min	Max	Mean	SD	Min	Max	
10th quantile	-0.338	0.997	-3.329	-0.006	-0.579	1.240	-4.303	-0.165	Rejected ***
20th quantile	-0.130	0.556	-1.243	0.148	-0.303	0.812	-1.926	0.103	Rejected ***
30th quantile	-0.011	0.404	-0.629	0.254	-0.132	0.602	-1.052	0.262	Rejected ***
40th quantile	0.059	0.368	-0.393	0.359	-0.025	0.443	-0.567	0.337	Rejected ***
50th quantile	0.136	0.360	-0.224	0.496	0.057	0.410	-0.353	0.466	Rejected ***
60th quantile	0.204	0.345	-0.078	0.627	0.140	0.423	-0.206	0.658	Rejected ***
70th quantile	0.280	0.377	0.033	0.855	0.229	0.420	-0.046	0.871	Rejected ***
80th quantile	0.369	0.392	0.172	1.150	0.325	0.439	0.105	1.203	Rejected ***
90th quantile	0.478	0.428	0.335	1.756	0.458	0.463	0.303	1.846	Rejected *

Note: Descriptive statistics are calculated by using sampling weights provided in the survey.
In the last column, we test for the null hypothesis that there is not difference between urban and rural households;
And this hypothesis is rejected at *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$, respectively.

3.5.2 The impact of household characteristics on household saving rate by OLS and UQR

To apply the Oaxaca-Blinder decomposition approach, we start by conducting OLS and UQR for urban and rural households separately. The results obtained from these regressions indicate the impact of household characteristics on the household saving rate at the mean and unconditional quantiles. Understanding these determinants helps to explain the higher saving rate of urban households. We present the results of these regressions in **Table 3.4** and **Table 3.5** for urban and rural households, respectively. We also use bivariate scatterplots to summarise the results of UQR for urban households in **Figure 3.5**, and rural households in **Figure 3.6**. In every scatterplot, the values of the vertical axis represent the estimated values of the coefficients of the independent variables, while the quantiles of household saving rate distribution are indicated on the horizontal axis. In addition, we compare the estimated coefficients in UQR of each covariate between urban and rural households in **Figure 3.7**. Some crucial findings from these tables and figures are discussed in detail below.

Concerning household income (lnINCOME), we find that this covariate tends to be an important factor affecting the saving rate in both areas due to its significant effects in the OLS and all UQRs (see **Table 3.4** and **Table 3.5**). This finding is consistent with saving theories, empirical studies, and our results in the previous chapter (Abdelkhalek et al., 2010; Curtis et al., 2015; Friedman, 1957). The positive coefficients of this covariate indicate that an increase in household income increases the saving rate, ceteris paribus. Moreover, along the distribution, the higher coefficients at the low quantiles in both areas indicate that the effect of this covariate on the saving rate is expected to be larger for those at the low quantiles than for those at the high quantiles (see **Figure 3.5a** and **Figure 3.6a**). This result implies that households at low quantiles are likely to increase their saving rate faster than those at the high quantiles if their income increases and other factors are equal. As far as we can compare the impact of this covariate on the saving rate of urban and rural households, we find a stronger effect for rural than for urban areas, especially at the low quantiles (see **Figure 3.7a**).

According to Friedman (1957), the stronger effect of income for rural households can be explained by higher income volatility possibly caused by weather, market, etc. Due to this reason, rural households tend to have stronger saving motives than urban families. Thus, rural households tend to save more if other factors are controlled. This finding is consistent with numerous preceding empirical studies (Akhtar, 1987; Friedman, 1957; Nalin, 2013; Pan, 2016) and our study in the previous chapter.

Furthermore, we find that household size is also a significant covariate in OLS and UQR in both areas (see **Table 3.4** and **Table 3.5**). Mainly, households of larger size tend to have lower saving rates, ceteris paribus. This finding implies that with more members, households would spend more on their consumption and thus have less for saving, ceteris paribus (Abdelkhalek et al., 2010). Along the distribution, the effect is stronger for rural households than for urban families, especially at the low quantiles (see **Figure 3.7h**).

With respect to ethnicity, the positive significant coefficients of this covariate indicate that the Kinh majority is likely to save less than the ethnic minorities (see **Table 3.4 and Table 3.5**). This finding can be supported by the stronger saving motives of the minorities due to their disadvantages compared with the Kinh majority. Besides the inequality mentioned in section 3.5.1, ethnic minorities are also the group receiving less support from relatives and friends than the Kinh majority (Nguyen & Vu, 2018). These reasons induce the minorities' stronger precaution motives to save more than the Kinh, to protect themselves from unexpected risks if other factors are controlled for. Our finding is consistent with Le and Booth (2014), who found that minorities have significantly lower expenditure than the Kinh majority, other things being equal. Moreover, the impact of this covariate is stronger for rural than for urban households, especially at the low quantiles (see **Figure 3.7c**). Nevertheless, while the impact of this covariate for rural households is significant in OLS and all UQRs (see **Table 3.5**), for urban households the effect is significant only at a few quantiles, mainly the 50^{th}, 70^{th} and 80^{th} quantiles (see **Table 3.4**). This finding suggests that in rural areas ethnicity tends to be a more crucial determinant of saving than in urban areas.

Related to children, we find that households with more children tend to save more due to the positive impact of this covariate on the household saving rate in both areas (see **Table 3.4** and **Table 3.5**). This finding can be explained by various reasons. Firstly, families with children tend to save more than those without children due to the bequest motive (Horioka & Watanabe, 1997; Schunk, 2009). Moreover, in Vietnam, children could be treated as household labour force, especially for rural areas, since children can help their parents in agricultural activities (Hua & Erreygers, 2020). Children in poor Vietnamese households often drop out of school early and work in less-skilled occupations to support their households (World Bank, 2012). However, if children increase household saving rates in this way, poverty perpetuation across generations could happen, since children are considered human capital for economic development in the future. Thus, the poverty reduction of households and growth of the country could be affected. Indeed, we find that the impact of children on household saving rate in rural areas is significant in both OLS and UQR

(see **Table 3.5**). Along the distribution, we note that the impacts of these covariates also decrease as quantiles increase. Nevertheless, for urban households, we only find the significant impact of younger children under six years old on saving rate at the 60th and 70th quantiles (see **Table 3.4**).

Concerning elderly members, we find that this covariate has a significantly positive effect only for rural households in the OLS and the 10th. 20th. and 40th quantiles (see **Table 3.5**). Therefore, we agree with Nguyen (2013) that elderly members could be considered as household labour force rather than dependent members in rural Vietnam, since they still attend all economic activities of the household. Nevertheless, this covariate does not influence the saving rate of urban households (see **Table 3.4**).

Concerning the gender of household-head, the evidence suggests that households with a female household-head save more than families with a male household-head due to the significant positive impact of this covariate. This finding is supported by the assumption that females are likely to have stronger saving motives than males. As we mentioned in the previous chapter, shorter work-span (Warren et al., 2001), more unstable income (Fisher, 2010; Warren et al., 2001) and more responsibility for bearing children (Abdelkhalek et al., 2010) are the reasons for this. Moreover, in Vietnamese culture, women are charged with the role of mother and housewife, taking care of the whole family. Thus, they are disadvantaged in their ability to access education and to advance their capacity and development opportunities. In addition, gender inequality in rural areas is still high even though there is a legal framework that supports gender equality (Oxfam, 2017). For these reasons, we expect that females often have stronger saving motives and thus could save more if other factors are controlled for. We find that the higher saving rate of households with a female household-head is significant in the OLS and from 30th to 80th quantiles for rural households (see **Table 3.5**), and for urban households only at the 20th quantile (see **Table 3.4**). This result implies that the impact of gender on household saving rates in urban households is more significant than that in rural families.

Last but not least is the impact of the educational level of household-heads. We find that the coefficients of all three dummy variables (*EDU1. EDU2. EDU3*) are significantly positive (see **Table 3.4** and **Table 3.5**). Since the reference group is the highest-educated households, our finding indicates that households with lower-educated household-heads tend to save more than those with well-educated household-head. As mentioned in the previous chapter, the ability to save more (if other variables are controlled for) of lower-educated households refers to their stronger precautionary saving motive due to their unstable and unskilled jobs. We find that the impacts of education are stronger and more significant for rural households than for urban families. Along

the distributions, we notice that for households in urban areas, the impacts tend to be stronger at the high quantiles; in contrast, for rural households, the stronger effect tends to occur at the low quantiles (see **Figure 3.7d**, **Figure 3.7e,** and **Figure 3.7f**).

In summary; consistent with the results in the previous chapter, we find from the OLS and UQR that household characteristics have stronger effects at low quantiles than at high quantiles, and for rural households than for urban households. This finding implies that the impacts of household characteristics on household saving rates are robust due to the similar effects in both conditional and unconditional quantiles.

Table 3.4 Determinants of household saving rate by OLS and UQR regressions for urban households by the quantiles

Variables	OLS	10th	20th	30th	40th	50th	60th	70th	80th	90th
lnINCOME	0.265***	0.449***	0.290***	0.243***	0.231***	0.230***	0.218***	0.240***	0.239***	0.223***
	0.012	0.036	0.017	0.011	0.010	0.009	0.010	0.013	0.016	0.021
MALE	-0.005	-0.025	-0.043*	0.009	0.004	0.005	0.001	0.005	-0.006	0.004
	0.014	0.041	0.023	0.017	0.016	0.016	0.015	0.017	0.018	0.021
KINH_ETH	-0.043	0.005	0.030	-0.013	-0.021	-0.064**	-0.046	-0.059*	-0.092***	-0.028
	0.029	0.110	0.058	0.037	0.032	0.031	0.029	0.031	0.034	0.034
EDU1	0.133***	0.099	0.063	0.096	0.113	0.141*	0.102	0.121	0.190**	0.226***
	0.043	0.064	0.071	0.071	0.069	0.072	0.071	0.078	0.074	0.078
EDU2	0.071	-0.060	-0.078	0.007	0.046	0.079	0.063	0.105	0.192**	0.317***
	0.060	0.143	0.104	0.088	0.081	0.082	0.081	0.089	0.088	0.107
EDU3	0.025	-0.118	-0.032	-0.003	-0.018	0.056	0.003	0.044	0.122	0.149*
	0.045	0.076	0.074	0.073	0.070	0.073	0.072	0.079	0.076	0.081
AGE	-0.007**	-0.012	-0.014***	-0.010**	-0.006	-0.004	-0.002	0.001	-0.006	-0.003
	0.003	0.010	0.005	0.004	0.004	0.004	0.004	0.004	0.005	0.005
SAGE	0.0001***	0.0001	0.0001***	0.0001**	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000
	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HHSIZE	-0.057***	-0.066***	-0.064***	-0.061***	-0.058***	-0.054***	-0.053***	-0.058***	-0.045***	-0.062***
	0.007	0.017	0.011	0.008	0.007	0.007	0.007	0.008	0.010	0.012
CHILD1	0.019	0.002	0.033	0.021	0.023	0.021	0.035**	0.030*	0.011	0.024
	0.015	0.044	0.025	0.017	0.016	0.016	0.015	0.017	0.018	0.022
CHILD2	0.015	-0.001	0.009	0.014	-0.001	-0.005	0.000	0.008	-0.004	0.024
	0.011	0.034	0.019	0.014	0.013	0.012	0.012	0.013	0.015	0.017
ELDERLY	0.012	0.013	0.040	0.010	0.022	0.007	0.011	0.018	-0.009	-0.009
	0.020	0.056	0.031	0.023	0.021	0.021	0.020	0.023	0.026	0.025
Constant	-2.639***	-5.028***	-2.919***	-2.423***	-2.300***	-2.270***	-2.115***	-2.329***	-2.147***	-1.971***
	0.167	0.489	0.245	0.180	0.167	0.165	0.167	0.196	0.220	0.260
SigF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R square	0.234	0.089	0.120	0.154	0.162	0.171	0.166	0.171	0.160	0.118

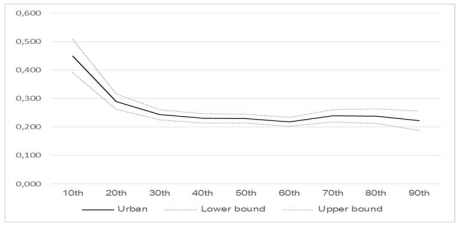
Notes: Weighted robust standard error are given in the second row of each covariates; *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$

Table 3.5 Determinants of household saving rate by OLS and UQR regressions for rural households by the quantiles

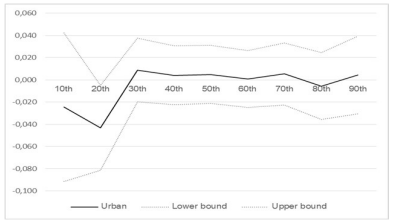
Variables	OLS	10th	20th	30th	40th	50th	60th	70th	80th	90th
lnINCOME	0.397***	0.712***	0.547***	0.436***	0.319***	0.305***	0.314***	0.306***	0.301***	0.271***
	0.010	0.033	0.018	0.012	0.009	0.008	0.008	0.008	0.010	0.013
MALE	-0.038***	-0.052	-0.041	-0.063***	-0.049***	-0.037***	-0.027*	-0.030**	-0.031**	-0.015
	0.013	0.041	0.026	0.019	0.014	0.013	0.014	0.014	0.015	0.016
KINH_ETH	-0.133***	-0.252***	-0.147***	-0.113***	-0.104***	-0.093***	-0.112***	-0.116*	-0.112***	-0.096***
	0.014	0.049	0.030	0.022	0.016	0.014	0.014	0.014	0.014	0.016
EDU1	0.610***	1.451**	0.565*	0.646***	0.355**	0.286*	0.348***	0.269**	0.307***	0.234***
	0.227	0.718	0.312	0.237	0.166	0.151	0.112	0.114	0.080	0.072
EDU2	0.522**	1.447**	0.432	0.566**	0.242	0.178	0.242**	0.182	0.232**	0.195**
	0.231	0.722	0.328	0.248	0.175	0.159	0.123	0.125	0.100	0.101
EDU3	0.484**	1.315*	0.428	0.515**	0.245	0.170	0.184	0.136	0.198**	0.107
	0.229	0.721	0.319	0.242	0.170	0.156	0.120	0.122	0.094	0.088
AGE	-0.003	-0.006	-0.007	-0.010**	-0.005*	-0.003	-0.002	-0.004	0.000	0.001
	0.003	0.008	0.005	0.004	0.003	0.003	0.003	0.003	0.003	0.003
SAGE	0.000*	0.000	0.000*	0.000***	0.000**	0.000	0.000	0.000**	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HHSIZE	-0.088***	-0.158***	-0.119***	-0.090***	-0.066***	-0.064***	-0.066***	-0.066***	-0.066***	-0.064***
	0.005	0.017	0.010	0.007	0.005	0.005	0.005	0.005	0.006	0.007
CHILD1	0.073***	0.146***	0.106***	0.060***	0.047***	0.048***	0.049***	0.045***	0.045***	0.039***
	0.010	0.033	0.021	0.015	0.012	0.011	0.011	0.011	0.012	0.013
CHILD2	0.054***	0.119***	0.084***	0.053***	0.043***	0.037***	0.037***	0.033***	0.027***	0.039***
	0.007	0.024	0.015	0.011	0.008	0.008	0.008	0.008	0.008	0.009
ELDERLY	0.037***	0.070*	0.068**	0.027	0.028*	0.011	0.011	-0.005	-0.004	0.013
	0.012	0.040	0.027	0.021	0.015	0.014	0.014	0.014	0.015	0.016
Constant	-4.396***	-8.795***	-6.031***	-4.782***	-3.360***	-3.131***	-3.191***	-2.904***	-2.877***	-2.425***
	0.253	0.808	0.377	0.274	0.194	0.177	0.148	0.153	0.141	0.160
SigF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R square	0.311	0.122	0.168	0.194	0.189	0.203	0.199	0.192	0.171	0.124

Notes: Weighted robust standard error are given in the second row of each covariates; *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$.

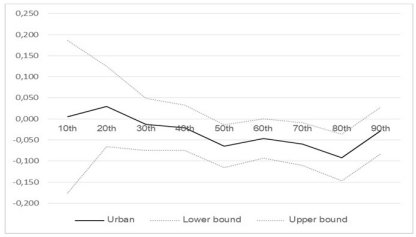
Figure 3.5 Effect of household characteristics on saving rates at unconditional quantiles for urban households



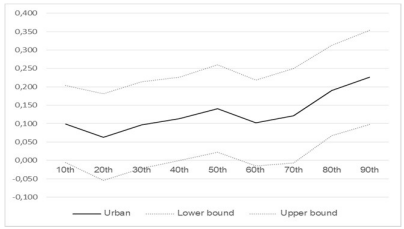
3.5a Effect of income on saving rates



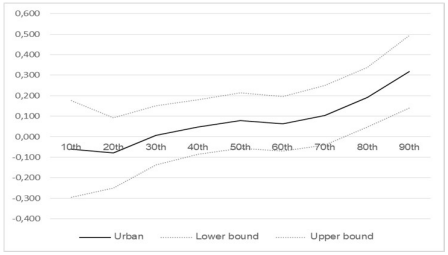
3.5b Effect of male on saving rates



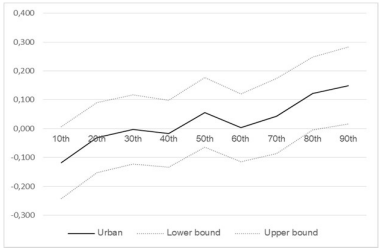
3.5c Effect of ethnicity on saving rates



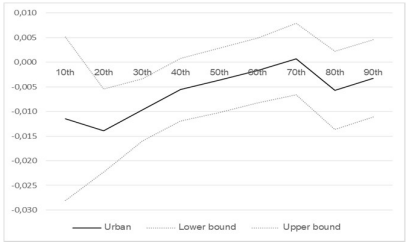
3.5d Effect of EDU1 on saving rates



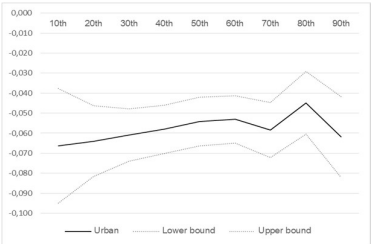
3.5e Effect of college (EDU2) on saving rates



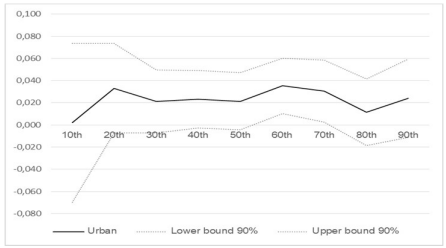
3.5f Effect of university degree (EDU3) on saving rates



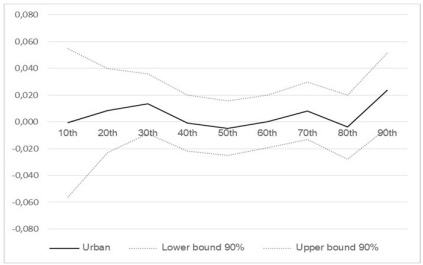
3.5g Effect of household-head age on saving rates



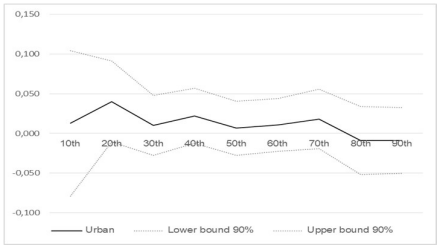
3.5h Effect of household size on saving rates



3.5i. Effect of younger children on saving rates

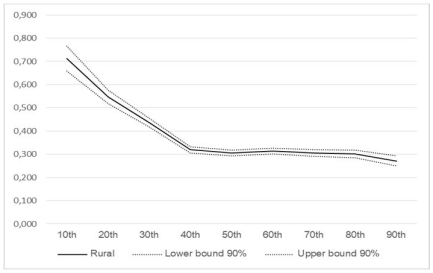


3.5j Effect of older children on saving rates

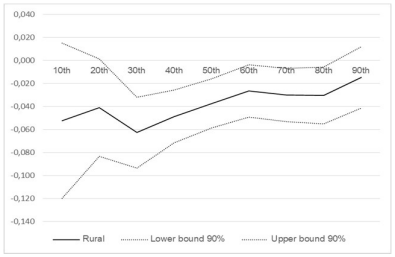


3.5k Effect of elderly members on saving rates

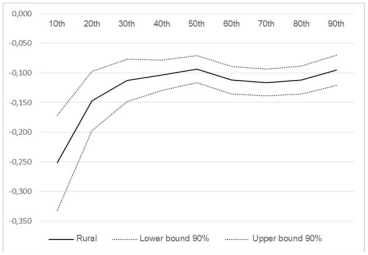
Figure 3.6 Effect of household characteristics on saving rates at unconditional quantiles for rural households



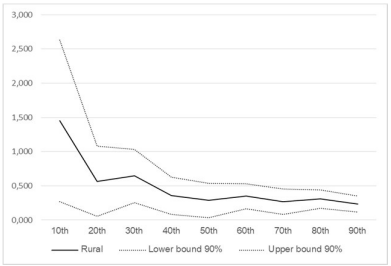
3.6a Effect of income on saving rates



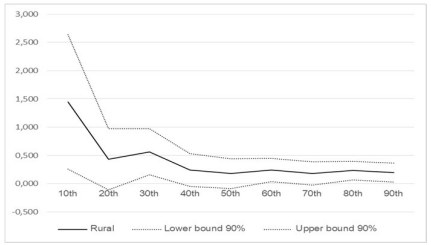
3.6b Effect of male on saving rates



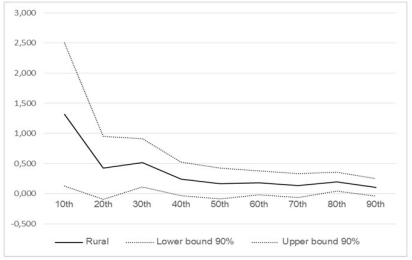
3.6c Effect of Kinh ethnicity on saving rates



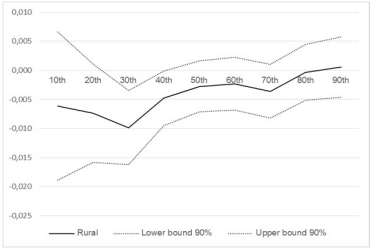
3.6d Effect of low education (EDU1) on saving rates



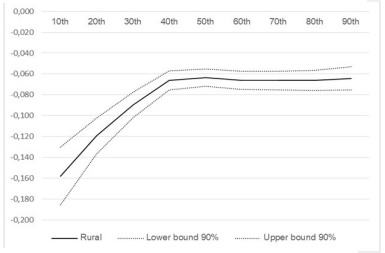
3.6e Effect of college degree (EDU2) on saving rates



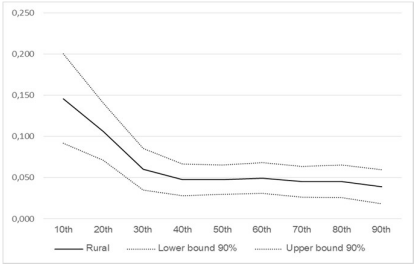
3.6f Effect of university degree (EDU3) on saving rates



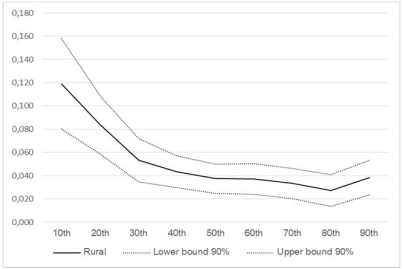
3.6g Effect of household-head age on saving rates



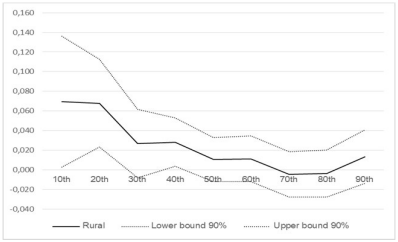
3.6h Effect of household size on saving rates



3.6i Effect of younger children on saving rates

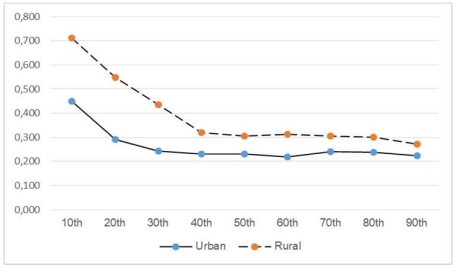


3.6j Effect of older children on saving rates

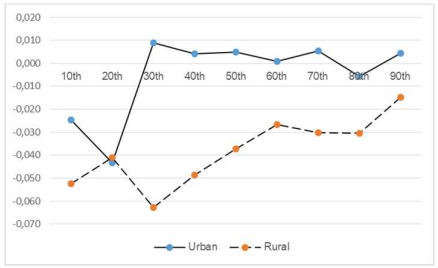


3.6k Effect of elderly members on saving rates

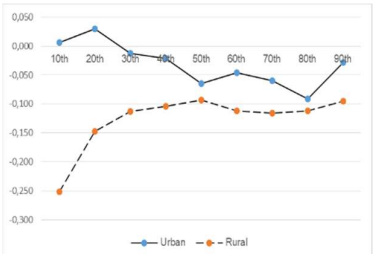
Figure 3.7 Effects of household characteristics on saving rates at the unconditional quantiles for urban and rural households



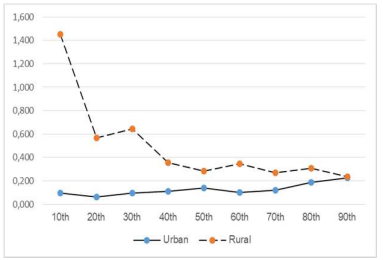
3.7a Effect of income on household saving rates



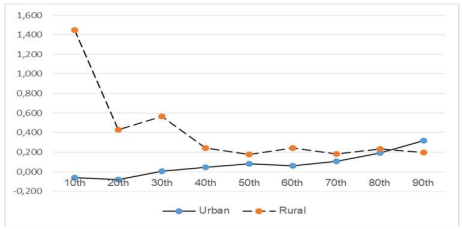
3.7b Effect of male on household saving rates



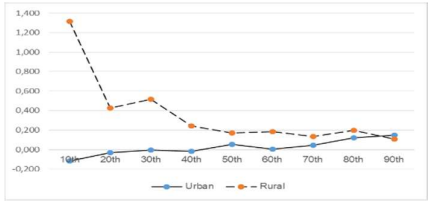
3.7c Effect of Kinh ethnicity on saving rates



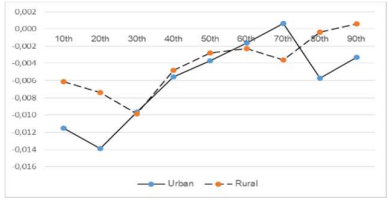
3.7d Effect of low education (EDU1) on saving rates



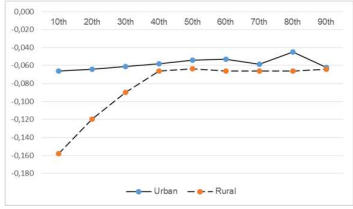
3.7e Effect of college degree (EDU2) on saving rates



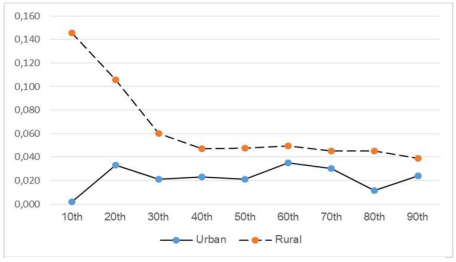
3.7f Effect of university degree (EDU3) on saving rates



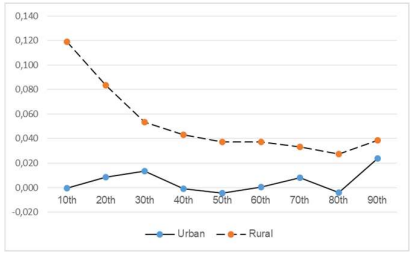
3.7g Effect of household-head age on saving rates



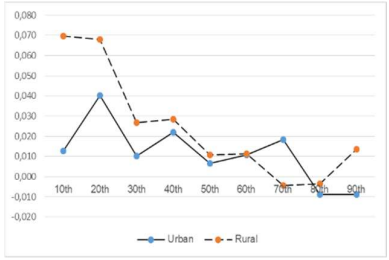
3.7h Effect of household size on saving rates



3.7i Effect of younger children on saving rates



3.7j Effect of older children on saving rates



3.7k Effect of elderly members on saving rates

3.5.3 Results of the Oaxaca-Blinder decomposition approach

We present the aggregate results of the Oaxaca-Blinder decomposition approach at the mean and selected quantiles in **Table 3.6**. At the mean, the saving rate of urban households is 10.56% higher than that of rural families. Along the distribution, this rate goes from 24.05% at the 10^{th} quantile to 2.06% at the 90^{th} quantile. These numbers confirm that the differences in saving rate between urban and rural households at the quantiles are unequal, which we mentioned in section 3.4.3. Mainly, the saving rate disparity tends to be larger at the low quantiles than at the high quantiles. This finding implies a higher level of saving inequality between urban and rural households at the low quantiles. Among the components of the Oaxaca-Blinder decomposition, we recognise that the endowment effect is positive and significant at the mean and all quantiles. This finding implies that the favourable characteristics of urban households can help them to save more than rural households. In contrast, the unexplained effect is negative, and thus tends to reduce the urban-rural saving rate difference. In the following, we discuss in detail the contribution of each component to urban-rural difference.

Contribution of the endowment effect

We find that the endowment effect induces urban households to save 16.11% more than rural families at the mean. This means that rural households could increase their saving rate by 16.11% if they had the same characteristics as urban households. Along the distribution, the positive contribution of this component decreases from 28.07% at the 10^{th} quantile to 13.86% at the 90^{th} quantile (see **Table 3.6**). As we mentioned above, the urban-rural saving rate difference goes from 24.05% at the 10^{th} quantile to 2.06% at the 90^{th} quantile. These numbers indicate that the endowment effect can help to explain most of the differences at the low quantiles. This finding also implies a stronger impact of characteristic differences between urban and rural households on the saving rate difference at these quantiles. Our result is in line with the research of Nguyen et al. (2007), who found that in Vietnam in 1998, the higher per capita expenditure of urban households at the low quantiles was due to the endowment effect. As far as the isolated contributions of household characteristics are concerned, some crucial findings are discussed as follows (see **Table 3.7**).

Firstly, we notice the dominant contribution of income to the saving rate difference at the mean and all the quantiles (see **Table 3.7**). At the mean, this number is 17.35%, meaning that the higher income of urban households induces them to save 17.35% more than rural households. This result

is consistent with the evidence that high income households save more than low income families (Bozio et al., 2017; Dynan et al., 2004; Huggett & Ventura, 2000). Along the distribution, the contribution of income goes from 29.41% at the 10^{th} quantile to 14.58% at the 90^{th} quantile. These numbers imply that the effect of income differences at low quantiles is likely to be stronger than at high quantiles. This means that if rural households at the low quantiles had a higher income, they could increase their saving rate faster than those at other quantiles.

In addition, the difference in household size between the two areas is another significant factor in the endowment effect (see **Table 3.7**). Mainly, we find that urban households with fewer members tend to consume less, and hence could save more than rural households with more members. Although the impact of this factor is found significant at the mean and all quantiles, the contribution of this covariate is only 0.64% to 0.95% and rather small compared to that of household income with a contribution of 14.29% to 29.41%.

For ethnicity, we find an interesting result that rural households with high proportion of ethnic minorities are likely to save more than urban households (see **Table 3.7**). Mainly, we observe that this evidence is significant at the 50^{th} and 80^{th} quantiles. This finding indicates that some ethnic minority households in rural areas could save more than those in urban areas. This result proves that various ethnic inequality programmes of the government and other organisations applied to improve education, health, living conditions, and reduce poverty for ethnic minorities in rural areas affect effectively and efficiently on their saving behaviours (World Bank, 2012; Oxfam, 2013, 2017). However, we agree with the report of Oxfam (2017) that the effectiveness and efficiency of the inequality programmes is still a limitation for the poor minority households, since the results are insignificant at the low quantiles.

With respect to the gender of the household-head, as we mentioned in section 5.2.1, gender discrimination in rural areas seems to be more crucial than that in urban areas. As a result, urban households with lower gender discrimination can save more than rural households with higher gender inequality (see **Table 3.7**). In other words, higher gender inequality in rural areas is a factor increasing the urban-rural gap. Our result supports the evidence that gender inequality in rural areas is still high, although various programmes have been conducted to narrow the gender gap in Vietnam (Oxfam, 2017). Females, especially in rural areas, often face disadvantages in education,

health, wages and socio-mobility[18] (World Bank, 2012; Oxfam, 2017). Fortunately, the significant effect of gender inequality is only found at the 20th quantile.

Regarding education, we find that the difference in low educational level (EDU1) tends to reduce the urban-rural gap (see **Table 3.7**). In other words, households with low education (EDU1) in urban areas tend to save less than those in rural areas. This evidence is found significantly at the mean, and at the 50th, 80th and 90th quantiles. It can be due to the lower expenditure of rural households, especially for household with low education and low income (World Bank, 2012; Le & Booth, 2014; Nguyen et al., 2007). Thus, for some low-educated households with positive savings, living in a rural area could help them to save more than living in an urban area.

In contrast, the differences in higher educational levels (EDU2 and EDU3) are more likely to increase the urban-rural gap. Thus, households with higher education (EDU2 and EDU3) in urban areas tend to save more than those in rural areas. This finding is explained by the following reasons. According to a report of the World Bank (2012), urban areas with higher economic growth and urbanisation provide more opportunity for well-educated people to find high-skilled jobs, with better income than in rural regions. In addition, the impact of education on income is higher for workers in urban areas than in rural areas. Mainly, in Vietnam's urban areas, an additional year of schooling increases hourly wages by 7.6%, while in rural areas this number is only 4.1% (World Bank, 2012). Moreover, financial institutions such as banks and investment companies are often concentrated in big cities or urban areas; thus well-educated households in urban areas have more opportunity to increase their income by investing or saving in these institutions.

Nevertheless, when we group the three education covariates together, their net contribution to the saving rate is still negative, since the coefficient of EDU1 is larger than both coefficients of EDU2 and EDU3.

In sum; the aggregate decomposition proves that the favourable characteristics of urban households could help them to save more than rural households. At the low quantiles, the characteristic differences can be used to explain most of the higher saving rate of urban households. At the high quantiles, the impact of this component is decreased. As far as the detailed decomposition is concerned, the results show that higher income, fewer members, gender discrimination, and higher education of households in urban areas, could help them to save more.

[18] According to Oxfam (2018), socio mobility is defined as a change in the social status of an individual or household in the society. It can refer to a change in an adult compared to his or her parents ("inter-generational social mobility") or a change over the years in a life cycle ("intra-generational social mobility").

In contrast, differences in ethnic structure and low-education level between two areas tend to increase the saving rate of rural households and thus reduce the urban-rural saving rate disparity.

Contribution of the unexplained effect

We find that the unexplained effect is negative and significant at the mean and 30th to 90th quantiles (see **Table 3.6**). Mainly, this component is -5.56% at the mean, and goes from -2.8% to -11.8% at the 30th to 90th quantiles, respectively. The negative values imply that the unexplained effect tends to reduce the urban-rural saving rate difference. This result can be explained by the stronger impacts of household characteristics on household saving rates for rural households than on those for urban households. We find that the contribution of this component increases from the low to high quantiles. Thus, at the high quantiles, the positive contribution of the endowment effect tends to be offset by the negative contribution of the unexplained effect. Hence, the urban-rural differences at the high quantiles are rather small (see **Figure 3.4**). For instance, at the 90th quantile, while the endowment effect increases the urban-rural difference to 13.86%, the unexplained effect, in contrast, decreases this gap by 11.8%. As a result, the urban-rural disparity at this quantile is observed at only 2.06%. As far as the detailed decomposition is concerned, we find high contributions of income and intercept caused by other factors not observed in the model (see **Table 3.8**).

Table 3.6 Differences in saving rates between urban and rural households in means and unconditional quantiles by aggregate decomposition

Decomposition	**Mean**	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Urban	0.0899	-0.3380	-0.1295	-0.0106	0.0588	0.1360	0.2036	0.2797	0.3686	0.4783
Rural	-0.0157	-0.5785	-0.3025	-0.1321	-0.0245	0.0566	0.1395	0.2291	0.3250	0.4576
Difference	**0.1056*** (0.0096)**	**0.2405*** (0.0264)**	**0.1730*** (0.0159)**	**0.1215*** (0.0117)**	**0.0833*** (0.0099)**	**0.0794*** (0.0096)**	**0.0641*** (0.0095)**	**0.0506*** (0.0101)**	**0.0436*** (0.0107)**	**0.0206* (0.0117)**
Endowment effect	**0.1611*** **	**0.2807*** **	**0.1920*** **	**0.1495*** **	**0.1378*** **	**0.1393*** **	**0.1329*** **	**0.1474*** **	**0.1460*** **	**0.1386*** **
Unexplained effect	**-0.0555*** **	-0.0402	-0.0190	**-0.0280** **	**-0.0545*** **	**-0.0599*** **	**-0.0688*** **	**-0.0968*** **	**-0.1024*** **	**-0.1180*** **

Note: *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$.

Table 3.7 Detailed decompositions for the endowment effect at the mean and the unconditional quantiles

Variables	Mean	10th	20th	30th	40th	50th	60th	70th	80th	90th
lnINCOME	**0.1735*** **	**0.2941*** **	**0.1897*** **	**0.1593*** **	**0.1510*** **	**0.1506*** **	**0.1429*** **	**0.1570*** **	**0.1562*** **	**0.1458*** **
	0.0094	**0.0246**	**0.0121**	**0.0084**	**0.0075**	**0.0074**	**0.0076**	**0.0095**	**0.0111**	**0.0143**
MALE	0.0007	0.0039	**0.0069***	-0.0014	-0.0007	-0.0008	-0.0001	-0.0008	0.0009	-0.0007
	0.0023	0.0065	**0.0037**	0.0028	0.0026	0.0025	0.0025	0.0027	0.0029	0.0034
KINH_ETH	-0.0040	0.0005	0.0028	-0.0012	-0.0020	**-0.0061****	-0.0044	-0.0056	**-0.0087*****	-0.0027
	0.0028	0.0104	0.0055	0.0036	0.0031	**0.0029**	0.0027	0.0030	**0.0033**	0.0032
EDU1	**-0.0213*****	-0.0158	-0.0100	-0.0154	-0.0181	**-0.0225***	-0.0162	-0.0193	**-0.0304****	**-0.0361*****
	0.0070	0.0102	0.0114	0.0115	0.0111	**0.0116**	0.0113	0.0125	**0.0120**	**0.0126**
EDU2	0.0012	-0.0010	-0.0013	0.0001	0.0008	0.0013	0.0011	0.0018	**0.0033***	**0.0054****
	0.0011	0.0025	0.0018	0.0015	0.0014	0.0015	0.0014	0.0016	**0.0017**	**0.0022**
EDU3	0.0032	-0.0153	-0.0041	-0.0003	-0.0023	0.0072	0.0004	0.0056	0.0157	**0.0192***
	0.0058	0.0098	0.0095	0.0094	0.0091	0.0095	0.0093	0.0102	0.0099	**0.0106**
AGE	**-0.0119***	-0.0191	**-0.0231****	**-0.0161****	-0.0092	-0.0061	-0.0027	0.0011	-0.0095	-0.0054
	0.0061	0.0175	**0.0098**	**0.0073**	0.0068	0.0069	0.0068	0.0075	0.0084	0.0082
SAGE	**0.0137****	0.0240	**0.0236****	**0.0179****	0.0102	0.0076	0.0047	0.0009	0.0116	0.0076
	0.0063	0.0174	**0.0098**	**0.0074**	0.0068	0.0068	0.0067	0.0074	0.0085	0.0079
HHSIZE	**0.0082*** **	**0.0095*** **	**0.0091*** **	**0.0087*** **	**0.0083*** **	**0.0078*** **	**0.0076*** **	**0.0083*** **	**0.0064*** **	**0.0089*** **
	0.0025	**0.0035**	**0.0028**	**0.0024**	**0.0023**	**0.0022**	**0.0022**	**0.0024**	**0.0021**	**0.0028**
CHILD1	-0.0002	0.0000	-0.0003	-0.0002	-0.0002	-0.0002	-0.0003	-0.0002	-0.0001	-0.0002
	0.0004	0.0007	0.0006	0.0004	0.0004	0.0004	0.0006	0.0005	0.0003	0.0005
CHILD2	-0.0021	0.0001	-0.0012	-0.0019	0.0001	0.0006	0.0000	-0.0011	0.0005	-0.0032
	0.0016	0.0046	0.0026	0.0019	0.0017	0.0017	0.0016	0.0018	0.0020	0.0024
ELDERLY	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	0.0000	-0.0001	-0.0001	0.0001	0.0000
	0.0003	0.0007	0.0006	0.0003	0.0004	0.0003	0.0003	0.0004	0.0003	0.0003
Total	**0.1611*** **	**0.2807*** **	**0.1920*** **	**0.1495*** **	**0.1378*** **	**0.1393*** **	**0.1329*** **	**0.1474*** **	**0.1460*** **	**0.1386*** **
	0.0093	**0.0262**	**0.0130**	**0.0089**	**0.0079**	**0.0076**	**0.0078**	**0.0093**	**0.0107**	**0.0136**

Note: Standard deviation is conducted as in the paper of Jann (2008) given in the second row of each covariate; And *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$

Table 3.8 Detailed decompositions for the unexplained effect at the mean and the unconditional quantiles

Variables	Mean	10th	20th	30th	40th	50th	60th	70th	80th	90th
lnINCOME	**-1.4081*** **	**-2.8015*** **	**-2.7366*** **	**-2.0508*** **	**-0.9425*** **	**-0.8005*** **	**-1.0150*** **	**-0.6993*** **	**-0.6632*** **	**-0.5186** **
	0.1613	**0.5161**	**0.2600**	**0.1693**	**0.1376**	**0.1288**	**0.1355**	**0.1639**	**0.1959**	**0.2603**
MALE	**0.0269***	0.0223	-0.0018	**0.0574*** **	**0.0424** **	**0.0338** **	0.0219	**0.0284***	0.0199	0.0154
	0.0153	0.0462	0.0278	**0.0204**	**0.0171**	**0.0165**	0.0166	**0.0177**	0.0190	0.0215
KINH_ETH	**0.0773*** **	**0.2190** **	**0.1507*** **	**0.0850** **	**0.0702** **	0.0247	**0.0561** **	0.0484	0.0173	**0.0576***
	0.0277	**0.1023**	**0.0557**	**0.0369**	**0.0307**	0.0286	**0.0272**	0.0288	0.0312	**0.0316**
EDU1	**-0.4636** **	**-1.3144***	-0.4883	**-0.5341** **	-0.2346	-0.1412	**-0.2392***	-0.1442	-0.1135	-0.0083
	0.2248	**0.7004**	0.3114	**0.2402**	0.1744	0.1630	**0.1291**	0.1341	0.1062	0.1030
EDU2	**-0.0046***	**-0.0153** **	-0.0052	**-0.0057** **	-0.0020	-0.0010	-0.0018	-0.0008	-0.0004	0.0012
	0.0025	**0.0078**	0.0036	**0.0028**	0.0020	0.0018	0.0015	0.0016	0.0014	0.0015
EDU3	**-0.0078***	**-0.0242***	-0.0078	**-0.0087** **	-0.0044	-0.0019	-0.0031	-0.0016	-0.0013	0.0007
	0.0041	**0.0125**	0.0056	**0.0044**	0.0032	0.0029	0.0024	0.0025	0.0021	0.0020
AGE	-0.1865	-0.2571	-0.3106	0.0084	-0.0369	-0.0432	0.0326	0.2037	-0.2559	-0.1833
	0.1949	0.6058	0.3465	0.2606	0.2292	0.2288	0.2313	0.2490	0.2688	0.2732
SAGE	0.0829	0.1391	0.1277	-0.0115	-0.0028	0.0065	-0.0218	-0.1218	0.1128	0.0728
	0.0987	0.3061	0.1768	0.1328	0.1158	0.1151	0.1160	0.1263	0.1372	0.1355
HHSIZE	**0.1180*** **	**0.3579*** **	**0.2170*** **	**0.1133*** **	**0.0315*** **	**0.0365*** **	**0.0519*** **	**0.0309*** **	**0.0837*** **	0.0093
	0.0350	**0.0944**	**0.0584**	**0.0424**	**0.0358**	**0.0349**	**0.0350**	**0.0389**	**0.0436**	0.0546
CHILD1	**-0.0197*** **	**-0.0527*** **	**-0.0267** **	**-0.0143***	-0.0088	-0.0096	-0.0052	-0.0054	-0.0125	-0.0055
	0.0068	**0.0200**	**0.0119**	**0.0085**	0.0072	0.0070	0.0069	0.0075	0.0080	0.0091
CHILD2	**-0.0229*** **	**-0.0699*** **	**-0.0439*** **	**-0.0232** **	**-0.0258*** **	**-0.0246*** **	**-0.0215*** **	-0.0146	**-0.0183***	-0.0087
	0.0078	**0.0241**	**0.0143**	**0.0103**	**0.0088**	**0.0085**	**0.0084**	0.0089	**0.0098**	0.0113
ELDERLY	-0.0048	-0.0111	-0.0054	-0.0033	-0.0012	-0.0008	-0.0001	0.0044	-0.0011	-0.0043
	0.0046	0.0134	0.0080	0.0061	0.0051	0.0048	0.0048	0.0052	0.0058	0.0059
Constant	**1.7574*** **	**3.7676*** **	**3.1119*** **	**2.3594*** **	**1.0607*** **	**0.8615*** **	**1.0764*** **	**0.5749** **	**0.7301*** **	0.4537
	0.3035	**0.9444**	**0.4496**	**0.3280**	**0.2561**	**0.2424**	**0.2236**	**0.2487**	**0.2615**	0.3051
Total	**-0.0555*** **	-0.0402	-0.0190	**-0.0280** **	**-0.0545*** **	**-0.0599*** **	**-0.0688*** **	**-0.0968*** **	**-0.1024*** **	**-0.1180*** **
	0.0116	0.0410	0.0212	**0.0142**	**0.0116**	**0.0107**	**0.0102**	**0.0103**	**0.0106**	**0.0113**

Note: Standard deviation is conducted as in the paper of Jann (2008) given in the second row of each covariate. And *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$.

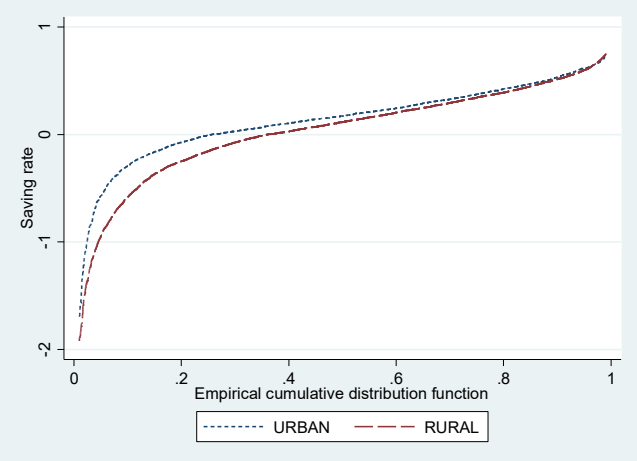
3.6 Robustness

In this section, we use dataset VHLSS 2012 to test the robustness of our main findings. We conclude that most of our findings attained from the dataset VHLSS 2010 are consistent to those from the updated dataset VHLSS 2012 due to the following reasons.

Firstly, **Table 3.9** reveals that the descriptive statistics of household characteristics in urban and rural areas of the survey VHLSS 2012 are similar to those for survey 2010. Mainly, urban households that are described with more favourable characteristics, such as higher income, higher education, smaller size, etc, have higher saving rate than rural households with less favourable characteristics. Moreover, results of the t-tests indicate significant differences in all covariates between the two areas.

Secondly, the empirical cumulative distributions of household saving rates for urban and rural households are described in **Figure 3.8**. This indicates that urban households have higher saving rates than rural households along the distribution. In addition, consistent with the results from dataset 2010 in **Figure 3.4**, the whole distributions of both urban and rural saving rates have the sharpest increase at the lower percentiles; and the magnitude of difference narrows when moving up, and tends to be very small at the higher percentiles. Thus, the differences in saving rates at the quantiles along distribution are unequal.

Figure 3.8 Empirical cumulative distribution of the household saving rate by using VHLSS 2012



Next, we represent the determinants of saving rates obtained from OLS and UQR by using datasets VHLSS 2010 and 2012 in **Table 3.10** for urban households, and **Table 3.11** for rural households. For urban households, we observe the significant effect of income and household size on the saving rate at the mean and selected quantiles for both datasets 2010 and 2012. For rural households, we find the consistent impact of income, ethnicity, household size and children in both datasets.

As far as the Oaxaca-Blinder decomposition is concerned, we represent the results of the endowment and unexplained effects in **Table 3.12** and **Table 3.13**, respectively. Consistent with the findings from dataset 2010, the results obtained from dataset 2012 show that at the mean and some selected quantiles, while the endowment effect increases the saving rate of urban households, the unexplained effect decreases it. Moreover, the endowment effect monotonically decreases from the low to the high quantiles, and the unexplained effect in contrast increases from the low to the high quantiles. As a result, we observe a small gap at the high quantiles in both datasets. When we isolate the contribution of each characteristic in the endowment effect (see **Table 3.12**), we find consistency in the significant positive contribution of differences in income, household size, higher educational levels (*EDU2* and *EDU3*), and the negative contribution of the differences in ethnic structure and the lower educational level (*EDU1*). However, we observe a significant contribution of the difference in the number of older children (*CHILD2*) in dataset 2012. Fortunately, the contribution of this covariate is rather small.

Table 3.9 Descriptive statistics of Vietnamese household saving rate in the year 2012

Variables	Urban households (N = 2,564; Weight = 6,622,550)				Rural households (N = 6,041; Weight = 14,840,874)				H0: No difference between urban and rural
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Saving rate - *RSAVE*	0.138	0.347	-1.695	0.741	0.038	0.441	-1.921	0.747	Rejected ***
Log transformation of income - *lnINCOME*	11.604	0.696	8.980	14.662	11.001	0.768	7.512	13.808	Rejected ***
Household-head is male - *MALE*	0.651	0.477	0.000	1.000	0.795	0.404	0.000	1.000	Rejected ***
Household-head Kinh ethnicity - *KINH_ETH*	0.946	0.226	0.000	1.000	0.849	0.358	0.000	1.000	Rejected ***
Educational level 1 - *EDU1*	0.819	0.385	0.000	1.000	0.977	0.149	0.000	1.000	Rejected ***
Educational level 2 - *EDU2*	0.021	0.142	0.000	1.000	0.006	0.078	0.000	1.000	Rejected ***
Educational level 3 - *EDU3*	0.144	0.351	0.000	1.000	0.016	0.126	0.000	1.000	Rejected ***
Educational level 4 - *EDU4*	0.017	0.129	0.000	1.000	0.000	0.022	0.000	1.000	Rejected ***
Age of household-head - *AGE*	50.488	13.859	19.000	94.000	49.373	13.804	18.000	95.000	Rejected ***
Household size - *HHSIZE*	3.779	1.445	1.000	12.000	3.867	1.543	1.000	11.000	Rejected ***
Children below 6 years old - *CHILD1*	0.327	0.571	0.000	3.000	0.351	0.599	0.000	3.000	Rejected ***
Children from 6 to 14 years old - *CHILD2*	0.502	0.713	0.000	4.000	0.556	0.780	0.000	5.000	Rejected ***
Elderly members 70+ years old - *ELDERLY*	0.206	0.494	0.000	2.000	0.212	0.499	0.000	3.000	Rejected *

Note: Descriptive statistics are calculated by using sampling weights provided in the survey.
In the last column, we test for the null hypothesis that there is not difference between urban and rural households;
And this hypothesis is rejected at *** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.1$, respectively.

Table 3.10 Determinants of urban household saving rate at mean and selected quantiles by VHLSS 2010. 2012

Variables	OLS		10th		50th		90th	
	2010	**2012**	**2010**	**2012**	**2010**	**2012**	**2010**	**2012**
lnINCOME	**0.265*** **	**0.2902*** **	**0.449*** **	**0.448*** **	**0.230*** **	**0.2371*** **	**0.223*** **	**0.194*** **
	0.012	**0.0124**	**0.036**	**0.034**	**0.009**	**0.0099**	**0.021**	**0.019**
MALE	-0.005	-0.0063	-0.025	-0.028	0.005	-0.0007	0.004	0.002
	0.014	0.0141	0.041	0.037	0.016	0.0153	0.021	0.018
KINH_ETH	-0.043	-0.0488	0.005	-0.035	**-0.064** **	**-0.0788*** **	-0.028	**-0.066** *
	0.029	0.0307	0.11	0.080	**0.031**	**0.0294**	0.034	**0.038**
EDU1	**0.133*** **	**0.0915** **	0.099	**0.310** **	**0.141** *	0.0532	**0.226*** **	-0.072
	0.043	**0.0443**	0.064	**0.120**	**0.072**	0.0541	**0.078**	0.116
EDU2	0.071	0.0693	-0.06	0.339**	0.079	0.0951	**0.317*** **	-0.047
	0.06	0.056	0.143	0.145	0.082	0.0681	**0.107**	0.130
EDU3	0.025	0.0234	-0.118	0.179	0.056	0.0037	**0.149** *	-0.090
	0.045	0.0448	0.076	0.119	0.073	0.0558	**0.081**	0.118
AGE	**-0.007** **	-0.0067	-0.012	-0.005	-0.004	**-0.0077** **	-0.003	**-0.009** *
	0.003	0.006	0.01	0.011	0.004	**0.0038**	0.005	**0.005**
SAGE	**0.0001*** **	0.0001	0.0001	0.000	0.000	**0.0001** **	0.000	**0.000** **
	0.0001	0.0001	0.0001	0.000	0.000	**0.000**	0.000	**0.000**
HHSIZE	**-0.057*** **	**-0.0605*** **	**-0.066*** **	**-0.096*** **	**-0.054*** **	**-0.0387*** **	**-0.062*** **	**-0.036*** **
	0.007	**0.0075**	**0.017**	**0.018**	**0.007**	**0.0072**	**0.012**	**0.009**
CHILD1	0.019	0.0218	0.002	0.063	0.021	0.0095	0.024	0.000
	0.015	0.016	0.044	0.039	0.016	0.0158	0.022	0.017
CHILD2	0.015	**0.0234** **	-0.001	0.102***	-0.005	0.0064	0.024	-0.011
	0.011	**0.0108**	0.034	0.029	0.012	0.0123	0.017	0.013
ELDERLY	0.012	-0.0013	0.013	0.001	0.007	**-0.0355** *	-0.009	-0.024
	0.02	0.0232	0.056	0.047	0.021	**0.0197**	0.025	0.021
Constant	**-2.639*** **	**-2.9305*** **	**-5.028*** **	**-5.394*** **	**-2.270*** **	**-2.2724*** **	**-1.971*** **	**-1.252*** **
	0.167	**0.2113**	**0.489**	**0.523**	**0.165**	**0.1578**	**0.26**	**0.262**
SigF	0	**0**	0	0	0	**0**	0	0.000
R square	**0.234**	**24.74**	**0.089**	**0.094**	**0.171**	**17.41**	**0.118**	**0.100**

Notes: Weighted robust standard error are given in the second row of each covariates and *** = p < 0.01; **= p < 0.05; *= p < 0.1

Table 3.11 Determinants of rural household saving rate at mean and selected quantiles by VHLSS 2010. 2012

Variables	OLS		10th		50th		90th	
	2010	**2012**	**2010**	2012	**2010**	**2012**	**2010**	**2012**
lnINCOME	**0.397*** **	**0.3974*** **	**0.712*** **	**0.749*** **	**0.305*** **	**0.3319*** **	**0.271*** **	**0.242*** **
	0.01	**0.0096**	**0.033**	**0.037**	**0.008**	**0.0066**	**0.013**	**0.011**
MALE	**-0.038*** **	**-0.0307** **	-0.052	-0.065	**-0.037*** **	-0.0098	-0.015	-0.010
	0.013	**0.0132**	0.041	0.047	**0.013**	0.0138	0.016	0.014
KINH_ETH	**-0.133*** **	**-0.0938** **	**-0.252*** **	**-0.175*** **	**-0.093*** **	**-0.0556*** **	**-0.096*** **	**-0.096*** **
	0.014	**0.0156**	**0.049**	**0.059**	**0.014**	**0.0147**	**0.016**	**0.015**
EDU1	**0.610*** **	0.0673	**1.451** **	-0.039	**0.286***	0.0757	**0.234*** **	-0.164
	0.227	0.1425	**0.718**	0.096	**0.151**	0.1999	**0.072**	0.372
EDU2	**0.522** **	0.0025	**1.447** **	-0.107	0.178	-0.0166	**0.195** **	-0.203
	0.231	0.1506	**0.722**	0.149	0.159	0.2117	**0.101**	0.383
EDU3	**0.484** **	-0.0951	**1.315***	**-0.346** **	0.17	-0.0587	0.107	-0.186
	0.229	0.1481	**0.721**	**0.146**	0.156	0.204	0.088	0.377
AGE	-0.003	**-0.0057** **	-0.006	-0.013	-0.003	**-0.0065** **	0.001	-0.002
	0.003	**0.0029**	0.008	0.010	0.003	**0.0029**	0.003	0.003
SAGE	**0.000***	**0.0001*** **	0.000	**0.000***	0.000	**0.0001*** **	0.000	0.000
	0.000	**0.000**	0.000	**0.000**	0.000	**0.000**	0.000	0.000
HHSIZE	**-0.088*** **	**-0.0936*** **	**-0.158*** **	**-0.171*** **	**-0.064*** **	**-0.0749*** **	**-0.064*** **	**-0.062*** **
	0.005	**0.0055**	**0.017**	**0.019**	**0.005**	**0.0053**	**0.007**	**0.006**
CHILD1	**0.073*** **	**0.0761*** **	**0.146*** **	**0.122*** **	**0.048*** **	**0.0596*** **	**0.039*** **	**0.040*** **
	0.01	**0.0111**	**0.033**	**0.040**	**0.011**	**0.0111**	**0.013**	**0.012**
CHILD2	**0.054*** **	**0.0534*** **	**0.119*** **	**0.106*** **	**0.037*** **	**0.0383*** **	**0.039*** **	**0.029*** **
	0.007	**0.0081**	**0.024**	**0.031**	**0.008**	**0.0082**	**0.009**	**0.008**
ELDERLY	**0.037*** **	**0.0294** **	**0.070***	0.053	0.011	0.0215	0.013	0.019
	0.012	**0.0133**	**0.04**	0.048	0.014	0.0141	0.016	0.015
Constant	**-4.396*** **	**-3.9223*** **	**-8.795*** **	**-7.786*** **	**-3.131*** **	**-3.2158*** **	**-2.425*** **	**-1.686*** **
	0.253	**0.1856**	**0.808**	**0.456**	**0.177**	**0.2227**	**0.16**	**0.396**
SigF	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.000**
R square	**0.311**	**32.68**	**0.1221**	**0.111**	**20.28**	**24.84**	**12.44**	**0.133**

Notes: Weighted robust standard error are given in the second row of each covariates and *** = p < 0.01; **= p < 0.05; *= p < 0.1

Table 3.12 Endowment effect at mean and selected quantiles by VHLSS 2010, 2012

Variables	Mean		10th		50th		90th	
	2010	2012	2010	2012	2010	2012	2010	2012
lnINCOME	**0.1735*** **	**0.1752*** **	**0.2941*** **	**0.271*** **	**0.1506*** **	**0.1432*** **	**0.1458*** **	**0.1460*** **
	0.0094	**0.0093**	**0.0246**	**0.022**	**0.0074**	**0.0072**	**0.0143**	**0.0078**
MALE	0.0007	0.0009	0.0039	0.0041	-0.0008	0.0001	-0.0007	0.0014
	0.0023	0.002	0.0065	0.0053	0.0025	0.0022	0.0034	0.0021
KINH_ETH	-0.004	-0.0047	0.0005	-0.0033	**-0.0061** **	**-0.0076*** **	-0.0027	**-0.0093*** **
	0.0028	0.003	0.0104	0.0077	**0.0029**	**0.0029**	0.0032	**0.0015**
EDU1	**-0.0213*** **	**-0.0145** **	-0.0158	**-0.049** **	**-0.0225** *	-0.0084	**-0.0361*** **	0.0260
	0.007	**0.0071**	0.0102	**0.0192**	**0.0116**	0.0086	**0.0126**	0.0591
EDU2	0.0012	0.001	-0.001	**0.005** **	0.0013	0.0014	**0.0054** **	-0.0030
	0.0011	0.0009	0.0025	**0.0024**	0.0015	0.0011	**0.0022**	0.0057
EDU3	0.0032	0.003	-0.0153	0.0228	0.0072	0.0005	**0.0192** *	-0.0237
	0.0058	0.0057	0.0098	0.0153	0.0095	0.0071	**0.0106**	0.0481
AGE	**-0.0119** *	-0.0075	-0.0191	-0.0059	-0.0061	**-0.0086** *	-0.0054	-0.0024
	0.0061	0.0075	0.0175	0.0134	0.0069	**0.0051**	0.0082	0.0037
SAGE	**0.0137** **	0.0091	0.024	0.0104	0.0076	**0.0105** *	0.0076	0.0041
	0.0063	0.0079	0.0174	0.0135	0.0068	**0.0054**	0.0079	0.0038
HHSIZE	**0.0082*** **	**0.0053** **	**0.0095*** **	**0.008** **	**0.0078*** **	**0.0034** **	**0.0089*** **	**0.0054*** **
	0.0025	**0.0025**	**0.0035**	**0.0038**	**0.0022**	**0.0015**	**0.0028**	**0.0022**
CHILD1	-0.0002	-0.0005	0	-0.0015	-0.0002	-0.0002	-0.0002	-0.0010
	0.0004	0.0006	0.0007	0.0014	0.0004	0.0005	0.0005	0.0006
CHILD2	-0.0021	**-0.0013** *	0.0001	**-0.006** **	0.0006	-0.0004	-0.0032	**-0.0016** **
	0.0016	**0.0008**	0.0046	**0.0024**	0.0017	0.0007	0.0024	**0.0007**
ELDERLY	-0.0001	0	-0.0001	0.0000	0	0.0002	0	-0.0001
	0.0003	0.0003	0.0007	0.0006	0.0003	0.0005	0.0003	0.0003
Total	**0.1611*** **	**0.1660*** **	**0.2807*** **	**0.256*** **	**0.1393*** **	**0.1341*** **	**0.1386*** **	**0.1419*** **
	0.0093	**0.0087**	**0.0262**	**0.0205**	**0.0076**	**0.0072**	**0.0136**	**0.0117**

Note: Standard deviation is conducted as in the paper of Jann (2008) given in the second row of each covariate and *** = $p < 0.01$; **= $p < 0.05$; *= $p < 0.1$

Table 3.13 Unexplained effect at mean and selected quantiles by VHLSS 2010, 2012

Variables	Mean		10th		50th		90th	
	2010	2012	2010	2012	2010	2012	2010	2012
lnINCOME	**-1.4081*** **	**-1.1790*** **	**-2.8015*** **	**-3.3065*** **	**-0.8005*** **	**-1.0428*** **	**-0.5186** **	**-0.5606** **
	0.1613	**0.1726**	**0.5161**	**0.5489**	**0.1288**	**0.1312**	**0.2603**	**0.2506**
MALE	**0.0269***	0.0193	0.0223	0.0291	**0.0338** **	0.0072	0.0154	0.0079
	0.0153	0.0154	0.0462	0.0473	**0.0165**	0.0164	0.0215	0.0152
KINH_ETH	**0.0773*** **	0.0382	**0.2190** **	0.1194	0.0247	-0.0197	**0.0576***	0.0284
	0.0277	0.0292	**0.1023**	0.0843	0.0286	0.0279	**0.0316**	0.0388
EDU1	**-0.4636** **	0.0236	**-1.3144***	**0.3408** **	-0.1412	-0.022	-0.0083	0.0750
	0.2248	0.1458	**0.7004**	**0.1502**	0.163	0.2024	0.103	0.3194
EDU2	**-0.0046***	0.0004	**-0.0153** **	**0.0027** **	-0.001	0.0007	0.0012	0.0032
	0.0025	0.001	**0.0078**	**0.0013**	0.0018	0.0014	0.0015	0.0084
EDU3	**-0.0078***	0.0019	**-0.0242***	**0.0085*** **	-0.0019	0.001	0.0007	0.0138
	0.0041	0.0025	**0.0125**	0.0032	0.0029	0.0034	0.002	0.0568
AGE	-0.1865	-0.0505	-0.2571	0.3970	-0.0432	-0.0573	-0.1833	-0.3401
	0.1949	0.3297	0.6058	0.7643	0.2288	0.2355	0.2732	0.2803
SAGE	0.0829	0.0021	0.1391	-0.2159	0.0065	0.017	0.0728	0.1570
	0.0987	0.1765	0.3061	0.3979	0.1151	0.1203	0.1355	0.1434
HHSIZE	**0.1180*** **	**0.1278*** **	**0.3579*** **	**0.2899*** **	**0.0365*** **	**0.1402** **	0.0093	**0.0970** **
	0.035	**0.0358**	**0.0944**	**0.1029**	**0.0349**	**0.0348**	0.0546	**0.0414**
CHILD1	**-0.0197*** **	**-0.0190*** **	**-0.0527*** **	-0.0207	-0.0096	**-0.0176*** **	-0.0055	**-0.0133***
	0.0068	**0.0068**	**0.02**	0.0198	0.007	**0.0068**	0.0091	**0.0069**
CHILD2	**-0.0229*** **	**-0.0167** **	**-0.0699*** **	-0.0020	**-0.0246*** **	**-0.0177***	-0.0087	**-0.01967** **
	0.0078	**0.0075**	**0.0241**	0.0233	**0.0085**	**0.0082**	0.0113	**0.0079**
ELDERLY	-0.0048	-0.0065	-0.0111	-0.0110	-0.0008	-0.0121	-0.0043	**-0.0090***
	0.0046	0.0057	0.0134	0.0143	0.0048	0.0052	0.0059	**0.0054**
Constant	**1.7574*** **	**0.9918*** **	**3.7676*** **	**2.3911*** **	**0.8615*** **	**0.9434*** **	0.4537	0.4345
	0.3035	**0.2812**	**0.9444**	**0.6942**	**0.2424**	**0.273**	0.3051	0.4747
Total	**-0.0555*** **	**-0.0665*** **	-0.0402	0.0226	**-0.0599*** **	**-0.0797*** **	**-0.1180*** **	**-0.1257*** **
	0.0116	**0.0118**	0.041	0.0364	**0.0107**	**0.0105**	**0.0113**	**0.0164**

Note: Standard deviation is conducted as in the paper of Jann (2008) given in the second row of each covariate and *** = p < 0.01; **= p < 0.05; *= p < 0.1

3.7 Conclusion

Household saving is an important determinant of economic growth and household development. Like in other countries, urban households in Vietnam have higher saving rates than rural households. The higher saving rate of urban households not only occurs at the mean but also at the quantiles, along the distribution. In addition, urban households have more favourable characteristics than rural households; for instance, higher income, higher education, lower gender discrimination, etc. The objective of this paper is to determine whether the more favourable characteristics help urban households to have a higher saving rate than rural households.

To achieve our objective, we apply the Oaxaca-Blinder decomposition approach based on the results of OLS and UQR to reveal the higher saving rates at the mean and unconditional quantiles by using the survey VHLSS 2010. This approach allows us to divide the higher saving rates at the mean and at unconditional quantiles into two components: the endowment effect and the unexplained effect. While the endowment effect is the higher saving rate due to the differences in characteristics, the unexplained effect is the higher saving rate not explained by these differences.

The results of the aggregate decomposition show that the endowment effect tends to enlarge the urban-rural saving rate difference, while the unexplained effect diminishes it. This finding implies that the differences in household characteristics help urban households to have higher saving rates than rural households. In contrast, the unexplained effect diminishes the saving rate. Along the distribution, we find that at the low quantiles, the effects of differences in characteristics tend to be larger and help to explain most of the higher saving rate of urban households. Nevertheless, at the high quantiles, these effects are likely to be compensated by the unexplained effect. As a result, we observe that there is not much difference in saving rates between urban and rural households at those quantiles.

Concerning the isolated contribution of the characteristics, we find that the higher income and smaller size of urban households are the factors that help urban households save more. In contrast, households in urban areas with a higher proportion of Kinh majority are likely to save less than rural households, although the Kinh majority has many advantages compared to the ethnic minorities. This finding indicates that the ethnic inequality programmes of the government and other organisations in rural are likely to be effective and efficient. Nevertheless, this result is significant only at the quantiles with positive saving rates. It implies that the effectiveness and efficiency of these programmes is still a limitation for the poor minority households. For the three education covariates, we find that education tend to be a factor diminishing the urban-rural saving

rate difference. Among observed characteristics, we note the dominant contribution of the difference in income between two areas. The impacts of other covariates in the endowment effect seem to be limited compared with household income.

The results in this study contribute to the literature in various ways. Firstly, we confirm the role of household characteristics in saving and consumption behaviours of both urban and rural households in Vietnam. Furthermore, this paper highlights the impact of the differences of characteristics on the higher saving rate of urban households at the low quantiles. Thus, our findings confirm that differences in household characteristics can help to explain the higher saving rate of urban households. not only in income (Sicular et al., 2008; Tran, 2015) and consumption (Le & Booth, 2014; Nguyen et al., 2007) but also in savings. We also agree with Nguyen et al. (2007) about the impact of the unexplained effect on the urban-rural gap at the high quantiles. Based on these findings, we suggest that policies for consumption and savings need to be designed specifically for groups of households at different quantiles. In addition, our findings suggest that inequality in gender and ethnicity in rural areas is still high; hence, we also agree that inequality in rural areas is a matter that must continue to be considered, especially for poor households.

Nevertheless, our study still has some limitations. In this study, we focus on the endowment differences between urban and rural areas in explaining the higher saving rate of urban households. Following the previous chapter, we consider the impact of household characteristics, including household income, gender, ethnicity, education, children, and the elderly. There are still other factors that possibly affect the saving rates of urban and rural households, such as migration, social networks, etc., that are not studied in our research. In addition, we find that in the unexplained effect, a large contribution of unobserved characteristics indicated in the intercept can impact the difference in saving rate between urban and rural families. Thereby, we suggest a new study investigating the impact of other factors besides household characteristics on household saving rates of urban and rural families and hence, on the difference in household saving rates between two areas.

APPENDICES

Appendix 3.1 - Machado-Mata decomposition on the conditional quantiles

According to Koenker and Bassett (1978), conditional quantile regression at the τ quantile for urban (U) and rural (R) households is expressed as:

$$Q_\tau(y_{Ui}|x_{Ui}) = x'_{Ui}\beta_{U.\tau} \quad \textbf{(A1)}$$

$$Q_\tau(y_{Ri}|x_{Ri}) = x'_{Ri}\beta_{R.\tau} \quad \textbf{(A2)}$$

Machado and Mata (2005) proposed an approach to decompose the difference in the conditional quantiles obtained using results from the CQR approach based on the probability densities distribution. Hence, we can apply the Machado-Mata approach to decompose the difference in conditional quantiles of saving rates between urban and rural households. With rural households as the base group, the decomposition would be:

$$Q_\tau(y_{Ui}|x_{Ui}) - Q_\tau(y_{Ri}|x_{Ri}) = \left[Q_\tau(y_{Ui}|x_{Ui}) - Q_q(y_{Ui}|x_{Ri})\right] + \left[Q_q(y_{Ui}|x_{Ri}) - Q_\tau(y_{Ri}|x_{Ri})\right]$$

$$y^*_{U\tau} - y^*_{R\tau} = (y^*_{U\tau} - y^*_{C\tau}) + (y^*_{C\tau} - y^*_{R\tau}) \quad \textbf{(A3)}$$

In which: $y^*_{U\tau}$, $y^*_{R\tau}$ and $y^*_{C\tau}$ are saving rates of urban households, rural households, counterfactual saving rate at quantile τ, which are estimated from the joint density distribution of all observed covariates and by results from the CQR.

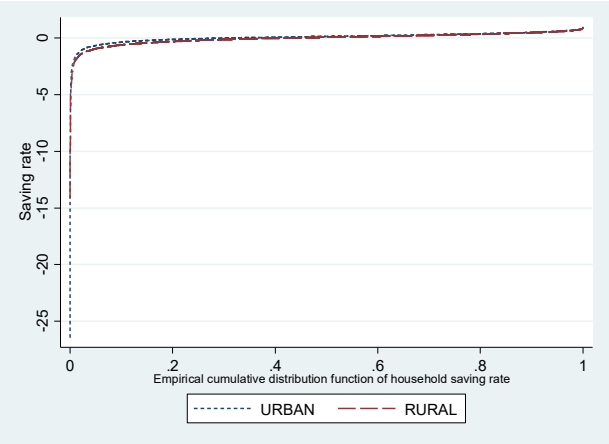
The procedure for estimating $y^*_{U\tau}$ and $y^*_{R\tau}$ in (**A3**) is as follows:

1. Generate a random sample of size m from Q [0. 1]: τ_1 ….. τ_m.
2. For the dataset of urban and rural households respectively. for each $\{\tau_i\}$ estimate the CQR: $Q_\tau(y_{Ui}|x_{Ui})$ and $Q_\tau(y_{Ri}|x_{Ri})$ obtaining coefficients $\hat{\beta}_U(\tau_i)$ and $\hat{\beta}_R(\tau_i)$ with $\tau = \overline{1,m}$
3. For urban and rural households, respectively, generate a random sample of *m* with the replacement from the rows of X_U, denoted by $\{X^*_{Ui}\}$, and from the rows of X_R, denoted by $\{X^*_{Ri}\}$ with $i = \overline{1,m}$
4. Estimate $\{y^*_{Ui} \equiv x^*_{Ui}\hat{\beta}_U(\tau_i)\}$ and $\{y^*_{Ri} \equiv x^*_{Ri}\hat{\beta}_R(\tau_i)\}$ with $i = \overline{1,m}$

Similarly, we can estimate the counterfactual saving rate $y^*_{C\tau}$ by applying the same procedure. Nevertheless, we run the conditional quantile regression in step 2 with the saving rate of urban households (y_{Ui}) as dependent variables and household characteristics of rural households (x_{Ri}) instead.

The result in (**A3**) provides us two components in the aggregate decomposition. The first $(y^*_{U\tau} - y^*_{C\tau})$ is the difference in conditional quantiles causing by covariates, while the second $(y^*_{C\tau} - y^*_{R\tau})$ explains the cause by coefficients between the two CQRs. Since this approach is based on the joint density of all covariates in the CQR. the contribution of separate characteristics as in Oaxaca-Blinder decomposition cannot be determined. This is the limitation of this technique.

Appendix 3.2 – Empirical cumulative distribution of the household saving rate before dropping observations



This graph indicates that there are some outliers at the low quantiles, which could have impact on results of our analyses. Hence, we suggest to drop out these outliers.

Appendix 3.3 – Monthly average income per capita at current prices by income source and living areas

	Salary & wage	Agriculture, forestry & fishery	Non-agriculture, forestry & fishery	Others	Total
Urban					
2010	1.169	96	601	264	2.130
2012	1.667	147	790	385	2.989
2014	2.226	175	1.029	534	3.964
Rural					
2010	390	357	210	113	1.070
2012	607	503	294	175	1.579
2014	814	586	393	245	2.038
WHOLE COUNTRY					
2010	622	279	328	158	1.387
2012	923	397	442	238	2.000
2014	1.253	458	591	335	2.637

Note: unit is 1.000 VND; Source: Data from VGSO

Chapter 4 A study of the impact of remittances on saving behaviour and expenditure patterns in Vietnam by means of propensity score matching[19]

Abstract

We examine the effects of receiving remittances on household saving behaviour and expenditure patterns by applying propensity score matching using the Vietnam Household Living Standard Survey (VHLSS) 2012. With respect to saving behaviour, we look at saving amount and saving rate. We find that remittances impact positively on household savings by increasing both saving amount and saving rate. As far as expenditure patterns are concerned, we consider the share of expenditure and per capita expenditure on many categories, including education, health, assets, house repairs, food, non-food and utilities. We reveal that receiving households spend more on health, assets and house repairs, and less on food. This finding implies that remittances are used productively in human and physical capital investments. With this use, remittances are likely to be considered as the transitory income in the Permanent Income Hypothesis. We find that remittances play an important role for the growth and development of households and the economy. Remittances help receiving households to increase income and savings, as well as human and physical capital investments. Moreover, for the economy, remittances can create more opportunities for the development of some services such as banks, financial institutions, hospitals, healthcare centres, and also be an incentive for the production and selling of building materials and tangible assets.

Keywords: Vietnam, remittances, saving behaviour, expenditure patterns, PSM

[19] This chapter is written by Hua Thanh Xuan, Professor Guido Erreygers and Professor Roselinde Kessels.

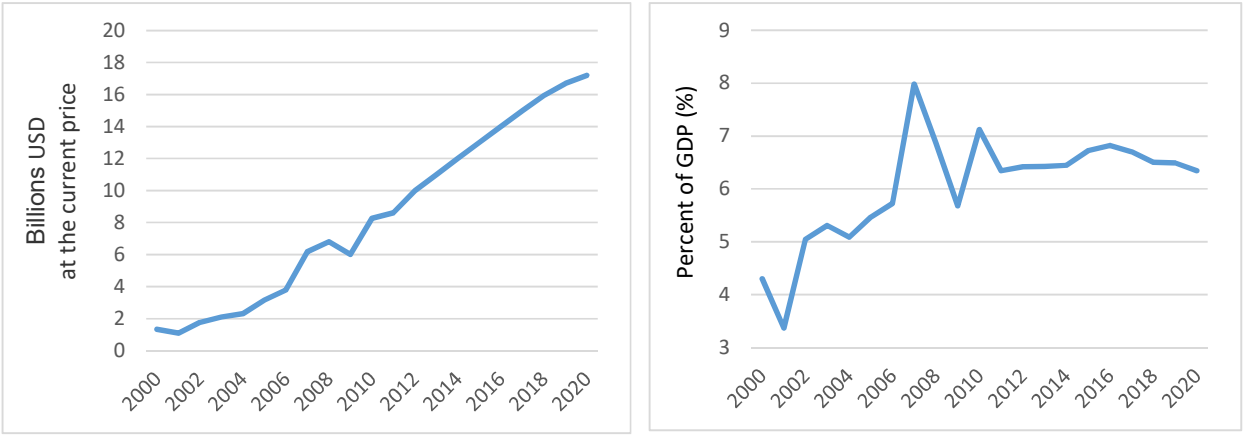
"At the microeconomic level, remittances allow poor recipient households to increase their savings, spend more on consumer durables and human capital, and improve children's health and educational outcomes. Remittances should thus be welcomed, encouraged, and facilitated."

Fajnzylber and López (2008)

4.1 Introduction

In developing countries, household remittances are one of the common income sources (McKenzie & Sasin, 2007). In Vietnam, remittances have been increasing over time (Nguyen, 2008). **Figure 4.1** shows a flow of external remittances into the country increasing rapidly from 2000 to 2020. Their contribution has been over 6% of GDP since 2010. Especially in 2019, Vietnam became the ninth highest remittance-receiving country, with inflow estimated at 16.68 billion USD, accounting for around 6.4% of GDP[20]. Moreover, in recent years, rapid urbanisation in Vietnam has induced a flow of labour migration from rural to urban areas, which has led to an increasing trend in internal remittances (World Bank, 2012). So both external and internal remittances have become more prevalent in the country. Nevertheless, we can find only a few number of papers investigating the impact of remittances on income and welfare (Nguyen et al., 2017; Nguyen, 2008; Nguyen & Mont, 2012; Nguyen & Vu, 2018). A comprehensive overview of the effect of remittances on saving behaviour and expenditure patterns is still missing.

Figure 4.1 External remittances in Vietnam



Source: The graphs are constructed using data collected from the website of World Bank.

[20] https://theleader.vn/viet-nam-nhan-gan-17-ty-usd-kieu-hoi-nam-2019-1571794661088.htm.

This study aims to uncover the impact of remittances on saving behaviour and expenditure patterns of Vietnamese households. In other words, we wish to find out how receiving households use their remittances. As far as saving behaviour is concerned, we look at the saving amount and the saving rate. Regarding expenditure patterns, we consider the share of expenditure and per capita expenditure on various categories, including education, health, assets, house repairs, food, non-food, and utilities. In most empirical studies, while expenditures on education, health, assets and households have been recognized as household investment categories, expenditures on food, non-food, and utilities have been referred to as consumption outlays. In addition, since remittances seem to be a common source of household income in developing countries such as Vietnam, we also explore whether remittances increase household income. This objective is achieved by comparing the incomes of receiving and non-receiving households. We expect our results to contribute to the current literature on remittances, which will be useful for either the government or researchers in constructing and implementing economic and social policies.

To achieve the objectives of this chapter, we apply the propensity score matching (PSM) approach proposed by Rosenbaum and Rubin (1983). Firstly, we estimate the propensity score for a household to receive remittances given a set of household characteristics by conducting a logit regression for the full sample. Then, we divide the full sample into two groups: households receiving remittances (treated group), and households not receiving remittances (non-treated group), and match receiving households with non-receiving families based on the estimated propensity score. Finally, the average treatment effect on the treated *(ATT)* determined by the differences in outcomes between households with and without remittances is estimated. We find that remittances can help households to increase their income and saving (in amount and in rate). In addition, households with remittances tend to spend more on health, assets and house repairs. These findings indicate that remittances in Vietnam are likely to be considered as transitory income in the Permanent Income Hypothesis.

By using PSM we can avoid endogeneity, which is a severe problem in the Working-Leser Engel curve regression approach (Engel, 1857; Leser, 1963; Working, 1943); an alternative approach applied in the same field of study. Moreover, PSM offers the advantage of controlling for self-selection based on observable characteristics without imposing too strong distributional assumptions in the absence of reliable instrumental variables (Jimenez-Soto & Brown, 2012).

The remainder of this chapter is structured as follows: section 4.2 reviews the impact of remittances on saving behaviour and expenditure patterns in previous studies; section 4.3 presents the framework of the PSM approach; section 4.4 describes the data, variable measurements, and

the descriptive statistics; and section 4.5 presents the empirical findings of this study. Finally, this chapter ends with a conclusion.

4.2 Literature review

Overall, various attempts have been made to study the impact of remittances on expenditure patterns (Ang et al., 2009; Castaldo and Reilly, 2007; Tabuga, 2010; and Clément, 2011), and a small number of papers have investigated the effect of these receipts on household saving amounts (Haider et al.; 2016; Nguyen & Vu, 2018). Nevertheless, evidence is still missing in respect of saving rates. In the literature, the impact of remittances on saving bahaviour and expenditure patterns can be explained by applying the *Life-cycle Theory* of Modigliani and Brumberg (1954) and the *Permanent Income Hypothesis* by Friedman (1957), in at least three ways, given as follows.

Firstly, according to the *Life-cycle Theory* of Modigliani and Brumberg (1954), how much households consume and save depends on the total income that families receive, rather than income sources. This finding means that remittances are fungible and used like income from other sources. Therefore, remittances could have impact on both household consumption and savings. Similarly, for expenditure patterns, receiving households can use their receipts for both consumption goods and investment categories. Thus, the expenditure patterns of households receiving and not receiving remittances seem to be indifferent.

In other words, families could consider one euro of remittance receipt like one euro of wage income. Therefore, one euro of remittance would be distributed to both consumption and savings in the same way as one euro of wage. Hence, remittances would impact both household consumption and savings (Haider et al., 2016; Nguyen & Vu, 2018). Likewise, regarding expenditure patterns, remittances can be used disproportionately for consumption goods (such as food, non-food, and utilities) and investment categories (such as education, health, and housing). Supporting evidence can be found in research by Adams Jr. et al. (2008), Ang et al. (2009), Castaldo and Reilly (2007), and Tabuga (2010).

Secondly, remittances can be considered as permanent income in the *Permanent Income Hypothesis* (Friedman, 1957). According to this theory, remittance income is stable for the long term and tends to be used for consumption. Therefore, if remittances are treated as a consumption component, they can be used for consumption expenditure (such as food, non-food, and utilities) rather than savings and investments. Numerous studies support this evidence.

For example, by applying the PSM approach, Clément (2011) found that receiving households in Tajikistan allocated a higher share of expenditure to food and utilities, and a lower share to housing and investment expenditure. The author concluded that remittances are not used productively since they do not impact positively on investment expenditure. In addition, Zhu et al. (2014) provided that Chinese rural households tend to use their remittances predominantly for consumption such as food and utilities, rather than for investment. They concluded that remittances should be considered as permanent income in rural areas of China. The finding of Zhu et al. (2014) is confirmed by the study of Démurger and Wang (2016). By using the PSM approach, Démurger and Wang (2016) found that remittance-receiving households in rural China have a higher share of expenditure on consumption goods and a lower share on educational spending. They stressed that remittances could be detrimental to sustaining investment in human capital for rural families in China.

Thirdly, remittances can also be treated as transitory income with unexpected, accidental occurrence in the *Permanent Income Hypothesis* (Friedman, 1957). Hence, remittances would be used for saving and investment expenditure rather than for consumption due to the zero propensity to consume from this income component. In this way, remittances are expected to impact the growth and development of households, and thereby considered as productive use (Randazzo & Piracha, 2019; Yang, 2008).

For example, in Guatemala, Adams and Cuecuecha (2010) found that households receiving external remittances used these productively on two forms of investment expenditure – education and housing – compared with non-receiving families. Moreover, the authors also show less spending on food by remittance-receiving households. This finding supports the view that remittances can help increase the level of investment in human and physical capital for remittance-receiving countries. Furthermore, the productive use of remittances on education is also found in the studies of Sosa and Medina (2006) in Colombia, Yang (2008) in the Philippines, and Randazzo and Piracha (2019) in Senegal. In addition, Mora and Taylor (2006) found use of remittances on education, health, and housing rather than on consumption expenditure categories in Mexico. This evidence of more spending on health of remittance-receiving households is also the finding of Berloffa et al. (2019) in Peru, and Ponce et al. (2011) in Ecuador.

In Vietnam, the current literature about the impact of remittances mostly focuses on income and expenditure. In most studies, researchers used the VHLSS datasets and defined remittances as receipts of households from other people such as migrant members, relatives and friends. First of all, Nguyen (2008) used the VHLSS 2002 and 2004 datasets to compare the impact of remittances

on income and expenditure. For external remittances, the authors found that the impact on income was much higher than the impact on consumption expenditures. Hence, they concluded that a large proportion of international remittances were used for saving and investment. Nevertheless, for internal remittances, the effect on consumption expenditures was slightly smaller than the effect on income.

The impact of external remittances on investment expenditure was supported by results of Nguyen and Mont (2012) using the updated VHLSS 2006 and 2008 datasets. Mainly, receiving households were likely to invest their receipts in housing, land, paying for debt, and saving, rather than using the receipts for living consumption.

In addition, Nguyen and Vu (2018) examined the patterns and impact of migration and remittances on household welfare in Vietnam using fixed-effect regressions and panel data from the VHLSS 2010 and 2012 datasets. They found that remittances help households to increase per capita income and per capita expenditure. Moreover, the effect of remittances on expenditure is smaller than the effect on income. They concluded that receiving households use remittances not only on consumption but also on savings.

Finally, Nguyen et al. (2017) conducted a study to investigate the effect of remittances on expenditure of internal migrant households in rural areas of three provinces; Ha Tinh, Thua Thien Hue, and Dak Lak, for the years 2007, 2008, and 2010 by using the survey from the project 'Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies'. In this project, remittances were defined as household receipts from migrant members who had moved to urban areas outside the original province for at least one month. The authors showed that migrant households with remittances preferred to spend more on housing and other non-food items, while families who did not receive remittances spent more on food, healthcare, and other non-food items.

An overview study of the impact of remittances on expenditure patterns and savings in Vietnam is still lacking. In this chapter, we contribute to the current literature in Vietnam by reflecting on various outcomes for remittances. With respect to household savings, we use saving amount and saving rate. As far as expenditure patterns are concerned, we study the share of expenditure and per capita expenditure for various expenditure categories. All outcomes will be described in more detail in the section on variable measurement.

4.3 Methodology

Commonly, empirical researchers investigate the impact of remittances on expenditure patterns and saving behaviour by applying two approaches: the Working-Leser Engel curve regression approach (Engel, 1857; Leser, 1963; Working, 1943), and the propensity score matching (PSM) approach (Rosenbaum & Rubin, 1983).

With respect to the Working-Leser Engel curve regression approach, based on the hypothesis of household utility maximisation, Working (1943) and Leser (1963) constructed a basic model to estimate the share of expenditure based on the logarithm of the total household expenditure. The basic model has then been extended to include other variables assumed to affect budget share, such as household characteristics (Deaton, 1997). In this way, empirical researchers added a dummy variable to observe the impact of remittances on household expenditure patterns (Castaldo & Reilly, 2007; Mora & Taylor, 2006; Tabuga, 2010). Hence, the Working-Leser Engel curve regression model is:

$$w_{ij} = \alpha_j + \beta_j \ln(z_i) + \gamma_j x_i + \theta_j REMIT_i + v_{ij} \qquad (\mathbf{1})$$

with

w_{ij} is the share of expenditure of good j by household i

z_i is the total expenditure of household i

x_i is the vector of household characteristics of household i

$REMIT_i$ is a binary variable indicating whether household i receives remittances

($REMIT_i = 1$) or not ($REMIT_i = 0$)

v_{ij} is the error term

The coefficient θ_j in equation (**1**), considered as the difference in share of expenditure on good j by a receiving and non-receiving household, is often estimated by OLS regression. Since the variable of receiving remittances $REMIT_i$ is also influenced by household characteristics x_i, this can lead to an endogeneity problem. Unobserved variables may affect both the household expenditure pattern and remittance status. Theoretically, this is a major problem that needs to be solved. If not, the estimated impact of household remittances on their expenditure pattern will be biased (Deaton et al., 1989).

One popular method to avoid endogeneity in this approach is using instrumental variables. With aggregate data, Aggarwal et al. (2011) suggest using per capita GDP and unemployment rate as

instrumental variables to avoid the endogeneity problem in studying the impact of remittances on financial development. Nevertheless, with micro-data, it is difficult to identify a suitable instrumental variable for remittances (Randazzo & Piracha, 2019). Also, McKenzie and Sasin (2007) argue that it is difficult to determine a valid instrumental variable that strongly correlates with receipt of remittances and does not impact directly on the household expenditure pattern. Using invalid instruments can result in an even larger bias in impact estimates (Nguyen & Mont, 2012; Randazzo & Piracha, 2019).

Instead, the PSM approach by Rosenbaum and Rubin (1983) performs well to estimate the impact of remittances on expenditure patterns (Caliendo & Kopeinig, 2008; Clément, 2011; Li, 2012; McKenzie et al., 2010; Randazzo & Piracha, 2019). We applied this alternative method to achieve the objectives of this chapter. In general, PSM has been applied to estimate the causal treatment effect in various fields of study. The basic idea of PSM is to compare and match households in the treated group with those in the non-treated group in terms of similar observable characteristics. In other words, the causal effect caused by the treatment is the difference in outcomes between the treated and non-treated groups that have similar observable characteristics. Therefore, selection bias between treated and non-treated households can be reduced (Clément, 2011). Usually, this approach consists of six steps as shown in an application by Caliendo and Kopeinig (2008).

Step 1. We constructed a logit / probit model to estimate the propensity score, defined as the probability for a household to receive remittances given a set of household characteristics. According to Caliendo and Kopeinig (2008), the choice between logit and probit is not critical since both usually yield similar results in the case of a binary dependent variable. We followed previous papers in using a logit regression to estimate the propensity score (Caliendo & Kopeinig, 2008; Clément, 2011; Li, 2012; McKenzie et al., 2010):

$$logit(P(REMIT_i = 1)) = \ln\left(\frac{P(REMIT_i = 1)}{1-P(REMIT_i = 1)}\right) = \beta x_i + \varepsilon_i \qquad (2)$$

where $P(REMIT_i = 1)$ is the probability of receiving remittances for household i with observed covariates x_i, β is the effect of x_i on (the logit of) the probability of receiving remittances, and ε_i is the error term.

In most studies, remittances are defined in two ways. First, remittances are defined as overall receipts from people, such as migrant members, relatives, friends, and neighbours (Castaldo & Reilly, 2007; Clément, 2011). Most of the current literature of remittances in Vietnam have defined remittances in this way, by using available information of household receipts in the VHLSS dataset (Nguyen et al., 2008; Nguyen & Mont, 2012; Nguyen & Vu, 2018). Second, Stark and Bloom

(1985), in the New Economics of Labour Migration, defined remittances as the sending by migrant members to their families. This definition provides researchers some insights of not only remittances but also migration, and has been used in numerous previous studies in other countries (Démurger & Wang, 2016; Nguyen et al., 2017; Randazzo & Piracha, 2019; Tabuga, 2010). We find that various definitions of migrant members have been used in the current literature. For instance, Randazzo and Piracha (2019) used the Africa Migration Survey defined migrant member as "a person who used to live in a household in the country in which the interview is being conducted but left before the interview to live abroad, or in another village or urban area within the country, for at least six months". In addition, Démurger and Wang (2016) used the dataset from Rural–Urban Migration in China defining migrant members as members working outside their home county and having been living away for at least six months over the preceding year.

In our study, we used the VHLSS 2012 dataset, which contains a special module on migration with extensive data on both migrants and their sending, detail missing in earlier and latter VHLSS. Applying this module, we define migrant members as "people had left the households, but were still considered as important to the household in term of either filial responsibility or financial contributions". There are three types of migration of these members, including international, inter-provincial, and intra-provincial migrations. We limit our study with this definition of migration, since we could not observe remittances from other former members, who had left the household and played less important role in term of either filial responsibility or financial contributions. However, we suppose that remittances from these members may also be low and rare due to their less important financial role in households. Thus, excluding these unobserved receipts may not impact our findings.

We have two motivations for using the second definition of remittances. First, we find that migration within the country as well as from Vietnam to other foreign countries has increased rapidly in recent years (Junge et al., 2015; Luong, 2018; Nguyen et al., 2017; Nguyen & Vu, 2018). Particularly, Vietnam's 2009 census showed that 8.5 percent of the population were inter- and intra-provincial migrants due to their residence changes; and the government expect this percentage to continue rising in Vietnam (World Bank, 2016). Furthermore, there are around 4 million Vietnamese descent living abroad (Ministry of foreign affairs of Vietnam, 2012). Thus, by using the second definition, our findings could contribute to empirical literature not only of remittances, but also of migration in Vietnam. Second, since the current literature of remittances are almost based on the first definition, by using an alternative definition, our results could provide an expanded view of remittances in the country.

An important note in the application of PSM is related to the selection of observed covariates to estimate the propensity score using equation **(2)**. These variables should be chosen based on relevant theories, institutional settings, and previous empirical studies, and should have a simultaneous impact on the treatment (receiving remittances) and potential outcomes (expenditure patterns and saving behaviour) to attain a reliable result (Caliendo & Kopeinig, 2008; Heckman et al., 1997; Li, 2012). Following previous empirical studies in the context of remittances in developing countries, we included the following numerical covariates in the logit model: household size, number of members with a high-school degree or above, age of the household head and its squared mean-centred term (to observe a non-linear relationship), number of elderly members over 70 years old, number of children below 6 years old and number of children between 6 and 14 years old. We also studied the effect of the following categorical covariates: living area of the household (urban/rural), ethnicity of the household head (Kinh/other minorities), marital status of the household head (married/otherwise), and the six regions of Vietnam including Red River Delta, Midlands and Northern Mountainous Areas, Northern and Coastal Central Region, Central Highlands, South-Eastern Area, and Mekong River Delta. We specified this region covariate by means of five dummy variables in the logit model, with Mekong River Delta as the base region group.

We followed Clément (2011), and Randazzo and Piracha (2019), as well as other remittances studies applying the PSM approach, by not including income as a covariate in equation (**2**) for estimating the propensity score, due to two reasons. First, according to the authors of these studies, household income does not have an impact on receiving remittances. Thus, adding income as a covariate in the logit regression to estimate the probability of a household receiving remittances, would not be meaningful. Second, theories of consumption state that household characteristics influence household income. Hence, including both covariates in the regression model may potentially cause an endogeneity bias.

Step 2. We checked the region of common support to ensure that treated households can be matched with some non-treated households having a similar propensity score by comparing the range of propensity score for households with and without remittances. Any treated household which has a propensity score lying outside the region of common support is dropped or deleted, since we cannot find any non-treated household having similar propensity to match with them (Caliendo & Kopeinig, 2008). The common methods to determine the common support is based on the minima, maxima and density of the propensity scores in both treated and non-treated group (Caliendo & Kopeinig, 2008).

Step 3. We used PSM estimators to match each observation in the treated group with one or some observations in the non-treated group to the matched samples in term of similar predicted propensity score. Rosenbaum and Rubin (1983) constructed several PSM estimators, which differ not only in the way the neighbourhood for each treated observation is defined, but also concerning the weights assigned to the neighbours. Each estimator presents advantages and drawbacks in terms of a trade-off between quality and quantity of the matches (Caliendo & Kopeinig, 2008). Asymptotically, all PSM estimators should yield the same results, thus, various matching estimators should be implemented in a research to compare the results and check the robustness of the findings (Caliendo & Kopeinig, 2008; Garrido et al., 2014; Randazzo & Piracha, 2019). Following the previous empirical studies, we considered the *k*-nearest neighbour (*k*NN) estimator ($k = 5$), the radius caliper estimator at caliper ($r = 0.001$), and the kernel estimator.

The *k*-nearest neighbour estimator matches each treated household with the *k* closest non-treated households in terms of propensity score. We applied both $k = 5$ and $k = 10$, but only report on $k = 5$ because the results for both numbers are similar. However, any treated household for which the nearest non-treated households are far away, could face the issue of bad matches. This matter can be avoided by applying the radius caliper estimator. In this research, the caliper fixed at 0.001 allows us to match each treated household with non-treated households within the threshold of 0.001 propensity score distance. With both these estimators, each treated household is matched with only a few households in the non-treated group. Therefore, the non-treated households which do not satisfy the matching condition are excluded from the matched sample. However, the kernel estimator allows us to match each treated household with a weighted average of all households in the non-treated group.

Step 4. It is crucial to check the balancing property of observed covariates and propensity score distributions between treated and non-treated groups after matching. If these distributions are balanced or equivalent after matching, the results of the PSM approach are valid. Otherwise, the matching results could be misleading and biased, and the propensity score estimated by observed covariates would need to be re-examined (Caliendo & Kopeinig, 2008; Garrido et al., 2014; Rosenbaum & Rubin, 1983). Various tests are allowed to check the balancing property of observed covariates and propensity score distributions after matching (Austin, 2009; Ho et al., 2007; Rosenbaum & Rubin, 1985; Sianesi, 2004). We conducted various tests to check the robustness of the balancing property for all matching estimators (see **Appendix 4.1**).

Step 5. If the balancing property is sufficient, the effect caused by the treatment can be determined by the average treatment effect on the treated (*ATT*), which is defined as the difference between

expected outcome values with and without treatment for households in the treatment group. In this research, ATT is the effect of remittances on saving behaviour and expenditure patterns and given by

$$ATT = E(Y_{i1}|REMIT_i = 1) - E(Y_{i0}|REMIT_i = 1) \quad (3)$$

with $E(Y_{i1}|REMIT_i = 1)$ and $E(Y_{i0}|REMIT_i = 1)$ the expected outcome values with and without treatment for households in the treatment group.

In PSM, the expected outcome values of observations without treatment for households in the treatment group $E(Y_{i0}|REMIT_i = 1)$ is simply the expected outcome values of observations without treatment (the non-treated group) after matching $E(Y_{i0}|REMIT_i = 0)$. Hence,

$$ATT = E(Y_{i1}|REMIT_i = 1) - E(Y_{i0}|REMIT_i = 0) \quad (4)$$

We used two sets of outcomes for saving behaviour and expenditure patterns. Regarding saving behaviour, we studied saving amount (1,000 VND) and saving rate. With respect to expenditure patterns, we analysed the share of expenditure and per capita expenditure (1,000 VND) on various categories, including education, health, assets, house repairs, food, non-food, and utilities which we described in detail in **Table 4.1.**

Furthermore, we wanted to test whether remittances can help receiving households to increase their income. We noted that income provided in the dataset includes remittances defined in the first way. However, we defined remittances in the second way; thus, we recalculated the adjusted income (used as an outcome) by the formula:

Adjusted income = Total income – Household remittances in the first definition
+ Household remittances in the second definition

Table 4.1 Description of expenditure categories

Category	Description
Education	Relating all expenses for education of household, including tuition fees, contributions to class, school, uniforms, books, study instruments (such as paper, pen, etc.), coaching sessions; and others (such as exam fees, travel, rent, and student body insurance).
Health	Relating all expenses for healthcare and health checks, such as doctor fees, lab fees, hospitalisation, prescription, travel, insurance fees, etc.
Assets	Including spending on buying house equipment, such as bikes, motorbike, car, boat, phone, air conditioner, washing machine, etc.
House repairs	Including all costs for repairing and maintaining the house.
Food	All expenditure on food and drink.
Non-food	All expenditure on non-food expenditure categories.
Utilities	Including expenditure on water, electricity, and waste.

Step 6. We conducted the bounding approach proposed by Rosenbaum (2002) (see **Appendix 4.2**) for testing the sensitivity of the PSM results. In PSM, any unobserved covariates are assumed not to impact the *ATT*. If there are any unobserved covariates affecting the treatment and the outcomes simultaneously, a 'hidden bias' might occur. Testing sensitivity allows us to examine whether the estimated *ATT* is sensitive to the influence of unobserved covariates, or the possible effect of hidden bias in the cases of existing unobserved covariates (Becker & Caliendo, 2007).

There are two reasons for us to apply PSM in this research. First, as mentioned before, this approach performs well in the case that we cannot find a suitable instrumental variable to avoid endogeneity problems which often occur when studying the effect of remittances on household expenditure patterns and saving behaviour (Caliendo & Kopeinig, 2008; Démurger & Wang, 2016; Li, 2012; McKenzie et al., 2010; Randazzo & Piracha, 2019). Second, PSM allows us to reduce the sources of bias in the observational data (Heckman et al., 1998). Particularly, in this approach, the treated and non-treated households are matched in term of similar propensity score; those households with different characteristics are not matched and excluded. Thus, the bias from non-overlapping observations can be reduced. In addition, this technique allows us re-weight the non-treated households to obtain equivalent distributions between the treated and non-treated households, and thereby, diminish the bias due to difference in density weighting between these two groups.

4.4. Descriptive statistics

The VHLSS 2012 consists of 9,399 households. Because a household head younger than 18 is illegal, we deleted six households with household heads of an illegal age. Next, we excluded three households who had answered 'do not remember' for the receiving remittances question, 608 households for missing educational information, and three households who could not determine their saving rate. Overall, our final sample included 8,778 households where 2,174 households (24.73%) received remittances, and 6,604 households (75.23%) did not. Regarding sources of remittances, 2,071 and 159 households received internal and external remittances, respectively. Because the sample of households receiving external remittances was small, we did not analyse the impact of internal and external remittances separately. Instead, we focused on total remittances.

Table 4.2 shows the characteristics of the households with and without remittances. Households receiving remittances tend to have smaller size, lower education, more elderly members and less children than those not receiving. In addition, the high proportion of households receiving remittances were likely to be more rural, of Kinh ethnicity, and to have a non-married household head. Furthermore, there was a difference in the proportion of receiving households between regions.

The means and standard deviations of income, saving and expenditure for the whole sample as well as for families with and without remittances appear in **Table 4.3**. Distributions of these variables vary between the whole sample and the two subgroups, especially compared to the subgroup without remittance receipt. With respect to the means, adjusted income, total expenditure, and per capita expenditure were lower for receiving households than for families without remittances. This indicates that in Vietnam receiving households may be poorer and have lower welfare compared with families without remittances. Nevertheless, they can save more as shown by a higher saving amount and saving rate. Regarding variability, the numbers reveal a high standard deviation, especially for families without remittance receipt. Lastly, concerning expenditure patterns, receiving households tend to spend more on health, assets and house repairs, while non-receiving families tend to spend more on education, food, non-food and utilities.

Table 4.2 Descriptive statistics of the sample characteristics with sample weights

	Households with remittances (N = 2,174 and W = 5,427,473)				Households without remittances (N = 6,604 and W = 16,442,717)			
Numerical variables	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**
Household size	3.478	1.686	1.000	11.000	3.954	1.437	1.000	12.000
Nr members with high-school degree or above	0.738	1.017	0.000	6.000	0.928	1.158	0.000	7.000
Age household head	58.116	11.748	20.000	95.000	46.969	13.324	18.000	94.000
Nr elderly members	0.329	0.595	0.000	3.000	0.171	0.454	0.000	2.000
Nr children 0-5 years	0.244	0.512	0.000	3.000	0.375	0.609	0.000	3.000
Nr children 6-14 years	0.283	0.597	0.000	4.000	0.623	0.789	0.000	5.000

Categorical variables (in %)	**With remittances**	**Without remittances**	**Whole sample**	**Categorical variables (in %)**	**With remittances**	**Without remittances**	**Whole sample**
Living area household				**Region of household living**			
Urban	20.99	34.02	30.79	Red River Delta	28.36	23.78	24.92
Rural	79.01	65.98	69.21	Midlands and Northern Mountainous Areas	12.39	12.59	12.54
Ethnicity household head				Northern and Coastal Central Region	26.96	20.88	22.39
Kinh	91.37	86.81	87.95	Central Highlands	2.92	5.91	5.17
Minor ethnicity	8.63	13.19	12.05	South-Eastern Area	8.75	19.47	16.81
Marital status household head				Mekong River Delta	20.62	17.37	18.17
Married	78.24	83.14	81.93				
Otherwise	21.76	16.86	18.07				

Table 4.3 Descriptive statistics for adjusted income, remittances, saving behaviour and expenditure with sample weights

	Whole sample (N = 8,778 and W = 21.870.190)		Households with remittances (N = 2,174 and W = 5,427,473)		Households without remittances (N = 6,604 and W = 16,442,717)	
Numerical variables	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Adjusted income (1000 VND)	99,406.460	99,510.700	89,412.370	80,718.890	102,705.400	104,774.100
Remittances (1000 VND)	3,259.227	15,572.290	13,133.170	29,116.130		
Saving amount (1000 VND)	22,027.620	71,713.220	22,227.710	67,708.120	21,961.570	72,991.840
Saving rate	-0.005	1.456	0.059	0.642	-0.026	1.638
Total expenditure (1000 VND)	77,378.850	61,546.320	67,184.660	56,730.740	80,743.780	62,696.420
Share of education expenditure (%)	0.044	0.069	0.034	0.064	0.048	0.070
Share of health expenditure (%)	0.048	0.079	0.064	0.096	0.043	0.072
Share of asset expenditure (%)	0.040	0.089	0.041	0.095	0.040	0.087
Share of house repairs (%)	0.012	0.056	0.015	0.066	0.010	0.052
Share of food expenditure (%)	0.542	0.129	0.536	0.133	0.544	0.128
Share of non-food expenditure (%)	0.280	0.096	0.278	0.101	0.280	0.095
Share of utilities (%)	0.034	0.033	0.031	0.025	0.035	0.035
Per capita expenditure (PCE) (1000 VND)	21,329.770	17,054.220	20,383.920	16,176.260	21,641.980	17,324.120
PCE for education (1000 VND)	1,086.043	4,559.845	718.995	1,839.826	1,207.199	5,145.896
PCE for health (1000 VND)	1,072.264	2,672.007	1,420.606	3,260.805	957.283	2,436.128
PCE for assets (1000 VND)	1,223.634	6,611.444	1,426.143	10,424.190	1,156.789	4,718.759
PCE for house repairs (1000 VND)	3,582.293	2,255.531	537.692	3,030.480	298.992	1,929.331
PCE for food (1000 VND)	10,704.140	6,671.854	10,007.310	5,234.823	10,934.150	7,067.761
PCE for non-food (1000 VND)	6,111.310	6,252.114	5,649.425	4,550.661	6,263.771	6,713.151
PCE for utilities (1000 VND)	99,406.460	99,510.700	623.750	787.180	823.795	1,278.468

4.5 Empirical findings of the PSM approach

4.5.1 Results of the estimated propensity score by logit regression

Table 4.4 presents two models for the the estimation of the propensity score, which is interpreted as the probability of a household receiving remittances based on the observed household characteristics. We included all observed covariates in the initial model revealing that the effects of the number of elderly members and the number of children below 6 years old on the propensity score are insignificant at the 5% level. Therefore, we excluded these two variables from the final model, which only shows the impact of the significant characteristics.

The importances of the significant explanatory variables to the propensity score estimates obtained from logit regression appear in **Figure 4.2**. They are indicated by means of the logworth, defined as $-\log_{10}$ (p-value of the F-test) (Kessels & Erreygers, 2019). The horizontal bar graph depicts the logworth values of the variables relative to the most important variable, age of the household head, for which the logworth values of its main and squared term combined, are normalized to 100%. The age of the household head and the squared age have most effect on the propensity score, followed by region, urban living area, education, older children, marital status of the household head, household size and ethnicity of the household head.

Figure 4.2 Importances of the explanatory variables to the propensity score estimates obtained from logit regression

Source	Logworth	PValue
Age household head	241.650	0.00000
Squared mean-centred age	66.219	0.00000
Region	14.786	0.00000
Urban living area	12.896	0.00000
Nr members high-school degree	11.177	0.00000
Nr children 6-14 years	7.217	0.00000
Married household head	6.755	0.00000
Household size	3.328	0.00047
Kinh household head	2.511	0.00309

The overall goodness of fit as measured by the pseudo R^2 is 18.9%, indicating that the observed characteristics can explain 18.9% of the propensity score. There is no threshold for this number in the PSM approach. Most of the previous papers accept at least 10%; for instance, 10% and 8% in

the research of Clément (2011), and Démurger and Wang (2016), respectively. Hence, the explanatory power of the logit model for the estimated propensity score in our study is satisfactory. Indeed, the objective of propensity score is not to maximize the fit of the model, but to serve as a balancing score (Randazzo & Piracha, 2019). Thus, the estimated effects of the observed characteristics on the propensity score can be applied[21].

Some interesting results are found as follows. First, the probability of receiving remittances increases steeply with the age of the household head until the age of 70 is reached, after which the probability decreases. Second, there are significant differences in the probability of receiving remittances between households in different regions. Based on the coefficients of the different regions in the final model, the probability of households receiving remittances is the highest for the Midlands and Northern Mountainous Areas, followed by the Northern and Coastal Central Region, the Red River Delta, the Mekong River Delta, the Central Highlands, and the South-Eastern Area. However, the difference in the probability of receiving remittances of households in the Mekong River Delta and households in the Red River Delta is not significant. Third, rural households have a higher probability of receiving remittances than urban households. Fourth, as far as education is concerned, the probability of receiving remittances depends negatively on the number of well-educated members. Migrants from a well-educated household could have less strong motives to send remittances to support their home families. Fifth, relating to the marital status of household head, married household heads have a higher probability of receiving remittances than the others. Sixth, older children negatively affect the probability of receiving remittances. Migrant members could have less responsibility to support their home families in case these consist of more older children. Similarly to the work of Hua and Erreyers (2019), we considered older children as belonging to the household labour force, and not as dependent members, as in other empirical papers. This result confirms the role of older children as labourers in households. Seventh, the probability of receiving remittances depends negatively on household size. This implies that small families tend to receive remittances more often than larger families. Lastly, the effect of the ethnicity covariate reveals that the Kinh ethnic group has a higher probability of receiving remittances than other minorities. This result supports the conclusion of Coxhead et al. (2015), and Nguyen and Vu (2018), who found that people from minor ethnicities were less likely to migrate than Kinh people.

[21] We conducted PSM with internal and external remittances separately. Nevertheless, the pseudo R^2 for the logit model using the external remittances was smaller than 5%, and therefore we abandoned this subgroup analysis.

Table 4.4 Initial and final logit model for propensity score estimation of a household to receive remittances where the variables are listed in decreasing order of importance

Variable	Coefficient initial model (Chi-square value)	Coefficient final model (Chi-square value)
Age household head	0.101*** (677.99)	0.101*** (700.42)
Squared age household head (mean-centred)	-0.003*** (208.09)	-0.002*** (252.88)
South-Eastern Area	-0.625*** (31.04)	-0.627*** (31.28)
Central Highlands	-0.529*** (13.05)	-0.527*** (12.95)
Northern and Coastal Central Region	0.162** (3.88)	0.165** (4.00)
Midlands and Northern Mountainous Areas	0.169* (2.71)	0.178* (3.00)
Red River Delta	0.004 (0.00)	0.015 (0.03)
Urban	-0.491*** (53.99)	-0.488*** (53.49)
Members with high-school degree or above	-0.193*** (41.81)	-0.200*** (45.94)
Married household head	0.389*** (25.70)	0.388*** (26.70)
Children 6-14 years	-0.249*** (21.25)	-0.273*** (28.48)
Household size	-0.097*** (12.80)	-0.074*** (12.08)
Kinh household head	0.287*** (8.17)	0.294*** (8.61)
Elderly members	0.116 (2.64)	/
Children 0-5 years	0.079 (1.41)	/
Constant	-5.791*** (533.53)	-5.857*** (559.30)
Pseudo R^2	0.189	0.189
-Log-likelihood(full model – constant model)	928*** (1,856.23)	926*** (1,852.70)
Observations, N	8,778	8,778

Note: *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.
The reference household of the model is a household in a rural area of the Mekong River Delta where the household head is not married and of minor ethnicity.

4.5.2 Checked common support for propensity scores of treated and non-treated groups

Table 4.5 contains the minima and maxima of the estimated propensity scores for treated and non-treated households. This range was [0.0017; 0.7063] for treated households and [0.0007; 0.7048] for non-treated households, and thus the range of propensity scores for both groups was largely overlapping. Therefore, the region of common support was determined from 0.0017 to 0.7048. Any treated household with a propensity score outside this range was excluded, and therefore not used in the next steps.

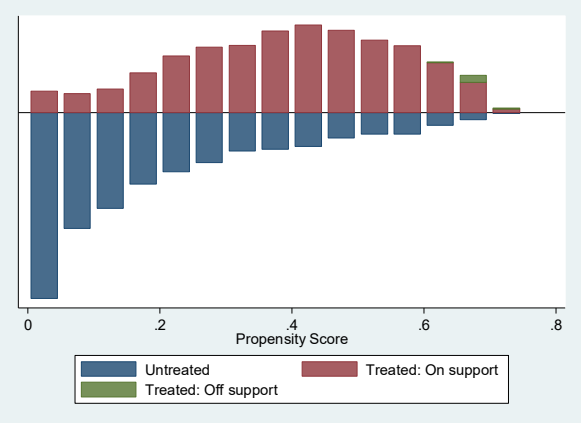
Figure 4.3 shows the densities of the propensity scores of the treated and non-treated households. The histogram of treated households, which is in the upper part of the horizontal line, shows an inverted U-shaped distribution. In contrast, the histogram of non-treated households is the right-skewed distribution, which appears below the horizontal line. Hence, there could be a difference between the two distributions before matching; comparing the outcomes of the two groups without matching would result in misleading and biased results. The PSM approach allowed us to create matched samples and re-weight the non-treated households by using the matching estimators, so that distributions of the treated and non-treated households in the matched samples are equivalent. Thus, the procedure of this approach helped to reduce the bias from non-overlapping supports and the bias due to different density weighting, which we mentioned in section 4.3.

Table 4.5 Descriptive statistics of propensity score estimates from the final logit model

Household group	*N*	Mean	Std. Dev.	Min	Max
With remittances	2,174	0.3965	0.1662	0.0017	0.7063
Without remittances	6,604	0.1987	0.1732	0.0007	0.7048

Note: The region of common support is [0.0017; 0.7048].

Figure 4.3 Densities of the propensity score for treated and non-treated households

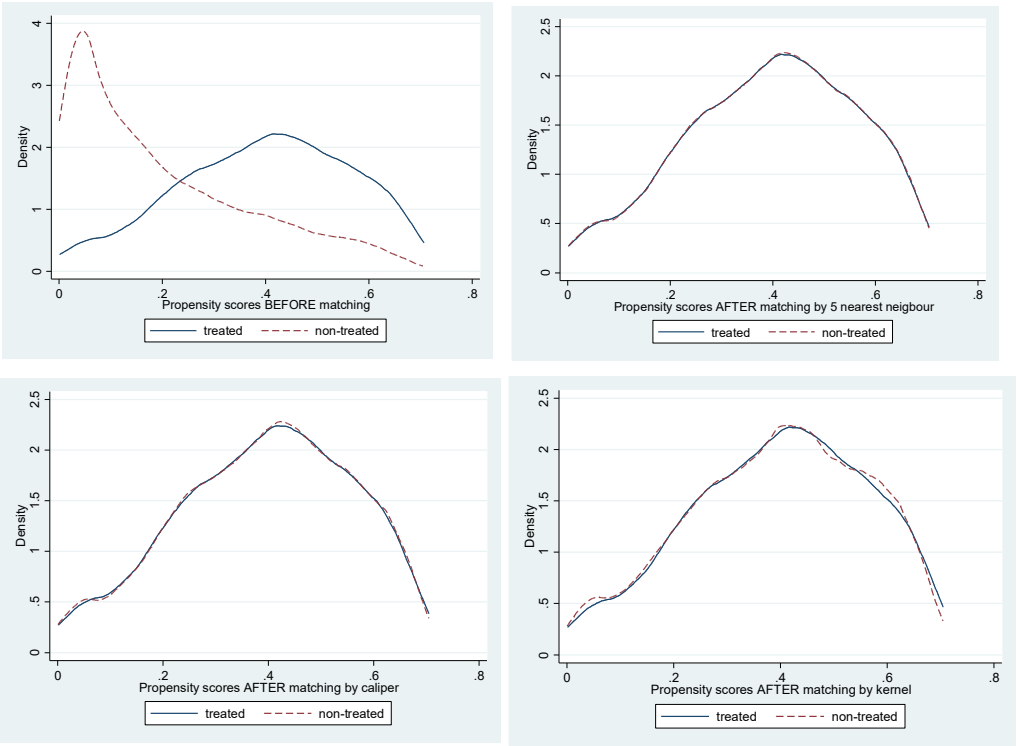


4.5.3 Qualifying matching estimators

We present the results of the balancing property tests for covariates in **Tables 4.6, 4.7** and **4.8** for the three matching estimators. Firstly, the tests of standardised differences or mean differences of each covariate show that there is no difference in the means of the covariates between households with and without remittances after matching. Secondly, the absolute standardised bias after matching is always below 5%, with a maximum of 4.1% for the kernel matching estimator. Finally, the variance ratios for the continuous covariates in the last columns of these tables are approximately equal to 1 after matching; this finding means that variance of propensity score of the two groups after matching are likely the same. Results of all these tests indicate that the balancing property of covariates is satisfied.

As far as the balancing property of the joint-covariates is concerned, firstly, the new regressions of treated and non-treated households in the matched sample show that the joint F-tests of all estimators are insignificant (see **Table 4.9**). Thus, none of the observed covariates can explain the difference in propensity scores between treated and non-treated groups in the matched sample. Hence, after matching, the distributions of the propensity score for the treated and non-treated households are balanced (see **Figure 4.4**). In addition, very small pseudo R^2 values are observed; only 0.1% for all estimators. These numbers indicate that the observed covariates can explain very little of the propensity score in the matched sample.

Figure 4.4 Propensity score distribution before and after matching



In addition, we also consider the mean of absolute standardised bias proposed by Ho et al. (2007), and Austin (2009). As presented in **Table 4.9**, we note that this figure for the unmatched sample (before matching) is rather high (25%), while for the matched samples, these numbers are low; only from 1.5% to 1.6%. Among the matching estimators, we find that the kernel estimator with the lowest mean and median (1.6% and 1.3% respectively) compared with other estimators is the best reduction bias. Indeed, Caliendo and Kopeinig (2008) found that the advantage of the kernel estimator is the lower bias, since all observations in the non-treated group are included in the matched sample. We also find the similar result in the paper of Garrido et al. (2014).

In summary, the results of all the tests confirm that the balancing property is satisfied. Thus, the distributions of households with and without remittance receipt after matching are equivalent. Therefore, the PSM approach can be applied to estimate the impact of remittances on expenditure patterns and saving behaviour.

Table 4.6 Tests for the balancing property of each covariate using the 5 nearest neighbour matching estimator

Variable	Sample	Mean		Absolute standardised bias (%)	t-test	Prob	Variance ratio (VT/VC)
		Treated	Control				
Age household head	Unmatched	58.111	46.507	92.8	36.46	0.000	0.79
	Matched	**58.095**	**58.243**	**1.2**	**-0.41**	**0.680**	**0.99**
Squared age household head (mean-centred)	Unmatched	213.740	183.150	11.0	4.78	0.000	1.71
	Matched	**213.470**	**217.530**	**1.5**	**-0.44**	**0.658**	**1.13**
South-Eastern Area	Unmatched	0.070	0.137	22.1	-8.34	0.000	
	Matched	**0.070**	**0.072**	**0.6**	**-0.24**	**0.813**	
Central Highlands	Unmatched	0.035	0.076	17.9	-6.69	0.000	
	Matched	**0.035**	**0.034**	**0.4**	**0.18**	**0.856**	
Northern and Coastal Central Region	Unmatched	0.262	0.212	11.7	4.81	0.000	
	Matched	**0.262**	**0.257**	**1.2**	**0.37**	**0.709**	
Midlands and Northern Mountainous Areas	Unmatched	0.149	0.176	7.4	-2.94	0.003	
	Matched	**0.148**	**0.137**	**2.9**	**1.02**	**0.306**	
Red River Delta	Unmatched	0.264	0.207	13.4	5.52	0.000	
	Matched	**0.264**	**0.273**	**1.9**	**-0.61**	**0.542**	
Urban	Unmatched	0.223	0.322	22.4	-8.79	0.000	
	Matched	**0.223**	**0.224**	**0.1**	**-0.05**	**0.959**	
Members with high-school degree or above	Unmatched	0.737	0.871	12.4	-4.87	0.000	0.80
	Matched	**0.738**	**0.736**	**0.2**	**0.06**	**0.948**	**0.95**
Married household head	Unmatched	0.786	0.842	14.4	-6.01	0.000	
	Matched	**0.785**	**0.772**	**3.6**	**1.10**	**0.273**	
Children 6-14 years	Unmatched	0.285	0.645	50.9	-19.25	0.000	0.56
	Matched	**0.285**	**0.268**	**2.4**	**0.96**	**0.336**	**1.11**
Household size	Unmatched	3.531	3.992	29.3	-12.40	0.000	1.40
	Matched	**3.533**	**3.569**	**2.3**	**-0.71**	**0.475**	**1.11**
Kinh household head	Unmatched	0.896	0.831	18.8	7.23	0.000	
	Matched	**0.895**	**0.901**	**1.7**	**-0.62**	**0.534**	

Note: - There is no significant difference in the means of the covariates between households with and without remittances after matching.

- The maximum of the absolute standardised bias after matching is 3.6%.
- The variance ratios of the treated and non-treated groups (VT/VC) for the continuous variables are approximately equal to 1 after matching, meaning that the variances of these two groups are equivalent.

Table 4.7 Tests for the balancing property of each covariate using the radius matching estimator (r = 0.001)

Variable	Sample	Mean		Absolute standardised bias (%)	t-test	Prob	Variance ratio (VT/VC)
		Treated	Control				
Age household head	Unmatched	58.111	46.507	92.8	36.46	0.000	0.79
	Matched	**58.006**	**58.265**	**2.1**	**-0.72**	**0.470**	**1.00**
Squared age household head (mean-centred)	Unmatched	213.740	183.150	11.0	4.78	0.000	1.71
	Matched	**212.16**	**216.33**	**1.5**	**-0.45**	**0.653**	**1.14**
South-Eastern Area	Unmatched	0.070	0.137	22.1	-8.34	0.000	
	Matched	**0.071**	**0.074**	**1.2**	**-0.47**	**0.638**	
Central Highlands	Unmatched	0.035	0.076	17.9	-6.69	0.000	
	Matched	**0.356**	**0.356**	**0.1**	**0.03**	**0.978**	
Northern and Coastal Central Region	Unmatched	0.262	0.212	11.7	4.81	0.000	
	Matched	**0.258**	**0.248**	**2.4**	**0.76**	**0.447**	
Midlands and Northern Mountainous Areas	Unmatched	0.149	0.176	7.4	-2.94	0.003	
	Matched	**0.147**	**0.145**	**0.5**	**0.17**	**0.865**	
Red River Delta	Unmatched	0.264	0.207	13.4	5.52	0.000	
	Matched	**0.270**	**0.267**	**0.0**	**-0.01**	**0.994**	
Urban	Unmatched	0.223	0.322	22.4	-8.79	0.000	
	Matched	**0.226**	**0.232**	**1.6**	**-0.54**	**0.589**	
Members with high-school degree or above	Unmatched	0.737	0.871	12.4	-4.87	0.000	0.80
	Matched	**0.746**	**0.764**	**1.6**	**-0.56**	**0.575**	**0.93**
Married household head	Unmatched	0.786	0.842	14.4	-6.01	0.000	
	Matched	**0.783**	**0.768**	**4.0**	**1.23**	**0.217**	
Children 6-14 years	Unmatched	0.285	0.645	50.9	-19.25	0.000	0.56
	Matched	**0.288**	**0.272**	**2.2**	**0.87**	**0.382**	**1.13**
Household size	Unmatched	3.531	3.992	29.3	-12.40	0.000	1.40
	Matched	**3.545**	**3.594**	**3.1**	**-0.97**	**0.333**	**1.09**
Kinh household head	Unmatched	0.896	0.831	18.8	7.23	0.000	
	Matched	**0.895**	**0.897**	**0.6**	**-0.24**	**0.814**	

Note: - There is no significant difference in the means of the covariates between households with and without remittances after matching.

- The maximum of the absolute standardised bias after matching is 4%.

- The variance ratios of the treated and non-treated groups (VT/VC) for the continuous variables are approximately equal to 1 after matching, meaning that the variances of these two groups are equivalent.

Table 4.8 Tests for the balancing property of each covariate using the kernel matching estimator

Variable	Sample	Mean		Absolute standardised bias (%)	t-test	Prob	Variance ratio (VT/VC)
		Treated	Control				
Age household head	Unmatched	58.111	46.507	92.8	36.46	0.000	0.79
	Matched	**58.095**	**58.236**	**1.1**	**-0.39**	**0.695**	**0.98**
Squared age household head (mean-centred)	Unmatched	213.740	183.150	11.0	4.78	0.000	1.71
	Matched	**213.47**	**219.03**	**2.0**	**-0.6**	**0.547**	**1.11**
South-Eastern Area	Unmatched	0.070	0.137	22.1	-8.34	0.000	
	Matched	**0.070**	**0.074**	**1.3**	**-0.5**	**0.621**	
Central Highlands	Unmatched	0.035	0.076	17.9	-6.69	0.000	
	Matched	**0.035**	**0.035**	**0.1**	**0.03**	**0.975**	
Northern and Coastal Central Region	Unmatched	0.262	0.212	11.7	4.81	0.000	
	Matched	**0.262**	**0.250**	**2.9**	**0.93**	**0.355**	
Midlands and Northern Mountainous Areas	Unmatched	0.149	0.176	7.4	-2.94	0.003	
	Matched	**0.148**	**0.148**	**0.1**	**0.03**	**0.979**	
Red River Delta	Unmatched	0.264	0.207	13.4	5.52	0.000	
	Matched	**0.264**	**0.264**	**0.0**	**-0.00**	**0.998**	
Urban	Unmatched	0.223	0.322	22.4	-8.79	0.000	
	Matched	**0.223**	**0.230**	**1.4**	**-0.49**	**0.624**	
Members with high-school degree or above	Unmatched	0.737	0.871	12.4	-4.87	0.000	0.80
	Matched	**0.738**	**0.748**	**0.9**	**-0.29**	**0.769**	**0.94**
Married household head	Unmatched	0.786	0.842	14.4	-6.01	0.000	
	Matched	**0.785**	**0.770**	**4.1**	**1.26**	**0.208**	
Children 6-14 years	Unmatched	0.285	0.645	50.9	-19.25	0.000	0.56
	Matched	**0.285**	**0.277**	**1.2**	**0.47**	**0.642**	**1.10**
Household size	Unmatched	3.531	3.992	29.3	-12.40	0.000	1.40
	Matched	**3.533**	**3.590**	**3.6**	**-1.12**	**0.261**	**1.10**
Kinh household head	Unmatched	0.896	0.831	18.8	7.23	0.000	
	Matched	**0.895**	**0.890**	**1.6**	**0.57**	**0.570**	

Note: - There is no significant difference in the means of the covariates between households with and without remittances after matching.

- The maximum of the absolute standardised bias after matching is 4.1%.

- The variance ratios of the treated and non-treated groups (VT/VC) for the continuous variables are approximately equal to 1 after matching, meaning that the variances of these two groups are equivalent.

Table 4.9 Tests for the balancing property of the joint covariate distribution

Sample	Total sample size	Number of treated households	Number of non-treated households	Pseudo R^2	LR chi-square	p>chi-square	Mean bias (%)	Median bias (%)
Unmatched	8,778	2,174	6,604	0.186	1,829.32	0.000	25.0	17.9
5 nearest neighbour	5,656	2,171	3,485	0.001	6.93	0.906	1.5	1.5
Radius caliper (r=0.001)	8,509	2,150	6,359	0.001	6.97	0.904	1.6	1.6
Kernel	8,775	2,171	6,604	0.001	7.52	0.873	1.5	1.3

Note: The mean or median bias is the mean or median standardised difference in covariates.

4.5.4 Impact of remittances on saving behaviour and expenditure patterns

4.5.4.1 Effect of remittances on saving behaviour

The estimated *ATT* presented in **Table 4.10** are the differences in saving amount and saving rate between households with and without remittances. Before matching, we find that the effect of remittances is only significant for the saving rate. Nevertheless, after matching, the results of all matching estimators prove that the differences in both saving amount and saving rate between treated and non-treated households are significant. Mainly, households with remittances tend to save more in level (approximately from 4.6 million VND to 4.9 million VND) as well as in rate (from 16.8% to 20.7%) than those without remittances. These results imply that remittances impact saving behaviour positively. Also, the significant results for all matching estimators in this table confirm that our findings are robust.

The high savings of remittance receiving households can be caused by their higher income. **Table 4.11** shows that before matching, the income of non-receiving households is significantly higher. Nevertheless, after matching, as we control for all observed characteristics, receiving households tend to have a higher income (from 4.7 million VND to 5.8 million VND). This finding supports the evidence of Nguyen and Vu (2018), that remittances help to reduce poverty for the receiving households. However, the difference in total expenditure between remittance receiving and non-receiving households is insignificant after matching (see **Table 4.11**).

In summary, receiving households are likely to use their remittances on saving rather than on consumption. The use of remittances on saving can be an incentive for the development of banks and other financial institutions. Our finding is consistent with those in the studies of Nguyen (2008), and Nguyen and Mont (2012). This finding implies that remittances should be treated as transitory income in the Permanent Income Hypothesis. As a result, we conclude that remittances can be considered as a capital source for households and economic development in the long-term.

4.5.4.2 Effect of remittances on household expenditure patterns

With respect to shares of expenditure, **Table 4.12** shows a significant difference in the share of expenditure on health, asset, house repairs, and food between households with and without remittances. Mainly, receiving households spend significantly more on health (from 0.9% to 1.0%), assets (from 0.6% to 0.7%), house repairs (from 0.3% to 0.4%), and less on food (from 2.0% to 2.2%).

As far as per capita expenditure is concerned, we recognise in Table 4.13 significant higher spending on health (approximately 228 thousand VND to 243 thousand VND), assets (496 thousand VND to 536 thousand VND) and house repairs (215 thousand VND to 235 thousand VND) by receiving households compared with non-receiving households. We find that the results of all matching estimators are consistent; thus, we conclude that the impacts of remittances on per capita expenditure of health, assets, and house repairs are robust. Moreover, we observe a significantly higher per capita expenditure by receiving households than by non-receiving households according to the 5-nearest neighbour matching estimator and the radius caliper. This finding is consistent with the study of Nguyen and Vu (2018), who concluded that remittances help receiving households increase per capita consumption. Nevertheless, this finding is not robust due to the insignificant results according to the kernel marching estimator. Therefore, we do not consider this finding crucial.

In sum, the results of the estimated *ATT* for the shares of expenditure and per capita expenditure confirm that there is a significant difference in expenditure patterns between households with and without receiving remittances. Notably, we find that receiving households tend to spend more on health, house repairs, and asset categories. In other words, receiving households use their remittances on health, house repairs, and assets. This finding supports the evidence that remittances are likely to be used productively for human and physical capital investments. Moreover, we also observe a lower share on food. As a result, remittances could be considered as a supplement of the transitory income in the Permanent Income Hypothesis.

The higher spending on health by receiving households is consistent with the results of Case et al. (2002), Mora and Taylor (2006), Berloffa et al. (2019), and Ponce et al. (2011). Wen and Lin (2012) found that spending on health could affect the mental and human constitution of all household members positively. Mainly, by spending on this category, households expect to improve their health, and to reduce the risk of disease and loss of household members, which could have an impact on the growth of their families. Thus, it is considered as a human investment (Berloffa & Giunti, 2019; Case et al., 2002). Moreover, this remittance-inspired expenditure on health confirms the altruism motive of migrant members who send money home to care for other family members. Also, the productive use of remittances on health creates more opportunities for the development of hospitals and healthcare centres in the local economy.

Concerning house-repair expenditure, we agree with other papers that this form of spending should be considered as an investment expenditure for the following two reasons (Adam & Cuecuecha, 2010; Mora & Taylor, 2006). Firstly, from the viewpoint of households, this expenditure could

help them improve their quality of life (Démurger & Wang, 2016), providing receiving households with some expected future rate of financial return (Adam & Cuecuecha, 2010). Secondly, from the viewpoint of the wider economy, this expenditure could create new income and employment opportunities for labourers, and new business opportunities for merchants selling building materials (Adam & Cuecuecha, 2010).

With respect to asset expenditure, while in most previous papers, spending on assets is considered as consumption expenditure (Adam & Cuecuecha, 2010; Clément, 2011), we have treated spending on assets as an investment expenditure, like house repairs. We have two explanations for our decision. First, we find that informal self-employed workers and small-scale family businesses hold a large proportion in Vietnam[22]. Hence, these assets can be used not only as household facilities but also as family business facilities for informal self-employed workers in Vietnam. Our finding is consistent with the paper of Castaldo and Reilly (2007), in Albania. Moreover, Démurger and Wang (2016) also considered spending on assets as an investment type rather than consumption category, since this expenditure can help households to improve the quality of life for their members, and thus could have a positive impact on the growth of households.

Lastly, relating to expenditure on food, we found that remittance-receiving households have a lower expenditure share on food compared with non-receiving households. Nevertheless, per capita expenditure on this goods category of the groups tends to be indifferent. This means that remittances do not increase the demand for food, but they are also not detrimental to food production in Vietnam.

In summary, we observed that remittances not only increased household saving, but also had a positive effect on investment categories such as human and physical capital investment. Therefore, remittances could have a positive influence on the growth and development of households and the economy in Vietnam.

[22] https://tradingeconomics.com/vietnam/self-employed-total-percent-of-total-employed-wb-data.html.

Table 4.10 Estimated ATT for the impact of remittances on saving behaviour

	Treated	Non-treated	Difference	S.E.	T-stat
Saving amount					
Unmatched	21,322.069	18,775.257	2,546.813	1,680.144	1.52
5NN	21,353.926	16,441.609	4,912.318	2,000.714	2.46**
r=0.001	21,362.624	16,712.992	4,649.633	2,044.478	2.27**
Kernel	21,353.926	16,537.695	4,816.232	1,932.336	2.49**
Saving rate					
Unmatched	0.047	-0.049	0.096	0.039	2.44**
5NN	0.048	-0.125	0.173	0.055	3.17***
r=0.001	0.048	-0.119	0.168	0.041	4.14***
Kernel	0.048	-0.159	0.207	0.037	5.66***

Note: Significant at ***= $p < 0.01$ ($t > 2.575$) ; ** =$p < 0.05$ ($t > 1.96$) ; * =$p < 0.1$ ($t > 1.645$)

Table 4.11 Estimated ATT for the impact of remittances on adjusted income and total expenditure

	Treated	Non-treated	Difference	S.E.	T-stat
Adjusted income					
Unmatched	89,125.092	96,554.327	-7,429.236	2,291.376	-3.24***
5NN	89,214.019	83,375.030	5,838.989	2,617.316	2.23**
r=0.001	89,509.807	84,803.818	4,705.989	2,651.937	1.77*
Kernel	89,214.019	83,836.196	5,377.824	2,483.378	2.17**
Total expenditure					
Unmatched	67,803.022	77,779.071	-9,976.049	1,486.577	-6.71***
5NN	67,860.093	66,933.422	926.670	1,753.725	0.53
r=0.001	68,147.183	68,090.826	56.356	1,780.121	0.03
Kernel	67,860.093	67,298.501	561.592	1,681.281	0.33

Note: Significant at *** =$p < 0.01$ ($t > 2.575$) ; **= $p < 0.05$ ($t > 1.96$) ; *= $p < 0.1$ ($t > 1.645$).

Table 4.12 Estimated ATT for the impact of remittances on the share of expenditure

Category	Sample	Treated	Non-treated	Difference	S.E.	T-stat
Education	Unmatched	0.033	0.046	-0.013	0.002	-7.92***
	5NN	0.033	0.033	0.000	0.002	0.22
	r=0.001	0.033	0.033	0.000	0.002	0.08
	Kernel	0.033	0.033	0.000	0.002	0.05
Health	Unmatched	0.065	0.043	0.022	0.002	11.17***
	5NN	0.065	0.055	0.010	0.003	3.5***
	r=0.001	0.065	0.056	0.010	0.003	3.68***
	Kernel	0.065	0.056	0.009	0.003	3.49***
Assets	Unmatched	0.043	0.043	0.000	0.002	0.03
	5NN	0.043	0.036	0.006	0.003	2.24**
	r=0.001	0.043	0.037	0.006	0.003	2.04**
	Kernel	0.043	0.036	0.007	0.003	2.47**
House repairs	Unmatched	0.015	0.011	0.005	0.001	3.36***
	5NN	0.015	0.012	0.003	0.002	1.80*
	r=0.001	0.015	0.011	0.004	0.002	2.21**
	Kernel	0.015	0.012	0.004	0.002	2.19**
Food	Unmatched	0.537	0.548	-0.012	0.003	-3.63***
	5NN	0.536	0.559	-0.022	0.004	-5.34***
	r=0.001	0.536	0.555	-0.020	0.004	-4.93***
	Kernel	0.536	0.559	-0.022	0.004	-5.78***
Non-food	Unmatched	0.278	0.278	0.000	0.002	0.09
	5NN	0.278	0.275	0.003	0.003	1.07
	r=0.001	0.278	0.277	0.001	0.003	0.43
	Kernel	0.278	0.274	0.004	0.003	1.30
Utilities	Unmatched	0.030	0.032	-0.002	0.001	-2.93***
	5NN	0.030	0.031	-0.001	0.001	-1.32
	r=0.001	0.030	0.031	-0.001	0.001	-1.44
	Kernel	0.030	0.031	-0.001	0.001	-1.37

Note: Significant at ***= $p < 0.01$ ($t > 2.575$) ; ** =$p < 0.05$ ($t > 1.96$) ; *= $p < 0.1$ ($t > 1.645$).

Table 4.13 Estimated ATT for the impact of remittances on per capita expenditure

Category	Sample	Treated	Non-treated	Difference	S.E.	T-stat
Expenditure per capita	Unmatched	20,331.619	20,633.493	-301.874	413.994	-0.73
	5NN	20,341.403	19,483.273	858.130	477.386	1.80*
	r=0.001	20,368.527	19,768.648	599.879	498.593	1.20
	Kernel	20,341.403	19,563.238	778.165	472.459	1.65*
Education	Unmatched	700.610	1,129.769	-429.158	112.147	-3.83***
	5NN	701.579	737.116	-35.538	64.935	-0.55
	r=0.001	708.431	798.690	-90.258	115.047	-0.78
	Kernel	701.579	782.200	-80.622	103.507	-0.78
Health	Unmatched	1,448.926	935.685	513.241	68.120	7.53***
	5NN	1,449.837	1,207.229	242.608	95.503	2.54**
	r=0.001	1,457.375	1,218.209	239.166	90.199	2.65***
	Kernel	1,449.837	1,221.525	228.311	86.381	2.64***
Assets	Unmatched	1,488.071	1,220.869	267.201	175.100	1.53
	5NN	1,489.008	952.164	536.843	247.270	2.17**
	r=0.001	1,491.888	995.499	496.390	258.983	1.92**
	Kernel	1,489.008	969.065	519.942	251.939	2.06**
House repairs	Unmatched	536.503	307.776	228.727	57.022	4.01***
	5NN	537.245	321.867	215.378	79.441	2.71***
	r=0.001	519.236	303.151	216.086	74.544	2.90***
	Kernel	537.245	301.387	235.858	75.382	3.13***
Food	Unmatched	9,956.491	10,489.693	-533.203	159.427	-3.34***
	5NN	9,958.977	10,202.106	-243.129	184.490	-1.32
	r=0.001	9,973.769	10,244.294	-270.525	180.117	-1.50
	Kernel	9,958.977	10,184.127	-225.150	169.063	-1.33
Non-food	Unmatched	5,614.585	5,847.380	-232.795	143.296	-1.62
	5NN	5,618.003	5,455.790	162.212	163.256	0.99
	r=0.001	5,629.198	5,592.111	37.086	161.619	0.23
	Kernel	5,618.003	5,500.074	117.929	150.432	0.78
Utilities	Unmatched	586.433	702.320	-115.888	24.676	-4.70***
	5NN	586.756	607.001	-20.245	23.182	-0.87
	r=0.001	588.630	616.696	-28.065	25.842	-1.09
	Kernel	586.756	604.858	-18.103	24.316	-0.74

Note: Significant at ***= $p < 0.01$ ($t > 2.575$) ; ** =$p < 0.05$ ($t > 1.96$) ; * =$p < 0.1$ ($t > 1.645$).

4.5.5 Analysing sensitivity

Since the *ATT* estimates for the outcomes obtained from PSM are only based on the observed covariates, other unobserved covariates are assumed not to impact these outcomes. Therefore, after estimating the *ATT*, a sensitivity test is needed to investigate whether the estimated *ATT* is sensitive to the influence of unobserved covariates or hidden bias. The Rosenbaum bound method allows us to analyse the estimated *ATT* values, which were found significant in the previous steps. In this approach, the sensitivity of the estimated *ATT* to the influence of unobserved covariates or the hidden bias is indicated using the critical value of the odds ratio (Γ). Mainly, if Γ is lower than 2, the estimated *ATT* is likely sensitive to the impact of hidden bias (Clément, 2011; Li, 2012).

Table 4.14 shows that the critical odds ratios range around 1 to 1.2 for saving amount. These numbers mean that the saving amount is susceptible to hidden bias. Nevertheless, this finding does not mean rejecting the impact of remittances on the saving level of households. It means that if there is any unobservable characteristic, the result could be different. In other words, it is considered as a 'worst-case scenario' that could happen if there are any unobserved covariates (Clément, 2011; Li, 2012). In this research, we defined remittances as receipts of households from migrant members, but other factors affecting income of those members could have an impact on household remittances. Due to lack of information in the dataset, we could not observe these covariates in our study. For saving rate, the critical odds ratio was at least 2, thus the impact of remittances on household saving rate was robust to the presence of unobserved characteristics (see **Table 4.14**).

Concerning the share of expenditure (see **Table 4.15**), the estimated *ATT* of house repairs is robust to hidden bias since the critical odds ratios at all matching estimators are higher than 2. For other outcomes, the lowest critical odds ratio is 1.2 for food category. This value means that the unobserved characteristics would have to increase the odds ratio by at least 20% before it could bias the estimated *ATT*.

Likewise, regarding per capita expenditure, the estimated *ATT* of assets and house repairs were robust, while the estimated *ATT* of health was likely sensitive to the hidden bias with the lowest critical odds ratio of 1.4 (see **Table 4.16**). The lowest critical odds ratios of saving behaviour and expenditure patterns in our research were lower than those in other studies. For instance, the critical value was 1.2 in the paper by Clément (2011), and 1.05 by Li (2012). Thus, the impact of remittances in this study was less sensitive to hidden bias than that in other studies.

Table 4.14 Rosenbaum bounds sensitivity analysis for the impact of remittances on saving behaviour

	Odds ratio	5 nearest neighbour 90% confidence intervals		Radius caliper r = 0.001 90% confidence intervals		Kernel estimator 90% confidence intervals	
		Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
Saving amount	**1**	-827.599	**1,854.640**	-2,233.310	**375.552**	-3,242.510	-774.992
	1.2	-3,761.300	4,943.700	-5,027.260	3,420.000	-5,868.310	**2,174.060**
	1.4	-6,221.200	7,677.400	-7,334.860	6,141.930	-7,977.920	4,837.780
Saving rate							
	1	0.146	0.179	0.157	0.188	0.251	0.283
	2	-0.002	**0.316**	0.017	0.315	0.108	0.419
	3	-0.097	0.394	-0.073	**0.386**	0.017	0.496
	4	-0.169	0.450	-0.142	0.436	-0.052	**0.550**

Table 4.15 Rosenbaum bounds sensitivity analysis for the impact of remittances on share of expenditure

	Odds ratio	5 nearest neighbour 90% confidence intervals		Radius caliper r = 0.001 90% confidence intervals		Kernel estimator 90% confidence intervals	
		Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
Health	**1**	-0.009	-0.005	-0.013	-0.008	-0.017	-0.013
	1.2	-0.014	-0.000	-0.017	-0.003	-0.021	-0.007
	1.4	-0.017	**0.005**	-0.020	**0.002**	-0.024	-0.002
	1.6	-0.020	0.010	-0.023	0.007	-0.027	**0.004**
	1.8	-0.023	0.014	-0.024	0.012	-0.029	0.008
	2	-0.026	0.019	-0.027	0.016	-0.031	0.013
Assets	**1**	-0.013	-0.009	-0.018	-0.014	-0.025	-0.021
	1.2	-0.017	-0.006	-0.021	-0.010	-0.027	-0.016
	1.4	-0.020	-0.002	-0.024	-0.006	-0.029	-0.011
	1.6	-0.023	**0.000**	-0.026	-0.002	-0.031	-0.006
	1.8	-0.026	0.005	-0.028	**0.002**	-0.031	-0.001
	2	-0.028	0.009	-0.030	0.006	-0.032	**0.003**
House repairs	**1**	-0.002	-0.001	-0.005	-0.004	-0.011	-0.011
	2	-0.008	-0.000	-0.011	-0.001	-0.012	-0.010
	3	-0.014	-0.000	-0.015	-0.000	-0.012	-0.009
	4	-0.021	**0.000**	-0.018	-0.000	-0.013	-0.006
	5	-0.025	0.006	-0.020	**0.006**	-0.013	**0.006**
Food	**1**	-0.023	-0.012	-0.020	-0.010	-0.021	-0.012
	1.2	-0.034	-0.001	-0.031	**0.001**	-0.032	-0.001
	1.4	-0.044	**0.009**	-0.041	0.010	-0.042	**0.007**
	1.6	-0.053	0.017	-0.049	0.018	-0.050	0.015
	1.8	-0.061	0.024	-0.056	0.025	-0.057	0.022
	2	-0.068	0.030	-0.063	0.031	-0.063	0.027

Table 4.16 Rosenbaum bounds sensitivity analysis for the impact of remittances on per capita expenditure

	Odds ratio	5 nearest neighbour 90% confidence intervals		Radius caliper r = 0.001 90% confidence intervals		Kernel estimator 90% confidence intervals	
		Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
Health	**1**	-209.196	-128.992	-329.267	-251.173	-537.931	-453.642
	1.2	-298.183	-33.133	-410.887	-154.956	-619.356	-343.860
	1.4	-374.833	**58.133**	-477.850	-61.484	-679.151	-238.119
	1.6	-444.075	148.283	-535.698	**31.414**	-725.822	-139.475
	1.8	-507.733	238.589	-587.215	123.451	-763.585	-47.978
	2	-566.648	327.306	-633.833	213.123	-795.264	**40.371**
Assets	**1**	-312.975	-233.333	-504.718	-422.329	-699.636	-626.816
	2	-718.333	**95.611**	-824.028	-23.500	-863.503	-214.918
	3	-969.583	524.400	-1,018.780	**403.492**	-959.510	**272.575**
House	**1**	-33.333	-12.667	-125.000	-100.312	-290.890	-280.802
	2	-160.000	-0.000	-266.933	-25.974	-322.804	-234.797
	3	-300.000	-0.000	-368.717	-0.000	-341.156	-196.526
	4	-462.500	-0.000	-457.447	-0.000	-356.384	-151.158
	5	-575.000	**105.000**	-542.262	**70.357**	-360.073	**0.913**

4.6 Conclusion

This study is an econometric analysis to analyse the impact of remittances on saving and expenditure behaviour for households in Vietnam. While most of the previous attempts in Vietnam defined remittances as household receipts from other members, such as migrant members, relatives, and friends, we defined this income source by total household receipts from migrant members only. Thus, our findings contribute to the literature of both remittances and migration, which have been prominent matters in Vietnam in recent years.

We achieved our objectives by applying the PSM approach proposed by Rosenbaum and Rubin (1983) using the VHLSS 2012 dataset. This approach allowed us to avoid the endogeneity problem which often occurs in attempts to investigate the impact of remittances on expenditure patterns using the Working-Leser Engel approach. Furthermore, PSM also allowed us to eliminate some sources of bias in the study of causal treatment effects.

According to Caliendo and Kopeinig (2008), PSM has been widely used in the study of causal treatment effects. In this research, we investigated the impact of remittances on saving behaviour and expenditure patterns by estimating the average treatment effect on the treated (*ATT*) for the outcomes. Mainly, we studied saving amounts and saving rates as outcomes for saving behaviour. As far as expenditure patterns are concerned, we analysed the share of expenditure and per capita expenditure on many expenditure categories.

With respect to saving behaviour, we found that households with remittances tend to have a higher saving amount and saving rate than those without. Nevertheless, the consumption of the two groups was similar. Thus, remittances are likely to be used for cumulating wealth rather than for consumption. Therefore, this capital source could impact the growth and development of families and the economy in the long term. Our finding is consistent with the studies of Nguyen (2008), and Nguyen and Mont (2012), who attempted to find the impact of external remittances on saving and consumption in Vietnam. Our study enriches the existing literature on the effect of remittances by considering both external and internal remittances together.

As far as expenditure patterns are concerned, remittances are used productively in human and physical capital investment. We also observed that households receiving remittances have a significantly lower expenditure share on food. Note that all these findings are robust when using various matching estimators. As far as the use of remittances on saving and investment expenditure is concerned, receiving households are unlikely to consider their remittances as expected and stable income. In other words, remittances are treated as transitory income in the Permanent Income Hypothesis.

Our findings refer to the contribution of remittances for households and the economy. Principally, remittances can help receiving households to increase income, saving, and human and physical capital investment. Thus, they would impact on the growth of households in the long run. Moreover, for the economy, remittances could create more opportunities for the development of some services, such as banks, financial institutions, hospitals, healthcare centres, and also be an incentive for the production and selling of building materials and tangible assets. Nevertheless, consistent with the study of Nguyen et al. (2017), we found that remittances did not influence education. Therefore, we agree with their suggestion that other capital sources should be considered for improving education, especially in rural areas in Vietnam.

There are still some limitations to our research. Firstly, we were not able to investigate the impact of external and internal remittances separately, due to the small size of foreign receipts (only 159 households) and small pseudo R^2 in the logit regression. It might very well be that external remittances have a different impact than internal ones. Also, as a disadvantage of the PSM approach, the matching method is based on the propensity score estimated from observed covariates. Therefore, the estimated *ATT* does not reflect the difference in other unobserved factors. Although the influence of the observed covariates in this research is significant and valid for estimating the results, perhaps there are still some variables unexplored. Finally, as other papers applied the PSM approach to testing the impact of remittances on household expenditure patterns, our findings provided an answer to whether remittances have an impact on saving behaviour and expenditure patterns. With this approach, we do not know the extent of the effect. In other words, how much one unit of saving and consumption changes by one unit of remittance, is not known. We expect to consider this question in a future study by applying other approaches.

APPENDICES

Appendix 4.1 - Tests for balancing property

Tests for the balancing property of covariate distributions

The first test is the standardised differences in means of each covariate before and after matching (Rosenbaum & Rubin, 1985). Mainly, two-sample t-tests are conducted for the means of all covariates in the logit regression (Caliendo & Kopeinig, 2008). Before matching, these t-tests could be significant. Nevertheless, after matching, we expect that all tests are insignificant. Thus, the null hypothesis that the means of observed covariates after matching are equal cannot be rejected. As a result, the balancing property is satisfied.

The second test is to check the absolute standardised bias (SB) for each covariate before and after matching (Rosenbaum & Rubin, 1985). Rosenbaum and Rubin (1985) defined absolute standardised bias as the absolute difference of sample means between treated and non-treated households divided by the square root of the average of sample variance in both groups. Hence:

$$SB = 100\frac{|\bar{x}_T - \bar{x}_N|}{\sqrt{0.5(V_T + V_N)}} \quad \textbf{(A1)}$$

where $\bar{x}_T$ and $\bar{x}_N$ are the means and V_T and V_N, the variances of covariates in the treated and non-treated groups, respectively.

According to Caliendo and Kopeinig (2008), the balancing property is satisfied if the standardised bias after matching is below 5%. Nevertheless, Garrido et al. (2014) propose that the maximum standardised bias after matching could range from 10% to 25%. Indeed, Clément (2011) used 10% as the threshold bias for the balancing property of the standardized bias. Furthermore, Jimenez-Soto and Brown (2012) accept the 20% bias in their study.

Also, we check the variance ratios for each continuous covariate proposed by Austin (2009). According to the author, these ratios should be approximately equal to 1 for the balancing condition. A ratio lower than 0.5 or higher than 2 is too extreme, and indicates a misleading matching result.

Tests for the balancing property of propensity score distributions

Firstly, Sianesi (2004) suggests re-estimating the propensity score for the matched sample (including treated and matched non-treated households after matching) using matching-weights and probit regression. Then, the author proposes to check the pseudo R^2 and the joint F-test

obtained from the new probit regression. According to the author, a small pseudo R^2 and an insignificant result for the joint F-test are expected. Notably, a small pseudo R^2 suggests that the observed characteristics explain very little for the propensity score after matching. Thus, the propensity score distributions of treated and non-treated groups after matching are balanced. In other words, the balancing property is satisfied. Moreover, an insignificant result for the joint F-test means that, after matching, none of the covariates can explain the difference in propensity score between treated and non-treated groups. In other words, the propensity score distributions of the two groups are balanced.

Secondly, evaluating the mean and median of the absolute standardised bias for the covariates across the treated and non-treated households of the matched sample, is another check for the balancing property as suggested by Ho et al. (2007) and Austin (2009). According to the authors, smaller values of the mean and median after matching is better. In addition, Garrido et al. (2014) proposed to compare the means and medians of the absolute standardised bias among the matching estimators. The matching estimator with the smallest mean and median can reduce the bias most.

Appendix 4.2 - Bounding approach for sensitivity analysis

In the bounding approach, a matching procedure is applied to estimate confidence intervals of the causal treatment effect (the outcomes) for different values of the odds ratio (Γ). Particularly, assume that the probability of receiving remittances for household *i* is:

$$P_i = P(REMIT_i = 1|x_i) = F(\beta x_i + \gamma u_i) \quad \textbf{(A2)}$$

where x_i is the vector of observed covariates of household *i*, β the effect of x_i on the probability of receiving remittances, u_i an unobserved covariate, γ the effect of u_i on the probability of receiving remittances, and *F* is the logistic distribution.

Therefore, the logit regression is

$$logit(P_i) = \ln\left(\frac{P_i}{1-P_i}\right) = \beta x_i + \gamma u_i \quad \textbf{(A3)}$$

If the unobserved covariate does not impact the probability of receiving remittances, or the study is free of hidden bias, then γ will be zero in equation (**A3**). Thus, the probability of receiving remittances will be determined only by observed characteristics (x_i). However, if there is any hidden bias, two households with the same characteristics could differ in the probability of receiving these receipts.

Then, assume we have a matched pair of household *i* and household *j*. Therefore, the odds defined as the ratio of probability of success and probability of failure are given by:

$$odds(i) = \frac{P_i}{1-P_i} = \exp(\beta x_i + \gamma u_i) \text{ and } odds(j) = \frac{P_j}{1-P_j} = \exp(\beta x_j + \gamma u_j)$$

Then the odds ratio of household *i* and household *j* is:

$$odds\ ratio = \frac{\frac{P_i}{1-P_i}}{\frac{P_j}{1-P_j}} = \frac{\exp(\beta x_i + \gamma u_i)}{\exp(\beta x_j + \gamma u_j)} = \exp[\beta(x_i - x_j) + \gamma(u_i - u_j)] \quad \textbf{(A4)}$$

By applying the PSM approach, household *i* and household *j* would have identical characteristics; thus x_i is similar to x_j, and the odds ratio in equation (**A4**) becomes:

$$odds\ ratio = \frac{\frac{P_i}{1-P_i}}{\frac{P_j}{1-P_j}} = \exp[\gamma(u_i - u_j)] \quad \textbf{(A5)}$$

If the unobserved covariate has no influence on the probability of the treatment ($\gamma = 0$) or if the unobserved covariates of household *i* and *j* are nearly the same ($u_i = u_j$), then the odds ratio is 1, referring to the absence of hidden or unobserved selection bias. Thus, the test of sensitivity is

constructed based on the changes of γ and $(u_i - u_j)$. Assuming that the unobserved covariate is a dummy variable ($u = 1$ or $u = 0$) (Aakvik, 2001), Rosenbaum (2002) proposed the following bounds on the odds ratio that the two matched households will receive remittances:

$$\frac{1}{e^{\gamma}} \leq \frac{\frac{P_i}{1-P_i}}{\frac{P_j}{1-P_j}} \leq e^{\gamma} \quad \text{or} \quad \frac{1}{\Gamma} \leq \frac{\frac{P_i}{1-P_i}}{\frac{P_j}{1-P_j}} \leq \Gamma \quad \text{with } \Gamma = e^{\gamma} \qquad \textbf{(A6)}$$

If the odds ratio $\Gamma = 1$, the odds ratios of the matched households are equal. If $\Gamma = 2$, the matched households could differ in their odds of receiving remittances by as much as a factor of 2.

Based on the bound on the odds ratio Γ, the confidence intervals of the outcomes could be estimated (for details see Rosenbaum (2002) and Aakvik (2001)). Varying the confidence intervals at the different odds ratio is the procedure of the Rosenbaum bounding approach to analyse the sensitivity of the estimated *ATT* with respect to hidden bias (Caliendo & Kopeinig, 2008). In order to implement this approach, we applied a Stata module constructed by Gangl (2004).

In this approach, if the analysis is free of hidden bias at the level of the odds ratio (Γ), the estimated *ATT* and confidence intervals of the outcomes are unbiased. Thus, the lower and upper bounds of confidence intervals have the same signs. In contrast, if there could be a hidden bias at the level of Γ, the lower and upper bound of the outcomes will change signs. Hence, the estimated *ATT* and confidence intervals of the outcomes at this Γ could be biased. The level of the odds ratio (Γ) at which the confidence intervals begin to change signs is called the critical odds ratio (Li, 2012). The lower the critical odds ratio, the more sensitive the outcomes to the hidden bias. If the critical odds ratio is lower than 2, the estimated *ATT* is likely to be sensitive to the impact of unobserved covariates (Clément, 2011; Li, 2012). We note that result from sensitivity analysis does not mean the existence of hidden bias in the estimated *ATT*. Instead, result from sensitivity analysis is described as a worst-case scenario that could happen if there are any unobserved covariates (Clément, 2011; Li, 2012). Thus, there are numerous papers that applied the PSM approach but did not conduct the sensitivity test, such as Randazzo and Piracha (2019), and Esquivel and Huerta-Pineda (2007).

Concluding Remarks

Finally, we end the thesis with concluding remarks which present a summary of our key findings as well as some limitations and topics for further research. As mentioned in the introduction, the key purpose of this thesis is to deepen our knowledge of determinants of Vietnamese household saving rates. We have pursued this purpose in an empirical perspective by applying different econometric techniques and using the dataset VHLSS 2010 and 2012. This has been done in four chapters.

The aim of the first chapter is to review theories of savings and consumption which are relevant in this thesis, including the Absolute Income Hypothesis, the Permanent Income Hypothesis, and the Life-cycle Theory. These theories, focusing on the role of income in determining household savings, have been applied in various papers to developed economies. However, in poor and developing countries, some assumptions of these theories are often violated; for instance, the uncertainty of the interest rate, of future income and of liquidity constraints. Savings are determined not only by current income, but also by household characteristics, for instance, gender, ethnicity, living place (urban/rural), education, children, elderly, etc. The way in which these characteristics influence savings is different in various economies. Also in the first chapter, we review the economic and social development of Vietnam in 2010-2014. In this period, the government has continued to reform the economic structure of the country in order to achieve higher agricultural productivity and greater productivity of manufacturing and services. Various policies has been applied for each economic sector. As a result of these strategies, income and household characteristics have been changed. These factors in turn have an effect on savings and thus on the economic development of the country in the future. Hence, a study on Vietnamese household saving rates is necessary.

Next, in the second chapter, we consider the effects of household characteristics on the household saving rates by means of data from VHLSS 2010. We apply quantile regression as an alternative for OLS regression to take into account the possible heterogeneity of household saving propensities. We find that many household characteristics appear to have stronger effects on the saving rate at low quantiles than at high quantiles. Besides, the evidence that higher incomes induce higher saving rates are proved in line with economic theory. Although these findings hold for both urban and rural families, the effects of household characteristics on family saving rates in

these areas are heterogeneous. Particularly, the marginal propensity to save of rural households rural is higher than that of urban households.

We find that urban households can save more than rural families not only at the mean but also at the quantiles, along the distribution. To understand the role of household characteristics in explaining the difference in saving rates between urban and rural families is our objective in the third chapter. Our main research question in the chapter is whether the more favourable characteristics help urban households to have a higher saving rate than rural households. This objective is achieved by applying the Oaxaca-Blinder decomposition approach based on the results of OLS and UQR on the survey VHLSS 2010. We find that the explained effect tends to enlarge the urban-rural saving rate difference, while the unexplained effect diminishes it. In addition, the explained effect tends to be larger and explains most of the higher saving rate of urban households at the low quantiles. At the high quantiles, there is not much difference in saving rates between urban and rural households. We also use the detailed decomposition to isolate the contribution of each characteristic on the difference in saving rates. Particularly, we find that the higher income and smaller size of urban households are factors which help urban households save more. In contrast, households in urban areas with a higher proportion of Kinh majority are likely to save less than rural households, although the Kinh majority has many advantages compared to the ethnic minorities. Besides, education tends to be a factor diminishing the urban-rural saving rate difference. A key finding in the chapter is the dominant contribution of the difference in income between two areas, while the effects of other characteristics on urban-rural saving rate difference seem to be limited.

Continuing our study of the role of income in determining household saving rates, we focus on remittances which are defined as household receipts from migrant members. Since “Doi moi” Vietnam has an increasing trend of migration, and remittances have become a common source of household income. Our aim in this chapter is to analyse the impact of remittances on the saving and consumption behaviour of households. This objective is achieved by applying the PSM approach proposed by Rosenbaum and Rubin (1983) on the dataset VHLSS 2012. Mainly, we study both saving amounts and saving rates as the outcomes of saving behaviour. As far as consumption patterns are concerned, the share of expenditure and per capita expenditure on many expenditure categories are analysed.

We find that households who receive remittances have higher saving amounts and saving rates than those who do not, while their consumption patterns are likely the same. Hence, we conclude that households tend to use their remittances for saving or for cumulating wealth rather than for

their consumption. Since saving is importance for investment, remittances would play a crucial role in the growth and development of families and the economy. In addition, we also observe a significant higher expenditure share on human and physical capital investment, and a lower share on food, of receiving households. Results from all matching estimators are broadly the same; it means that our finding are robust.

We derive some implications from the results of this research. *First of all*, we found that saving behaviours of urban and rural households are not the same. Hence, financial policies with regard to saving as well as consumption should be different for urban and rural households. *Secondly*, besides income, education is a determinant affecting household saving behaviours; therefore, it could be a factor to optimize savings. Hence, we suggest that policies with regard to education could be applied to help households improve their decisions concerning their consumption and thus their savings. *Thirdly*, there is a gap between the Kinh (the major group) and other minor ethnicities. Our results suggest that policies that the government and other non-govermental organization pursue in order to reduce ethnic inequality in Vietnam not only increase people's living standard, but also diminish the savings gap between the ethnic groups. *And lastly*, our results again confirm the role of remittances in saving and consumption behaviours; and therefore, in social development and economic growth.

However, there are still some limitations to our research. *Firstly*, given the scarcity of good data, we can only take into consideration the household characterstics for which data are available. Some characteristics that affect household saving rates, such as the wealth of households, have not been included in our study since these variables are not in the dataset. Hence, we recognize it as a limitation of this thesis. *Second*, we focus on the determinants of family saving rates from a microeconomic perspective. Therefore, the results of this thesis can be different from the results obtained by means of a macroeconomic perspective, which has not be done until now. Therefore, we cannot have a general comparison to see the difference between the two perspectives. *Third*, as far as chapter four is concerned, the impact of external and internal remittances on saving behaviour can be different; however, due to the small size of foreign receipts in our dataset we do not investigate the impact of external and internal remittances separately. We notice this as a limitation and suggest another study by using another dataset. *And lastly*, in this thesis, the dataset VHLSS 2010 and 2012 are used since they were the newest data at the time I started my PhD research in 2016. Since then, the economy of Vietnam has developed rapidly, and there may be changes both at the micro and at the macro level which might affect household saving behaviours. We take this matter as the last limitation of our research.

Several suggestions are proposed to deal with the limitations. First of all, the VGSO should collect more information regarding household characteristics such as wealth, social networks, migrant members at destination and their family at origin. Such information will be useful for further researches on household saving rates from a microeconomic perspective. In addition, a study of household saving rates from a macroeconomic perspective is necessary to obtain a more comprehensive picture of household savings. We also propose a study focusing on the economic policies of the government to unravel the unexplained effect of the difference in saving rates between urban and rural households. Besides, using another survey to analyse the impact of external and internal remittances separately is our last suggestion from the results of this thesis. And last but not least, new data could also be used to shed light on the changes of saving behaviours in recent years.

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