THESIS SUMMARY

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The impact of population ageing, economic growth on private savings in Vietnam

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1. The significance of research, statement of problem and objective

1.1 The significance of research

In recent decades, population ageing is recognized as a significant issue of most countries in the world. It has happened in almost developed countries and now spreads to less developed ones. Vietnam has entered the so-called "ageing phase" of the population since 2017 and now is facing a remarkable increase in the proportion of the elderly population, which is estimated to rise from 8.7 percent in 2010 to 11.6 percent in 2020 and to 24.8 percent in 2049 (General Statistics Office of Vietnam, 2011). This fast ageing process in Vietnam resulted from a rapid decline in fertility rate, an increase in the elderly dependency ratio and a higher life expectancy and will be a huge economic burden for the Vietnam's economic growth as well as affect the private savings.

According to the Life Cycle Hypothesis (LCH) of Modigliani and Brumberg (1954), the individuals attempt to smooth consumption over their lifetime. People tend to save more when they are young and their incomes are high, and spend when they are old and retired. Their savings are highest during their working life, and will gradually reduce during their retirement and old age in order to maintain their normal standard of living, thus leading to a decrease in private savings.

Modigliani and Brumberg (1979) and Modigliani (1986) developed the original LCH to create the macroeconomic consumption and savings functions. They revealed that if the proportion of the working age population in a country increases, private savings will increase. By contrast, if the ratio of dependents (the children less than 15 and the elderly older than 60 years to the working age population aged 15-60) rises, the savings will decrease because the children do not have income and their consumption relies entirely on the income of the working age adults in the households, while the retirees receive a lower income after retirement that may not be enough to maintain their living standards. Besides, as a consequence of population ageing, there are a large number of the elderly that suggests the possibility of more expenditure relative to their income, and thus comparatively less private savings (Wilson, 2000).

Increasing life expectancy also have an effect on private savings, the LCH of Modigliani and Brumberg (1954) indicated that with an increase in longevity, the working age adults tend to save more during the work period due to the longer retirement period in the future, meaning that private savings would rise at first. Later on, when the dependent population, which was known as spenders, was significantly higher than the working age population (active population), private savings would be reduced. In this case, private savings would be lower in case of having a higher rate of the elderly in the population (or would be higher in the opposite case).

From that, the implication of the LCH is that changes in the population age structure can exert a potentially large influence on private savings, especially in the context of population ageing as represented by a declining fertility rate, the higher young age and old age dependency ratios and a longer life expectancy.

On the other hand, the LCH of Modigliani (1986) considered the relationship between the population age structure (refers to the dependency burden), economic growth, and private savings in the economy and further confirmed the significant negative impact of the elderly dependency ratio on private savings rate. Specifically, private savings directly related to the levels of income and consumption by the individuals. Modigliani (1986), indeed, supposed that people choose their consumption (and hence their savings) relying on the current (and expected) levels of their income. If the economy grows, the income will grow, implying that the young people will be richer and save more than the elderly. Indeed, the savings of the young population will be much higher than the dissaving of the elderly population, leading to the higher private savings. Overall, there exists a positive association between economic growth and private savings in the economy. Also, based on the LCH, Apergis and Christou (2012) indicated that the

higher rate of the elderly population as a result of population ageing will increase the burden of government spending on social insurance plans and pension funds for the old age persons.

Furthermore, for the past few decades, private savings is often being mentioned as a key component in the economy system of a country from both social and economic aspects and has become a major concern for recent studies. There were a large number of studies investigating the relationship between population ageing and private savings. In particular, recent empirical researches employed the modern time series methods, including the cointegration and Granger causality tests in analyzing this linkage within the LCH framework and confirmed a substantial influence of the population ageing, referring to the youth and elderly dependency ratio, on private savings.

Similarly, in terms of the economic growth and private savings, there are a number of theoretical and empirical researches based on the LCH examining the linkage between economic growth and private savings, but sometimes the results are contradictory. Indeed, the direction of causality between two variables has continued to generate much debate among researchers. Most of the empirical studies used cross-country data for the estimation this relationship; however, the limitation of the cross-country regression analysis is that it relies on the assumptions of homogeneity about the nature and quality of the data, thus the result is of doubtful validity. Hence, there is a need to undertake the econometric analysis of private savings behavior using the time series data of an individual country and employing well developed techniques - the cointegration test for handling non-stationary time series data to investigate this relationship.

1.2 Statement of problem

Vietnam is a developing country situated in South East Asia and has experienced dramatic demographic changes with a decrease in the ratio of young dependents, an increase in the pre-retirement working population, and coincident with a remarkable growth in the sovereign economy. Specifically, Vietnam experienced a remarkable economic growth that earned her the moniker of a new economic dragon in Southeast Asia (Collins & Zhu, 2005). The achievement was made possible through the comprehensive economic reform known as *Doi Moi* (renovation program) since 1986 aimed at transforming the country "from a centrally planned economy to a market-oriented economy". However, whether the coincident development of demography and economy are interrelated is a moot question?

The author acknowledged the advantage of the cointegration techniques for handling non-stationary time series data, and was thus adopted in studying the relationship between population ageing, economic growth and private savings. More importantly, there is no robust consensus on the associations of population ageing and economic growth with private savings reported in previous researches, and to date there is no empirical study conducted on this relationship in Vietnam. Thus, there is clear merit in conducting empirical research in this area by employing the cointegration techniques. The approach is suitable for analyzing time series data from Vietnam and for investigating the short run and long run impacts of population ageing and economic growth on private savings within the LCH framework.

1.3 Research objective

The main purpose of this research is to investigate the short run and long run relationship between population ageing (the youth and the elderly dependency ratios, life expectancy and social insurance funds rate), economic growth (GDP growth rate, GDP per capita and inflation rate), and private savings in Vietnam within the LCH framework. Specifically, this study aims to determine whether the short run and the long run associations of population ageing and economic growth with private savings exist in Vietnam or otherwise. And if affirmative, what is the direction of causality between these variables. In addition, some policy recommendations are suggested to boost private savings in Vietnam.

1.4 Hypotheses

Hypothesis 1: There is a significant impact of the youth dependency ratio, the elderly dependency ratio, life expectancy, social insurance funds rate on private savings rate in Vietnam.

Hypothesis 2: The direction of causality runs from the young age dependency ratio, the elderly dependency ratio, life expectancy and social insurance funds rate to private savings rate.

Hypothesis 3: There is a significant impact of GDP growth rate, GDP per capita, and inflation rate on private savings in Vietnam.

Hypothesis 4: The direction of causality runs from GDP growth rate, GDP per capita and inflation rate to private savings.

Hypothesis 5: These findings confirm the Life Cycle Hypothesis in the case of Vietnam.

2. Literature review

2.1 The relationship between population ageing and private savings rate

Influence of the dependency ratios on savings rate

There were a large number of researches investigating the impact of dependency ratio on private savings and most studies affirmed a negative impact of dependency ratio on private savings rate. However, when separating into the youth and the elderly dependency ratios, other studies found the opposite results relative to its influences on private savings rate. Table 1 summarizes researches on the relationship between dependency ratios and private savings rate.

Table 1: The summarized results of previous researches on the linkage between dependency ratios and private savings

Studies	The degree of the association		Significance of dependency ratio	
	Youth	**Elderly**	**Youth**	**Elderly**
Fry & Masson (1982) Mason (1987,1988)	positive	negative		
Leff (1969)	negative	negative	significant	significant
Adam (1971); Ram (1982)			insignificant	insignificant
Kelley & Schmidt (1996)	The coefficients of relationship was small in 1960s, not statistically significant in 1970s and negative in 1980s			
Higgins & William (1997) Banerjee et al. (2010)	negative			
Horioka & Watanabe (1997) Koga (2006)		negative		
Faruquee & Husain (1998) Loayza et al. (2000) Erlandsen & Nymoen (2008) Kinugasa & Mason (2004) Agrawal & Sahoo (2009) Thanoon & Baharumshah (2005) Agrawal et al. (2009) Apergis & Christou (2012)	negative	negative		
Modigliani & Cao (2004)	negative		significant	
Zhu (2011)	negative	positive		
Jorgensen (2011)	negative	positive	insignificant	insignificant
Horioka (1997) Thornton (2001)	negative	negative	significant	significant
Lindh (1999)	positive	positive		
Kraay (2000)	positive	positive	small and insignificant	
Horioka & Wan (2007)			significant	insignificant
Heller & Symansky (1998) Lee et al. (2000)		positive		

Influence of life expectancy on private savings

Regarding the life expectancy variable, there was no empirical consensus in what involved the consequences of the increase in life expectancy in the economy. Thus, this research aims to investigate the impact of ageing, which is as a result of the increase of life expectancy, on private savings. In this case, life expectancy is an explanatory variable.

The LCH of Modigliani and Brumberg (1954) supposed that with the increase in longevity, the working age people tend to save more during their work period due to the longer retirement period in the future, meaning that private savings will rise first. Later on, when the elderly population was significantly higher than the working age population (active population), private savings will be reduced. On the other hand, the standard life cycle theory supported the negative relationship between life expectancy and private savings. For this theory, people looked forward to the future and desired to save more for their future expenditures. Accordingly, the aged were living in the second period of the life cycle or the retirement period, hence their savings rate should be low. This showed that longevity has a negative impact on the individual's savings in older ages.

Some recent studies of Li et al. (2007), Li et al. (2012), Prettner (2012) and de Freitas and Martins (2014) supported a positive relationship between an increase in individual's life expectancy and private savings. Specifically, Li et al. (2007) found a positive connection between an increase in longevity and a higher savings at private, household, and aggregate levels and explained that when people are expected to live longer, they tend to save more for their longer lives after retirement. Similarly, Li et al. (2012) confirmed a positive impact of a longer life expectancy on private savings rate in China in the period 1985 - 2005. Also, Prettner (2012) and de Freitas and Martins (2014) insisted that a longer life expectancy implies that people have a longer time span for savings, resulting in an increase in private savings. However, Doshi (1994) used a cross country data within the life cycle framework to analyze and found mixed results regarding to the association of life expectancy with private savings in 129 countries. For less developed countries, his study observed a positive relationship between life expectancy and private savings rate, whereas, for developed countries, there was a negative correlation between two variables. He explained that for less developed countries, people tend to save more for their longer lives after retirement, while for developed countries, due to the high income, people do not need to save more for their future expenditures, leading to a decline in private savings rate.

Influence of social insurance system on private savings

The social insurance system or pension scheme was not taken into account in previous studies and now its influence on private savings will be presented with two purposes: it is a reflection and supplementary analysis to previous models and it gives an in-depth explanation to the empirical analysis.

Feldstein (1974) was the first scholar considering the impact of pensions on private savings in life cycle savings theory. According to this savings theory, the pension system had two effects on private savings, including the asset substitution effect and the retirement effect. The asset substitution effect referred that due to having the pension insurance in the society, the employees could receive pension benefits from the public pension plan, which makes them reduce their savings associated with the retirement during their working lives. By contrast, the retirement effect referred that the pension insurance benefits mechanisms might encourage workers to retire early, and for the advantage of early retirement, they would raise savings to gain the financial security after retirement. Hence, if pensions were considered as a substitute of income, people would not need to save to be wealthy for and during their retirement period, meaning that pensions would decrease private savings. Whereas, pensions were considered as an incentive to early retirement, private savings would be higher and longer. On the other hand, Feldstein (1974) also mentioned that pension system might diminish the effect of ageing. If the individuals could receive more from the national transfer, they would reduce their savings for the purposes of pensions, unemployment, and healthcare

accordingly. From the entire ageing process, due to the relatively low savings rate in the young period resulting from pension system, the fluctuation of savings rate were much smaller than that in the case of without pension system. Furthermore, due to a lower degree of ageing in developing countries, the development of pension system in developing countries was weaker than that in developed ones. Therefore, the role of pension system would be reflected more in developing countries, more specific, improving pension system would be more beneficial to boost consumption, hence decreasing private savings in these countries.

Later on, recent researches on the association between social insurance system and private savings showed mixed results. Börsch-Supan et al. (2006) explored that the pensions diminishes private savings in three European countries with large pay-as-you-go pensions systems: France, Germany and Italy. Similarly, Edwards (1996) used a panel data of 36 Latin American countries in the period 1970 - 1992 and confirmed a negative impact of pensions system on private savings. In contrast, Bailliu and Reisen (1998) found a positive effect of pension funds on private savings in six OECD and four non-OECD countries. In OECD countries, the fast ageing process required the higher savings of employees for their retirement, which was also largely driven by the employees' long term savings goals. Similarly, in the emerging economies with the slow ageing process, it required the higher savings for the sustainable finance investment and economic growth. Thus, these emerging countries have promoted the development of pension funds to increase private savings and the aggregate saving in the economy.

2.2 The relationship between economic growth and private savings

Influence of economic growth on private savings

The LCH of Modigliani (1970) predicted that the higher economic growth led to an increase in the income per capita growth that then would cause a rise in the aggregate saving because of the higher lifetime resources and the higher savings of the young population as compared to the dissavings of the older population. However, there was a debate among researchers relating to its structural interpretation. Some authors gave evidence that savings drives economic growth through the saving-investment link, while others agreed that savings is driven by economic growth. Table 2 lists researches on the association between economic growth and private savings.

Table 2: The summarized results of previous researches on the relationship between economic growth and private savings

Studies	The direction of causality in the short run	The long run relationship
Jappelli & Pagano (1996) Gavin et al. (1997) Sinha & Sinha (1998) Saltz (1999) Kraay (2000) Sahoo et al. (2001) Carroll (2002) Baharumshah et al. (2003) Nurudeen (2010)	Running from economic growth to private savings	Positive
Mahambare & Balasubramanyam (2000)	Negative, from economic growth to private savings	Positive
Krieckhaus (2002) Sandilands & Chandra (2003) Ramesh (2011) Aswini & Mohit (2012)	Running from savings to economic growth	Positive
Agrawal (2000)	Mixed results of the direction in the East Asian countries (from GDP growth rate to private savings for India and Sri Lanka, and vice versa for Bangladesh and Pakistan. Non-causality for Nepal) and non-causality in the five South Asian countries (Malaysia, Indonesia, Thailand, Korea and Singapore)	Positive
Anoruo & Ahmadi (2001)	Mixed results among African countries. The	Positive

	bidirectional causality for Cote d'Ivoire and South Africa. From private savings to economic growth for Ghana, Kenya, Nigeria and Zambia. From economic growth to private savings for Congo.	
Anderson (1999)	The bidirectional causality for the United States, a unidirectional causality running from private savings to economic growth for the UK and an insignificant causality for Sweden.	Positive
Sajid & Sarfraz (2008)	The unidirectional causality (running from private savings to GDP and GNP to private savings), but no clear direction between savings and the output	Positive
Waithima (2009)	Non-causality	Positive

Influence of income per capita on private savings

The principal assumption of the LCH of Modigliani (1970) was that an individual looked for a maximized present value of lifetime utility subject to the budget constraint, which was obtained by using the current net worth plus the present value of expected income of the individual over the remaining working life. Therefore, the individual's consumption in each period would rely on his expectation about lifetime income. Besides, the individual's income fluctuated over the lifetime, thus the savings behavior of an individual was different in different stages in his life cycle. This implied that an individual would smooth consumption over his lifetime, being a net saver in his young age period due to the high income in this period and a net borrower in his old age period. However, this theory also stated that if the income growth rate was zero in case of without bequest motive, the savings of an individual would zero or was independent of its income per capita. Thus, the growth rate of income per capita was positively associated with private savings. To sum up, if the LCH existed in the context of a country, there would be a positive correlation between per capita income growth and private savings.

By contrast, the Permanent Income Hypothesis (PIH) of Friedman (1957) mentioned an opposite argument with the LCH that the growth rate of income per capita caused a decline in private savings. Specifically, the assumption of PIH was that an individual's consumption at a given time depends on his current income and expected income in the future, which is also called the permanent income. Hence, the change in an individual's income would lead to a change in private savings. People tended to save more when they expected that their incomes would increase, whereas, they tended to save less when they expected their incomes would decrease. Moreover, if people believed a future economic growth prospect, they would expect higher future income than current income, thus they would save less. The more confidence of customers due to the economic growth prospect was, the lower private savings was. In short, if the PIH exists in a country, we will expect a negative impact of income per capita growth on private savings.

Besides, the empirical studies indicated that the level of per capita income was a positive associated with private savings and the degree of this influence in developing countries was greater than that in high income countries. Loayza et al. (2000) estimated that a double increase in the real level of income per capita in developing countries will lead to a 10% increase in private savings. They also suggested that the development-enhancing policies are considered as an effective tool of the government for increasing private savings in the economy.

World Bank (1993) also showed a positive linkage, but mixed results regarding the causation between income growth and savings across the East Asian countries. Specifically, for six fast growing countries in the East Asia having the highest savings rates in the world (Indonesia, Thailand, Taiwan, Japan, Korea, and China), the income growth has a positive connection with the high savings rate and the income growth is a good predictor of a higher savings rate, but it was not true for the reverse direction. Nevertheless, for two other East Asian countries Malaysia and Hong Kong, a positive relationship between income growth and savings rate was also observed, but the direction of causality between income growth and savings rate run in either way.

On the other hand, Carroll and Weil (1994) explored a significant negative effect of income growth on private savings and a one-way causality running from income growth to private savings. Jappelli and Pagano (1996) found a similar result relating to the negative relationship between income growth and private savings in Italy. They confirmed that the higher growth rate of the economy in the future will lead to a higher increase in the permanent income of an individual, leading to a higher consumption and thus depressing private savings. Similarly, Kraay (2000) also found a significant negative effect of future income growth on savings rate in Chinese rural households.

Influence of the inflation rate on private savings

Inflation might affect an individual's savings in indirectly ways and its impact on private savings was ambiguous theoretically and practically (Deaton & Paxson, 1993). There exist two opposite results regarding savings behavior in case of inflation driven uncertainty relating to the future income growth that people, who are risk-averse, tend to save more as a precaution to overcome the future financial difficulties, whereas, due to increasing inflation, people increase their consumption before the price of products increase further, hence lesser savings.

On the one hand, when considering the linkage between the inflation and private savings, Heer and Süssmuth (2006) indicated that the inflation rate is significantly negatively correlated with private savings. The negative correlation was because the inflation is considered as the opportunity cost of holding money, implying that an increase in the inflation rate leads to increasing the opportunity costs of holding money as well as raising the benefits of spending and consumption, thereby declining private savings (Miller & Benjamin, 2008). Furthermore, Athukorala and Sen (2004) affirmed that the inflation brings the uncertainty in the future income and the reactions of an individual to a change in inflation will influence on his savings. Specifically, if a higher inflation rate occurs in the economy, people will react to an increase in the uncertainty by transferring financial assets to real tangible assets due to a decline in the utility of holding money. This reaction of an individual will reduce the present savings and cause greater consumption due to his consuming for durables products, hence decreasing private savings.

On the other hand, Chopra (1988) stated that the higher inflation rate will encourage the individuals to save more as a precaution to overcome the future financial difficulties. Indeed, Deaton (1977) posited that increasing inflation leads to a higher private savings whenever people misinterpret an increase in the nominal price for an increase in the real price and then is not decide to spend. Likewise, Loayza et al. (2000) confirmed a positive influence of the inflation rate on private savings in 20 industrial and 49 developing countries in the period 1970 - 1995. Masson et al. (1998) found the similar positive relationship between inflation rate and private savings in 21 industrial countries, but a negative linkage in 40 developing countries. Similarly, Gavin et al. (1997) affirmed a significant positive impact of inflation on private savings in 6 rapidly growing economies and 20 Latin American countries in the period 1970 - 1994. In contrast, Bandiera et al. (2000) found a mixed result of the association between inflation rate and private savings for 8 developing countries, including one significant positive correlation, 3 significant negative relationships and 4 insignificant correlations in the period 1970 - 1994. Also, Edwards (1996) did not find a significant linkage between inflation rate and private savings in 36 Latin American countries in the period 1970 - 1992.

Interestingly, Carroll (1992) explored different savings behaviors between the young and the older population in case of occurring inflation or uncertainty. Young customers, who expected their incomes to increase in the future, but did not know by how much, decided to increase their consumption in relation to their income when the inflation occurred, resulting in a decline in their savings. By contrast, the older population would face with a lot of uncertainty in their lives, for instance, the living costs and healthcare expenses for a longer life after retirement, thus they tended to save more against possible adverse changes in their income, leading to an increase in their savings.

3. Research design and methodology

3.1 Data collection

This study uses the time-series data from Vietnam, for the period 1986 - 2016, which was sourced from the World Development Indicators, the World Bank, Vietnam Social Security (VSS) and General Statistics Office of Vietnam.

In the thesis, private savings is known as the personal savings or the individual savings. Private savings is calculated through the national accounts identities, which is the difference between total savings and public savings as a percentage of GDP. The national accounts are collected from "Statistical Yearbook of Vietnam".

The youth dependency ratio is the ratio of children dependents (individuals aged below 15) to the working age population (those aged 15 - 60). The elderly dependency ratio is the ratio of the elderly (those above 60 years) to the working age population. Both the youth and elderly dependency ratios show the characteristics of population ageing and were sourced from General Statistics Office of Vietnam.

According to the World Health Organization (2006), life expectancy refers to the average number of years that a new born is expected to live in the condition of the current mortality rates remain constant in the future, which is collected from "Statistical Yearbook of Vietnam" and the World Development Indicators, World Bank.

Social insurance funds equal social insurance revenues minus its expenses, in which pension funds is the main part of social insurance funds. This funds is collected from "Statistical Yearbook of Vietnam" and Vietnam Social Security (VSS) reports, then is transferred as a percentage of GDP.

The economic growth, GDP growth rate, measures how fast the economy of a nation is growing. It is a measure of the rate of change that a country's Gross Domestic Product (GDP) experiences from one year to another. The values of annual real GDP, which are used to calculate GDP growth rate, are collected from "Statistical Yearbook of Vietnam".

Landefeld et al. (2008) stated that income is represented by GDP per capita, which is a measurement of GDP of a nation divides the population and adjusts for the inflation. Besides, Landefeld et al. (2008) indicated that the production of nation's output will generate the income (salary, rent and others) for the citizens who own these production factors, thus GDP will equal to the earned income of the citizens through production factors in a country. In this case, GDP is considered as the national income that allows the researcher to compare the standard of living across countries and over time. Hence, GDP per capita will be used to represent income per capita and are collected from "Statistical Yearbook of Vietnam".

The Organisation for Economic Cooperation and Development (2018) indicates that the inflation refers to rising consumer prices and the cost of living that affect the individual's standards of living. The inflation is measured in index by consumer price index (CPI), which is a measure of price changes in consumer goods and services over a certain time period or is measured in terms of the annual percentage change in prices of consumer goods and services and is collect from "Statistical Yearbook of Vietnam"

3.2 Model specification

The causal research is the most suitable research type and will be conducted in the research because this research type can identify the existence of a cause and effect linkage between the dependent variable (private savings) and the explanatory variables (DJS Research Ltd., 2005).

Following Long and Toan (2015) results that changes in population age structure has a significant positive effect on the Vietnam's economic growth. Thus, the investigation is divided into two separate models: one section aims to investigate the impact of population ageing on private savings rate and the other aims to examine the influence of economic growth on private savings in Vietnam.

Model 1 expresses the impact of population ageing (the youth dependency ratio *(YDR)*, the elderly dependency ratio *(ODR)*, life expectancy *(LFE)* and social insurance funds rate *(SIF)* on private savings rate *(PSR)*) as follows:

Model 1: $PSR_t = \alpha_0 + \alpha_1 * YDR_t + \alpha_2 * ODR_t + \alpha_3 * LFE_t + \alpha_4 * SIF_t + \mu_t$

Where: *t* represents time series; *α* represents the coefficient of the explanatory variables; PSR_t represents private savings rate as a percentage of GDP; YDR_t and ODR_t refer to the children and the elderly dependency ratios; LFE_t represents life expectancy; SIF_t represents social insurance funds rate as a percentage of GDP, and μ_t is the error term, which represents the effects of other variables are not mention on the variation of the dependent variable in model 1.

The model regarding the relationship between economic growth and private savings can be written:

$PS_t = f(GDPgr_t, GDPper_t, IFR_t)$

Where PS_t represents private savings, $GDPgr_t$ represents GDP growth rate, $GDPper_t$ represents GDP per capita, and IFR_t represents inflation rate.

According to Greene (2012), in the econometric model, both the dependent variable and independent variables can use the natural logarithms of the real time series data to linearize the trend of data and eliminate the heteroscedasticity of time series, while this transform do not change the cointegration of the original series. Thus, the author takes the logarithms of two variables (real private savings and real GDP per capita) because these variables are expressed in current Vietnamese Dong (VND), while GDP growth rate (GDPgr) and inflation rate (IFR) are shown in term of the percentage.

Thus, the economic model examining the linkage between private savings and economic growth will be developed:

Model 2: $LogRPS_t = \beta_0 + \beta_1 * GDPgr_t + \beta_2 * LogRGDPper_t + \beta_3 * IFR_t + \gamma_t$

Where: *t* represents time series; *β* represents the coefficient of the explanatory variables; $LogPS_t$ represents Log real private savings; $GDPgr_t$ represents GDP growth rate; $LogRGDPper_t$ represents Log real GDP per capita; IFR_t represents the inflation rate; γ_t is the error term, which represents the effects of other variables are not mention on the variation of the dependent variable in model 2.

3.3 Method of data analysis

Several research techniques are conducted to analyze the data series and provide the information for explaining the relationships between population ageing and private savings, and between economic growth and private savings. Firstly, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are applied to detect the stationarity of each of the demographic and macroeconomic variables in order to avoid the spurious regression problems. After confirming the stationarity of the variables in the same order (I(1)) and due to having the multivariate time series, the Johansen cointegration approach is employed to determine whether there is a presence of cointegrating (long run) relationship among the variables as well as identify the number of cointegrating vectors. In case of existing more than one cointegrating vectors among the stationary variables (I(1)), the Vector Error Correction Model (VECM) will be performed to disaggregate the short run and long run relationships between private savings and the explanatory variables. If the short run relationship exists, Pair-wise Granger Causality and VEC Granger Causality/Block Exogeneity Wald tests are then employed to further examine the direction of the causality between these variables. Finally, several diagnostic tests are conducted for the residuals in the dynamic VECM to check for the existence of normal distribution, heteroscedasticity, serial correlation and the stability of the residuals in order to achieve the best linear unbiased estimates model for the research.

4. Empirical results and findings

4.1 The impact of population ageing on private savings in Vietnam

The long run relationship for Model 1

Based on the results of VECM, the first normalized equation provides the long run relationship between the dependent variable (PSR) and the explanatory variables (YDR, ODR, LFE, SIF) can be rewritten in the regression model:

$$PSR = -2.670*YDR - 43.290*ODR - 16.271*LFE - 11.786*SIF + 1734.566$$

The highest negative coefficient for ODR of 43.290 signifies a strong negative effect of the elderly dependency rate (ODR) on private savings rate (PSR) in Vietnam whereby a 1% increase in the elderly dependency rate will lead to a greatly decrease in private savings rate in Vietnam by 43.29%. The statistically significant expected sign of the coefficient of ODR also implies that the elderly dependency rate is an important factor in determining private savings in Vietnam. Similarly, the youth dependency rate (YDR) has a significant negative effect on private savings rate (PSR), suggesting that in the long run, a 1% increase in the minor dependency ratio (YDR) will cause a reduction in private savings rate (PSR) by 2.67%. As compared to other three explanatory variables in the model, the coefficient of YDR is the smallest, meaning that in the long run the effect of YDR on PSR is modest. This finding is suitable with the ageing context of Vietnam where the population ageing is becoming a considered problem with a demographic transformation due to a rapid decline in fertility rate and an increase in the elderly population along with a higher longevity.

Short run analysis: A dynamic Error-Correction Model for Model 1

Table 3: The results of the short run Vector Error Correction Model for Model 1

Variables	Coefficient	Std. Error	t-Statistic	P-value
D(PSR(-1))	-0.471882	0.226557	-2.082838	0.0614
D(PSR(-2))	-0.237233	0.242691	-0.977512	0.3493
D(PSR(-3))	-0.308671	0.216566	-1.425302	0.1818
D(YDR(-1))	-0.597744	0.347822	-1.718537	0.1137
D(YDR(-2))	-0.578148	0.299015	-1.933509	0.0793
D(YDR(-3))	-0.002272	0.236098	-0.009621	0.9925
D(ODR(-1))	-10.10019	3.365762	-3.000863	0.0121
D(ODR(-2))	-5.469055	2.469203	-2.214907	0.0488
D(ODR(-3))	-3.933454	1.827762	-2.152060	0.0545
D(LFE(-1))	-2.311085	1.808675	-1.277778	0.2276
D(LFE(-2))	-0.620533	1.395372	-0.444708	0.6652
D(LFE(-3))	-0.249424	1.258094	-0.198255	0.8465
D(SIF(-1))	-4.694948	1.311477	-3.579894	0.0043
D(SIF(-2))	-3.205592	1.304125	-2.458041	0.0318
D(SIF(-3))	-2.501000	1.252266	-1.997180	0.0711
Constant (C)	1.404339	0.763529	1.839272	0.0930
ECT	-0.349616	0.084633	-4.130959	0.0017

Sources: The results are calculated by using EViews 8.0

As seen in Table 3, the coefficient of the error correction term (ECT) for the estimated private savings rate equation (D(PSR)) is both statistically significant and negative with the value of (-0.349), implying that private savings rate has the tendency to correct its previous period disequilibrium with the rate of 34.96% annually.

According to Engle and Granger (1987), the lagged coefficients of explanatory variables capture the short term influences on the dependent variable D(PSR). The results in Table 3 show the short run negative coefficient values of three lagged explanatory variables of the young age dependency ratio D(YDR), the old age dependency ratio D(ODR) and social insurance funds rate D(SIF) with different estimated values and signs, indicating that the youth dependency ratio, the elderly dependency ratio and social insurance funds rate have significant short run impacts on and can explain the changes in private savings rate. By contrast, the lags of life expectancy D(LFE) does not have a short term effect on D(PSR), meaning that in the short run private savings rate is non-responsive to life expectancy in Vietnam.

Specifically, there is only one negative short term relationship between the second lag of D(YDR) and D(PSR) with its correlation coefficient is (-0.58) at the 10% significance level. This means that the youth dependency ratio only affects the private savings rate (D(PSR)) at the second lag and can explain only 0.58% change in D(PSR). Similarly, the first and second lagged variables of D(ODR) have statistically significant and negative short run effects on D(PSR) with the coefficient values of -10.10 and -5.47 respectively at the 5% significance levels, meaning that in the short term a 1% rise in D(ODR) causes a decline in D(PSR) in Vietnam by 10.10% and 5.47% respectively. Likewise, the coefficients of the correlation between the first and second lagged variables of D(SIF) and D(PSR) are statistically significant and negative at the 5% significance levels with its values -4.69 and -3.21 respectively. This also indicates that in the short run a 1% increase in D(SIF) leads to a decline in D(PSR) in Vietnam by 4.69% and then 3.21%.

The Pair-wise Granger Causality test for Model 1

Table 4: The Pair-wise Granger Causality test results for Model 1

Null Hypothesis:	Obs	F-Statistic	Prob.
YDR does not Granger Cause PSR	29	0.35388	0.7868
ODR does not Granger Cause PSR	29	0.43027	0.7334
LFE does not Granger Cause PSR	29	0.57860	0.6352
SIF does not Granger Cause PSR	29	0.99328	0.4143

Sources: The results are calculated by using EViews 8.0

The results of the Pair-wise Granger Causality test given in Table 4 indicate that none of the coefficients are statistically significant because the p-values do not reject the null hypothesis. Hence, there is no meaningful Granger causality present between YDR and PSR, ODR and PSR, LFE and PSR and SIF and PSR.

VEC Granger Causality/Block Exogeneity Wald test for Model 1

Table 5: The results of VEC Granger Causality/Block Exogeneity test for Model 1

Dependent variable: D(PSR)			
Excluded	Chi-sq	df	Prob.
D(YDR)	6.892366	3	0.0754
D(ODR)	9.739447	3	0.0209
D(LFE)	2.401279	3	0.4934
D(SIF)	13.23106	3	0.0042
All	19.83013	12	0.0704

Sources: The results are calculated by using EViews 8.0

The results given in Table 5 indicate that there exists a causality running from the youth dependency rate, the elderly dependency rate and social insurance funds rate to private savings rate in Vietnam because the lags of two excluded variables D(ODR) and D(SIF) is rejected at the 0.05 significance level and D(YDR) is rejected at the 0.1 significance level. These results of the Block Exogeneity Wald test does not correspond to the Pair-wise Granger Causality test results relating to the short run effects of D(YDR), D(ODR) and D(SIF) on D(PSR), but in favor of the short run VECM results. Furthermore, in terms of the joint block exogeneity test, the Chi-square statistic value (χ^2) is significant at the 0.1 significant level, meaning that all lags of the excluded variables D(YDR), D(ODR), D(LFE) and D(SIF) may influence the endogenous variable D(PSR) in the long run.

4.2 The impact of economic growth on private savings in Vietnam

The long run relationship for Model 2

The first normalized equation from VECM for Model 2 provides the long run linkage between the dependent variable (LogRPS) and three explanatory variables (GDPgr, LogRGDPper, and IFR) can be represented as follows:

$$LogRPS = -0.026*GDPgr - 1.276*LogRGDPper + 0.006*IFR - 6.33$$

The above regression model indicates two significant negative long run associations of GDPgr and LogRGDPper with LogRPS and one positive relationship between IFR and LogRPS in Vietnam. Specifically, the impact of GDP growth rate (GDPgr) on private savings (LogRPS) was found to yield a significant negative result at the 5% significance level. A 1% increase in GDP growth rate (GDPgr) will cause a reduction in private savings by 2.6% in Vietnam. This negative, but statistically significant expected sign of the coefficient of GDP growth rate (GDPgr) in the long run implies that GDP growth rate is one of the important factors determining private savings in Vietnam in the future. Similarly, a high negative coefficient for LogRGDPper of 1.276 in the regression model signifies a strong negative impact of real GDP per capita (LogRGDPper) on real private savings (LogRPS) in Vietnam whereby a 1% increase in GDP per capita will lead to an increase in private savings in Vietnam by 1.28%. The statistically significant expected sign of the coefficient of LogRGDPper also implies that GDP per capita is another important factor in determining private savings in Vietnam. On the contrary, a small positive coefficient of IFR of 0.006 indicates that inflation rate has a small, positive influence on real private savings (LogRPS). It can be deduced that in the long run, a 1% increase in inflation rate (IFR) will only increase private savings in Vietnam by 0.6%.

Short run analysis: A dynamic Error-Correction Model for Model 2

Table 6: The results of the short run Vector Error Correction for Model 2

Variables	Coefficient	Standard error	t-statistic	Prob.
D(LogRPS(-1))	-0.420474	0.207613	-2.025276	0.0623
D(LogRPS(-2))	0.366482	0.160059	2.289674	0.0381
D(LogRPS(-3))	0.046645	0.179643	0.259655	0.7989
D(GDPgr(-1))	-0.004270	0.007225	-0.591014	0.5639
D(GDPgr(-2))	-0.008794	0.007405	-1.187670	0.2547
D(GDPgr(-3))	-0.000169	0.007569	-0.022351	0.9825
D(LogRGDPgr(-1))	1.302612	0.199744	6.521415	0.0000
D(LogRGDPgr(-2))	-1.127129	0.272144	-4.141662	0.0010
D(LogRGDPgr(-3))	-0.534451	0.502559	-1.063459	0.3056
D(IFR(-1))	0.000172	0.002113	0.081250	0.9364
D(IFR(-2))	0.000635	0.001828	0.347543	0.7334
D(IFR(-3))	-0.001449	0.001020	-1.419946	0.1775
Constant (C)	0.094120	0.026267	3.583173	0.0030
ECT	-0.251288	0.171235	-1.467504	0.0164

Sources: The results are calculated by using EViews 8.0

The estimated value for the coefficient of the error correction term (ECT) of the estimated private savings equation (D(PSR)) is both statistically significant and negative with the value (-0.251), implying that LogRPS can return back to its long run equilibrium position at the speed of adjustment 25.1% within a year.

In addition, the lagged coefficients with different estimated values and signs of only Log real GDP per capita (D(LogRGDPper)) can capture the short term influences of these variables on the dependent variable (D(LogRPS)) Specifically, the coefficient value of the first lag of D(LogRGDPper) is positive and significant at the 5% significance level, meaning that in the short run a 1% increase in the first lag of D(LogRGDPper) leads to an increase in the lag of LogRPS by 1.3%. This also suggests that a 1% increase in the GDP per capita in previous year brings a 1.3% increase in private saving in the current year. On the other hand, the coefficient values of the second lag of D(LogRGDPper) is significant and negative, indicating that there is a negative correlation between the second lag of D(LogRGDPper) and the lag of Log real private savings (D(LogRPS)). A 1% increase in the second lag of D(LogRGDPper) causes a decline in the dependent variable (D(LogRPS)) by 1.12%.

The Pair-wise Granger Causality test for Model 2

Table 7: The Pair-wise Granger Causality test results for Model 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPgr does not Granger Cause LogRPS	29	2.73931	0.0677
LogRPS does not Granger Cause GDPgr		3.94375	0.0216
LogRGDPper does not Granger Cause LogRPS	29	33.6417	2.E-08
LogRPS does not Granger Cause LogRGDPper		6.67558	0.0023
IFR does not Granger Cause LogRPS	29	10.3031	0.0002
LogRPS does not Granger Cause IFR		4.74115	0.0107

Sources: The results are calculated by using EViews 8.0

The results obtained in Table 7 indicate two bidirectional relationships between LogRGDPper and LogRPS, and between IFR and LogRPS, and the unidirectional causality running from LogRPS to GDPgr, while the causality running from GDP growth rate (GDPgr) to private savings (LogRPS) does not exist in Vietnam in the short term at the 5% significance level. This implies that in the short run private savings is an important factor contributing to the economic growth in Vietnam.

VEC Granger Causality/Block Exogeneity Wald test for Model 2

Table 8: The results of VEC Granger Causality/Block Exogeneity test for Model 2

Dependent variable: D(LogRPS)			
Excluded	**Chi-sq**	**df**	**Prob.**
D(GDPgr)	2.080839	3	0.5558
D(LogRGDPper)	296.4217	3	0.0000
D(IFR)	19.02851	3	0.0003
All	836.8015	9	0.0000

Sources: The results are calculated by using EViews 8.0

The results of Block Exogeneity test confirm the causality between the lags of two excluded variables D(LogRGDPper), D(IFR) and D(LogRPS) at the 0.05 significance level, while there is not a causality between the lags of the excluded variables D(GDPgr) and D(LogRPS) in Vietnam. This finding is similar to the results of the Pair-wise Granger Causality test, but does not correspond to the short run results in a VECM. However, in terms of the joint block exogeneity test, the Chi-square statistic value (χ^2) is significant at the 0.05 significant level that confirms the existence of the short run impact of the lags of all three excluded variables on D(LogPSR).

4.3 Confirmation of hypothesis in the research

Table 9 below is created to light up main results of the study.

Table 9: Confirmation of hypothesis in the study

Hypothesis	Accept/Reject
Hypothesis 1: There is a significant impact of the youth dependency ratio, the elderly dependency ratio, life expectancy, social insurance funds rate on private savings rate in Vietnam.	- Accept in the long run - Reject in the short run
Hypothesis 2: The direction of causality runs from the young age dependency ratio, the elderly dependency ratio, life expectancy and social insurance funds rate to private savings rate.	Reject
Hypothesis 3: There is a significant impact of GDP growth rate, GDP per capita, and inflation rate on private savings in Vietnam.	Reject in both the short run and long run
Hypothesis 4: The direction of causality runs from GDP growth rate, GDP per capita and inflation rate to private savings.	Accept
Hypothesis 5: These findings confirm the Life Cycle Hypothesis in the case of Vietnam.	- Accept in Model 1 - Reject in Model 2

Source: own creation

5. Summary of research and recommendations

5.1 Summary of research

The VECM findings revealed that in Model 1, there exists the long run equilibrium relationship between population ageing, which is represented by the children dependency rate (YDR), the elderly dependency rate (ODR), life expectancy (LFE), social insurance funds rate (SIF) and private savings rate (PSR) in Vietnam. Specifically, all the variables: the youth and the elderly dependency ratios, life expectancy and social insurance funds rate have statistically significant and negative impacts on private savings rate in Vietnam in the long run. The significant negative long run associations of the youth dependency ratio and the elderly dependency ratio with private savings

rate in Vietnam are in line with the LCH of Modigliani and conform to a priori expectations. Modigliani (1970) explained that the aged tends to consume more for their lives in relation to a lower income after retirement, thus the higher the elderly rate is, the lower private savings rate the aged saves. Indeed, for the minors (aged below 14), they do not have income, and their consumption depends entirely on the income of the working age adults in the household, thus the higher rate of the minors to the working age population (aged 15-60) will lead to a reduction in private savings rate. Furthermore, in Vietnam, the substantial decline of the youth dependency ratio coupled with a practical stagnation of the elderly dependency ratio resulted in a relatively high savings and high growth in the past, but as the decline of the children dependency ratio is likely to be much slower, while the elderly dependency ratio will tend to increase, the economic growth is likely to slow down as the households start to deplete the savings pool. This negative correlation was found by most recent studies, including the study of Horioka (1997) in the case of Japan, Thornton (2001) in the case of the United States, and Modigliani and Cao (2004) in the case of China. Nonetheless, I could not find significant short run relationship between private savings and the demographic situation; it most probably is due to the small sample size and the fact that only annual observations are available.

The negative long run influence of life expectancy on private savings rate in Vietnam favors the standard LCH and similar to Bloom et al.'s study (2007). According to the standard LCH, the retirees are living in the second period of the life cycle or the retirement period, thus their saving behavior is negatively affected, and the Vietnamese seniors tend to save less during this retirement period. This means that a longer life expectancy reduces the savings at older ages, thereby leading to a decrease in private savings in general. Additionally, the negative linkage between an increase in life expectancy and private savings rate in Vietnam was caused by the weak incentives from underdeveloped social security and private insurance systems in Vietnam along with the weak motivations of the Vietnamese elderly for savings accumulation for their retirement period because it is difficult for them to save for the future in case of living in the low income and poor living standards.

Likewise, the social insurance funds rate has a negative long run influence on private savings rate in Vietnam, which is in accordance to the asset substitution effect of Feldstein's life cycle savings theory (1974). In Vietnam, pensions is considered as a substitute of income, and as a result of the development of Vietnam's pension schemes, people know that they will receive higher pension benefits from the public pension scheme after retirement, which makes them reduce their savings during their work period.

Regarding the dynamic VECM results in Model 1, the coefficient of the ECT for the estimated private savings rate equation (D(PSR)) is statistically significant, showing that the cointegration relationship indeed represents an equilibrium path among savings and demographic variables. Indeed, the dynamic VECM results indicate three negative short run correlations between the lags of the youth dependency ratio (D(YDR)), the elderly dependency ratio (D(ODR)) and social insurance funds rate (D(SIF)) on the lag of private savings rate (D(PSR)), while the lags of life expectancy (D(LFE)) does not have a short term effect on the lag of private savings rate (D(PSR)), implying that in the short run private savings rate is non-responsive to life expectancy in Vietnam. However, Pair-wise Granger Causality test results show that there is no meaningful Granger causality present between private savings rate and the explanatory variables. On the other hand, the Block Exogeneity test confirm the causality running from the lag of the youth dependency rate (D(YDR)), the lag of the elderly dependency rate (D(ODR)) and the lag of social insurance funds rate (D(SIF)) to the lag of private savings rate (D(PSR)) in Vietnam in the short run, which contradicts the Pair-wise Granger Causality test results, but correspond to the short run dynamic VECM results.

With regards to Model 2 investigating the impact of economic growth on private savings in Vietnam, the VECM results indicate that there exists both the short run and the long run relationships between private savings (LogRPS)

and the economic growth variables. Specifically, we found two significant negative long run associations of GDP growth rate (GDPgr) and GDP per capita (LogRGDPper) with private savings (LogRPS) and one significant positive correlation between inflation rate (IFR) and private savings (LogRPS) in Vietnam.

The negative long run correlation between GDP growth rate and private savings in Vietnam, which is in favor of the Permanent Income Hypothesis of Friedman (1957), and in fact, the PIH is an Life Cycle Hypothesis with infinite life span, whereby as a result of the remarkable economic growth of Vietnam and its bright prospect in the future, the working age people will expect higher future income than current income that makes them more confident in consumption, thus resulting in a decline in their private savings. Similarly, in the long run GDP per capita growth significantly negative affects private savings in Vietnam. This result is also consistent with the Friedman (1957) and can be explained that the higher economic growth rate will lead to a higher increase in the permanent income of an individual, resulting in a higher consumption, and thus depressing private savings. In contrast, the inflation rate refers to the higher level of uncertainty in the economy has a positive long run impact on private savings, which is explained by the precautionary savings behavior of the Vietnamese. Specifically, an increase in the inflation rate encourages the Vietnamese to save more as a precaution to overcome the future financial difficulties.

In terms of the short run relationship between economic growth and private savings in Model 2, the coefficient of ECT for the estimated private savings equation (D(LogRPS)) is statistically significant and negative, meaning that private savings has the ability to act properly to correct any disequilibrium in the short run. Moreover, the dynamic VECM results only found the significant short term correlation between the lags of GDP per capita (D(LogRGDPper)) and the lag of private savings (D(LogRPS)), confirming that the lags of GDP per capita can explain changes in private savings.

Unlike the VECM findings, Pair-wise Granger Causality test revealed two bidirectional relationships between GDP per capita (LogRGDPper) and private savings (LogRPS), and between inflation rate (IFR) and private savings (LogRPS), and the unidirectional causality running from private savings (LogRPS) to GDP growth rate (GDPgr), while the opposite direction of the causality running from GDP growth rate (GDPgr) to private savings (LogRPS) does not exist in Vietnam in the short term. In the case of Vietnam, private savings is an important factor contributing to the economic growth, which is in favor of the neoclassical growth model where savings contributed to a higher capital accumulation for the faster economic growth. Similar to Pair-wise Granger Causality test, Block Exogeneity test confirm two causal relationships between the lags of two excluded variables GDP per capita (D(LogRGDPper)), inflation rate (D(IFR)) and the lag of private savings (D(LogRPS)). However, when considering the joint block exogeneity test in Block Exogeneity test, we explored that the lag of all the excluded variables D(GDPgr), D(LogRGDPper) and D(IFR) may influence the endogenous variable D(LogPSR), suggesting that the causality between the variables may be valid in the long run. In other words, all three lagged variables: GDP per capita (D(LogRGDPper)), GDP growth rate (D(GDPgr)) and inflation rate (D(IFR)) may still have an influence on the lag of private savings (D(LogRPS)) in Vietnam in the long run.

5.2 Policy implications and recommendations

In the long run, the government should mobilize its resources, for instance, in opening opportunities of production or investment for the institutions in the market through liberalizing the rules in order stimulate economic growth. This would lead to increased GDP per capita (per capita income) and elevate private savings.

Secondly, in order to motivate the older employees and self-employed individuals, who are near retirement age and want to save more for their future consumption during the retirement period, the Vietnam government should reform the elderly pension system, encourage and facilitate the financial institutions to start the elderly benefit schemes in order to bring a higher benefits for the elderly as well as promote their savings. Specifically, the funds of these

schemes deposited by the individuals will use to finance the economic development projects and invest in other economic activities with the purpose of increasing the income of participated individuals. Besides, the government can invest in the infrastructural development projects and the industry support programs to encourage the economic activities that in turn will contribute to GDP growth rate and income per capita growth in Vietnam. With an increased income per capita, the individuals have the higher ability to save, thereby increasing their savings.

According to Long (2008), the Vietnam's social security fund is predicted to suffer the implicit pension debts (IPDs) during the period 2000 - 2050. If the government does not reform the current publicly-managed pay-as-you-go defined-benefit (PAYG DB) pension system, the pension fund in Vietnam will be depleted and even deficit, which will threaten the government budget and private savings. Long (2008) further suggested the four ways to reform the pension scheme. *First,* the Vietnam government should transfer the benefits of the current pensioners to pensioners of the next generation by reducing the benefits of the current contributors to ensure inter-generational equity of the participants. Specifically, the government needs to cut the benefits of the rich pensioners along with increase the pension income tax of these pensioners, while still maintains the benefits of other pensioners who have the sufficient pension income to attain inter-generational equality. Indeed, instead of paying the benefits through statutory wage, the government needs to adjust the benefits relying on changes in consumption price index (CPI) because this index helps reflect the cost of maintaining a certain standard of living of the pensioners. *Second,* it would be better if the government transfers the pension scheme from the current PAYG DB pension system to a fully funded scheme to boost private savings, but before transferring, the Vietnam government needs to consider solving the implicit pension debts (IPDs). However, at this moment, the government should move to a partially funded scheme in order to avoid raising the budget debt quickly. Indeed, General Statistic Office or Vietnam Social Insurance (VSS) should publish outstanding pension liabilities every year to make the situation transparent. Moreover, as Long (2008) mentioned, in the Vietnamese pension system, the current contributors have to bear "double burden" of paying not only for themselves but also for the current pensioners who are members of the PAYG scheme. In order to reduce the burden of the participants in the current pension scheme, the Vietnam government can learn from the experiences from Friedman et al. (1996) and Estelle (1998) applied in Latin American countries and some other transitional economies are that these governments use the revenues or assets from the privatization process of state enterprises and co-finance fiscal requirements for the current pensioners or Kunieda (2001), who recommended that the government should allocate a part of personal pensions to notional defined contribution pension as well as commit to bring back the return rate that equals the economic growth rate for the current contributions. *Third,* although a transition will bring a larger burden and threaten the fiscal viability of the government, the Vietnamese pension scheme is in need of the further reform as soon as possible, especially in the difficult situation of the current PAYG pension system when it now covers 20% of the workforce, or only nearly 10% of the total population and the first contributions group of the post-1995 pension scheme will begin receiving their benefits in 2015. *Fourth,* the Vietnam government should focus on management and regulations when reforming the pension scheme. Specifically, the government should manage the pension fund along with enacting favorable policies for encouraging the diversification of investments to maintain and develop this fund with the principle of avoiding the use of this fund to cover the expenditures or the budget deficit. Besides, it is necessary to establish a sound regulatory framework that encourages the participation of the Vietnamese employees in the private sector and stimulates the voluntary scheme.

On the other hand, the government should maintain its budget under the control as well as recover and solve the budget deficit step by step by carefully making investments in profitable profits. Additionally, a carefully investing in profitable projects is necessary for the government to overcome the fear of the individuals preventing them

from savings that they save to cover the budget deficit, not for the investment and the economic development purposes, and thus encourage their savings along with boost the economic growth.

Furthermore, due to a prolonged period of slow economic growth after wars and the government budget deficit, the Vietnamese government had to borrow money from the World Bank, International Monetary Fund (IMF) and other countries to cover its budget deficit, which put strong pressure on the residents by increasing the inflation rate in the economy because the money demand of government for paying back loans increased and the Vietnam government, in fact, had to print the currency more to cover up this budget deficit. This activity might negatively affect the confidence of private investors and savers, resulting in a negative consequence that they did not want to invest or save. Thus, the properly controlling budget deficit and taking measures to recover the deficit and put the inflation under control without affecting the confidence of private investors or savers in the economy is one of the best ways to stimulate the savings.

In the short run, the Vietnam government can promote private savings by taking advantage of the golden population structure and limiting the effects of elderly dependency ratio through offering the attractively beneficial programs for the elderly. They should be provided opportunities to increase their productivity and thus contribute to economic growth as consistent with the increasing income per capita. With increased income, the individual citizen will be empowered to higher saving, thus contribute to rising private savings. Indeed, the government can spur private savings through the expansionary monetary policy, and the bank should set the spread between deposit and lending rates, i.e increasing the deposit rate and decreasing the lending rate. However, reducing the interest rate may create a pressure of higher inflation rate affecting savings. Hence, the government should provide protections to all private investors and savers by controlling the inflation rate to reinforce the confidence of private investors and savers. Furthermore, the competition and financial innovation can reduce the spread between deposit and lending rates, but the spread should cover credit risk, which largely depends on the share of non-performing loans. If it does not, the financial system will collapse unless the government saves it by spending huge sums.

6. Thesis contributions

This dissertation has revealed and developed the following contributions to the area of the relationship between population ageing, economic growth and private savings in Vietnam. These contributions include:

- This research is the first research applied the cointegration techniques in examining the connection between population ageing, economic growth, and private savings within the Life Cycle Hypothesis framework in Vietnam.

- This research helps to answer as well as confirm the possible negative effect of population ageing, more specific, the youth and the elderly dependency ratios and life expectancy on private savings, and the positive relationship between social insurance funds and private savings, especially in developing countries. Indeed, the Life Cycle Hypothesis can be applicable in both developed and developing countries. More specifically, for developing countries, a high dependency ratio, the weak incentives from underdeveloped social security and private insurance systems along with the poor standard of living does not encourage people to save more. The impact of social insurance funds on private savings is negative or positive relying on the ratio between the asset substitution effect and the retirement effect. Regarding the countries experiencing the development of pension scheme and pensions is considered as a substitute of income, people tend to save less because they expect to receive higher pension benefits.

- This study helps to confirm a significant relationship between private savings and economic growth in developing countries. In these countries, private savings is an important factor contributing to economic growth, which is in favour of the neoclassical growth model where savings contributed to a higher capital accumulation for the faster economic growth. Not only that, the negative impacts of economic growth, more specific, GDP growth rate and GDP per capita, on private savings conforms to the economy having a remarkable growth. The higher economic

growth rate leads to a higher increase in the permanent income of an individual, resulting in a higher consumption, and thus depressing private savings. By contrast, the inflation or the uncertainty has a positive impact on private savings that can be explained by the individuals' precautionary savings behaviour in developing countries.

- Another important contribution of this study is the policy related implications in boosting the level of private savings in Vietnam, whereby the government efforts would be performed to achieve the desired level of private savings.

7. Limitations and further research

The scope of my empirical analysis was strongly constrained by the availability of reliable data. I could only use annual time series for the period 1985 - 2016 (32 observations). A small sample size in the regression model may cause the problem that it is difficult to model reliably the relationship. However, I would emphasize that earlier observations do not and would not help, as the working of the economy changes substantially with the economic reform. Indeed, I would rather dwell on the lack of quarterly observations. Therefore, an extension of the number of observations should be considered in the further research because it can produce convincing results.

Furthermore, it is difficult in measuring and quantifying the ageing, and there is a large number of variables can represent for the population ageing and economic growth variables, while this study was conducted with the inclusion of control variables. Specifically, in addition to chosen demographic factors, there are other non-demographic factors such as the health status and health care expenditure of the elderly, social expenditure with the elderly population, the elderly labor force participation rate that only affect the elderly population indirectly, should be considered to produce the best findings possible. Indeed, there may be have relevant omitted variables relating to the economic growth variable, for instance, financial market development, capital accumulation, interest rate, tax and macroeconomic policies that should be taken into the study to capture the reality better. Hence, the future research should contain more variables to provide a comprehensive picture in regards to its influences on private savings in Vietnam.

Moreover, as ageing affects the demographic structure of the population, all people are somehow influenced. As a result of population ageing, the savings of the individuals is different in each age range. Specifically, in case of the expectancy of living longer, in fact, the working age (middle aged) individuals tend to save more for their longer lives after retirement, while the older people, who are near the retirement period or retired, tend to spend more since they live more years after retirement. The future research, indeed, should conduct a study on the relationship between longevity/ageing and private savings with the assumption of holding the population age structure constant to get a better result of increase or decrease in private savings.

Finally, it would be interesting to examine this topic in comparison with developed and developing countries to discover the difference in the relationships exist in these countries.

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