

# The Relationship Between Population Ageing and Private Savings in Vietnam

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## Abstract

Population ageing is recognised as a significant issue, following which many studies have emerged and indicate the presence of a significant relationship between this element with private savings in developed and developing countries both. However, the direction of causality linking these variables has continued to generate numerous debates among researchers; to date, there is no empirical study available and conducted regarding this linkage in the context of Vietnam. Accordingly, the study aimed to investigate the relationships between population ageing and private savings in Vietnam within the Life Cycle Hypothesis framework. The findings revealed four negative long-run relationships and three negative short-run associations of the youth and elderly dependency ratios and social insurance funds with private savings. The policy implications suggest that the government can promote savings by mobilising its resources, facilitating financial institutions to initiate insurance schemes, and carefully investing in projects to generate higher benefits for the elderly population. Moreover, the governing entity should limit the effects of dependency ratio by offering attractively beneficial programmes, reforming the pension system, and providing opportunities for the elderly to increase their income. Finally, establishing a sound regulatory framework is necessary to encourage the population's participation and stimulate the voluntary insurance scheme.

**Keywords** - Dependency ratio, life cycle hypothesis, life expectancy, social insurance funds, private savings.

## 1.0 Introduction

Population ageing is highly recognised as a significant issue encountered by developed and developing countries alike. The rapidly progressing ageing process results in a rapid decline in fertility rate, an increased elderly dependency ratio over time, and a higher life expectancy, thereby causing a bigger burden to the economic growth

of a country. Similarly, they can culminate in depressing private savings.

According to the Life Cycle Hypothesis of Modigliani (1970), people prefer smooth consumption over time, can reasonably estimate their income, and can plan their savings and consumption patterns to achieve a smooth consumption pattern over decades. They tend to save more when they are young and their incomes are high, while spending the money when they are old and retired. Accordingly, the amount of savings is at its highest during their working life and will gradually reduce during their retirement and old age in order to maintain the normal standard of living. The higher dependency ratio, otherwise described as the proportion of young dependents and the elderly (i.e. those less than 15 years and older than 60 years) to the working-age population (i.e. people aged 15-60 years), indicates the possibility of more expenditure relative to income, thus leading to comparatively less personal savings.

Along with the increase in life longevity, working-age adults tend to save more during their working period due to the longer retirement period anticipated in the future, thereby indicating that their private savings would rise at first. Later, when the dependent population or otherwise known as spenders is significantly higher in number than the working-age (i.e. active) population, their private savings would be reduced. In other words, private savings would be lower in case of a higher rate of elderly prevalence in a population, or higher vice versa (Modigliani & Brumberg, 1954).

Indeed, the social insurance fund is among the underlying factors affecting individual saving behaviour; without the pension system, people tend to save more in order to cope with their consumption post-retirement or any unexpected situations in the future. In contrast, the pension system renders it possible for individuals to adjust their savings behaviour accordingly.

A large number of empirical studies have previously investigated the relationship between population ageing and private savings in a country; however, the impact of social insurance fund on private savings has yet to be taken into account. In fact, most have indicated a significant connection between population ageing and private savings, whereas the direction of the causality linking these variables continuously and ceaselessly generate numerous debates among researchers to no end. Furthermore, most of these prior studies have employed cross-country data for estimation purposes, wherein the

limitation of cross-country regression analysis underlines its reliance on the assumptions of homogeneity for the nature and quality of data. This renders the outcomes and their validity to be suspect. Hence, the need to undertake an econometric analysis specifically looking into the saving behaviour cannot be denied, especially using the time-series data of individual country and employing the well-developed techniques for handling non-stationary time-series data within an integrated theoretical framework (Deaton, 2005).

In general, Vietnam is a developing country situated in South East Asia and has experienced dramatic demographic changes in the form of a decreased ratio of young dependents, an increase in the pre-retirement working and elderly population, and coincident with remarkable growth in the sovereign economy. The achievement was made possible through the comprehensive economic reform known as *Doi Moi* (renovation programme) carried out since 1986, which is aimed at transforming the country “from a centrally planned economy to a market-oriented economy” in relation with the changes in private savings. Regardless, whether these events are interrelated or not is a moot question.

The advantage of cointegration techniques is acknowledged in handling non-stationary time-series data and thus adopted in this study for examining the relationship between population ageing and private savings. More importantly, no robust consensus has been reached regarding the linkage between population ageing and private savings as reported in previous research works. Similarly, to date, no empirical study is available to detail such relationship in the context of Vietnam. More specifically, most studies have affirmed the presence of a negative impact for dependency ratio on private savings. However, when the element is specifically categorised into youth and elderly dependency ratios, other studies have yielded opposite results relating to their influences on private savings.

In particular, some researchers such as Heller and Symansky (1998), Lindh (1999), Kraay (2000), Lee et al. (2000), Zhu (2011), and Jorgensen (2011) have indicated that the elderly dependency ratio positively affects private savings, while most studies underline a negative connection between these elements (Leff, 1969; Fry & Masson, 1982; Mason, 1987, 1988; Horioka & Watanabe, 1997; Horioka, 1997; Faruquee & Husain, 1998; Loayza et al., 2000; Thornton, 2001; Erlandsen & Nymoer, 2008; Kinugasa & Mason, 2004; Thanoon & Baharumshah, 2005; Koga, 2006; Agrawal & Sahoo, 2009;

Agrawal et al., 2009; Apergis & Christou, 2012). In contrast, some studies have depicted the positive relationship between youth dependency ratio and private savings (Fry & Masson, 1982; Mason, 1987, 1988; Lindh, 1999; Kraay, 2000), whereas most show a negative linkage between the two variables (Leff, 1969; Higgins & William, 1997; Horioka & Watanabe, 1997; Horioka, 1997; Faruquee & Husain, 1998; Loayza et al., 2000; Thornton, 2001; Kinugasa & Mason, 2004; Modigliani & Cao, 2004; Thanoon & Baharumshah, 2005; Koga, 2006; Erlandsen & Nymoen, 2008; Agrawal & Sahoo, 2009; Agrawal et al., 2009; Banerjee et al., 2010; Zhu, 2011; Jorgensen, 2011; Apergis & Christou, 2012; Brookins et al., 2015).

Meanwhile, the impact of life expectancy on private savings has been depicted in various scholarly efforts. For example, Modigliani and Brumberg (1954) and Bloom et al. (2007) have confirmed the negative connection present between the two variables, whereas Li et al. (2007), Li et al. (2012), Prettner (2012), and de Freitas and Martins (2014) are in support of a positive relationship between them. Meanwhile, Doshi (1994) has highlighted mixed results regarding the association of life expectancy with private savings in 129 less developed and developed countries. Indeed, the clear merits in conducting empirical research on this particular topic by employing cointegration techniques cannot be denied. The approach is deemed suitable for analysing time-series data from Vietnam and investigating the short and long-term impacts of population ageing on private savings within the Life Cycle Hypothesis framework.

The main purpose of this research is to examine the short-run and long-run relationships between population ageing (i.e. age dependency ratios, life expectancy, and social insurance fund) and private savings in Vietnam within the Life Cycle Hypothesis framework. Specifically, it aims to determine whether these associations are present, which will be tested within the selected framework to shed light on whether the hypothesis is applicable in Vietnam. It may be seen that it is less likely to be applicable due to cultural peculiarities. In addition, certain policy recommendations can be offered to boost private savings in the context of population ageing in Vietnam.

## 2.0 Literature review

### 2.1 The Life Cycle Hypothesis of savings

According to the Life Cycle Hypothesis developed by Modigliani (1970), people tend to save more when they are young and working, while the tendency is spend relatively more when they are old and retired. In particular Modigliani (1970) has indicated that children do not have income and only contribute to consumption. If the youth dependency ratio increases, household savings is likely to decrease and thus lead to depletion of private savings. Similarly, for retirees, their income decreases following retirement, subsequently forcing them to use a part of their accumulated savings that are earned during working life to spend on their basic needs. In consequence, retirees record a negative saving rate, which is largely dependent on the size of their age group in the population: in specific, a higher proportion of the working population will lead to higher private savings. Conversely, a higher ratio of children and elderly in the population will result in lower savings.

Assume that individuals start working at age  $A$ , work for  $W$  years, retire for  $R$  years, and die at  $D$  years; the income obtained and consumption are independent of age; that no productivity growth and no bequest or other intergenerational transfers exist in the model; and that the interest rate is zero. The saving rate in Modigliani's model (1970) is presented as follows:

$$SR = \frac{(A+R)}{D} - \frac{W}{D} * DEP \quad (1)$$

Where  $DEP$ , the dependency ratio, is the ratio of dependents to the working-age population. Equation (1) shows that the saving rate is a declining function of the proportion of dependents ( $DEP$ ), in which the coefficient of  $DEP$  is calculated by dividing working life by total life span and it is negative.

In general, the Life Cycle Hypothesis posits that an increase in savings results from the earnings by a proportionally higher percentage of working adults together with those from a smaller percentage of youth and elderly in the population.

## 2.2 Influence of the dependency ratios on private savings

Based on the Life Cycle Hypothesis of Modigliani (1970), Fry and Mason (1982) and Mason (1987, 1988) have provided the variable rate-of-growth effect in the life cycle savings model related to the relationship between dependency burden and savings rate. In this model, growth effect implies that the population growth leads to a higher growth of income, which then results in a higher savings rate. By contrast, the dependency effect is expressed by an increase in the number of dependents operating in the opposite direction. Therefore an increased youth dependency ratio offers a higher rate of economic growth due to the higher contributions made by the working-age population in the economy, resulting from the shift from dependent children to mature young people and thus leading to higher individual income and higher private savings accordingly. Therefore, a positive association can be made of the percentage of child dependents with private savings. Nonetheless, Fry and Mason (1982) have found a negative impact due to the often-lesser income of the elderly compared to their expenses for their specific living standards, thereby leading to a lower savings rate.

Beyond this, Lindh (1999) has developed Modigliani's Life Cycle Hypothesis (1970) further and followed the theories of Fry and Mason (1982) and Mason (1987, 1988) by introducing the dual mechanisms of population age structure on private savings, including the indirect and direct effect mechanisms. In line with this, the indirect effect mechanism appears more frequently and has some time lag, specifying that the changes in the population age structure take action and explain the substantial parts of growth variation, hence generating a positive impact on savings in the next period.

Regarding the available empirical studies, Leff (1969) based on the Modigliani's Life Cycle Hypothesis (1970) has applied statistical techniques to analyse a cross-sectional data of 74 countries. The scholar found a statistically significant but negative correlation between the youth and elderly dependency ratios and the aggregate savings (i.e. private and public savings). It was thus explained that the children and elderly both consumed more and contributed less to their household income, causing the higher rate of dependent population to put pressure on a society's potential for savings.

In contrast, Adams (1971) and Ram (1982) have analysed the cross-sectional data of 74 countries from the year of 1970 and 121

countries in the period of 1970 – 1977, respectively, thereby underlining the insignificant influences of youth and elderly dependency ratios both on the aggregate savings. Indeed, Adams (1971) has further disagreed with Leff (1969), mentioning that the higher dependency ratio may provide some motivation to work harder and raise the savings level of the working-age people in order to support the dependents' future consumption. Thus, instead of imposing a constraint on the potential for savings, the higher dependency ratio will provide an opportunity for increasing the amount of private savings in a country.

More recently, Kelley and Schmidt (1996) have modified the Leff's (1969) model and utilised Mason's (1987, 1988) variable-growth life cycle framework to investigate the influence of dependency rate on savings. By using panel data of 88 countries set in the six periods from 1960-65 to 1985-90, the scholars have found small coefficients of correlation in the 1960s, which are not statistically significant in the 1970s and negative altogether in the 1980s. Nonetheless, the study has only provided the quantitative results of a complex topic regarding the elasticity of savings with respect to the dependency ratios, whereas an interpretation is not offered.

Meanwhile, Higgins and Williamson (1997) have utilised pooled cross-sectional and time-series data from Asian countries and found a remarkable increase in the savings rate in these countries since the 1960s, which is caused by the impressive decrement in the youth dependency burden. Furthermore, they have estimated that the higher elderly dependency depresses investment more than savings, thus increasing the capacity of these countries to export the capital to other countries in the next decades. However, Higgins and Williamson's study utilises the steady-state behaviour to examine the age structure dynamics, instead ignoring the econometric analysis in examining the impact of elderly dependency rate on savings.

Another study proposed by Horioka and Watanabe (1997), in particular, has employed the microeconomic data from Financial Asset Choice of Households Survey generated in 1994 to examine the saving motives for Japanese households and estimate the contribution of net saving for each motive to their household savings. Specifically, the scholars have found twelve motives otherwise classified into precautionary and bequest motives accordingly. Among the precautionary motive group, the elements of illness, peace of mind, and retirement are dominant positions contributing to net household

savings, while the bequest motive poses little impact. Indeed, the possible reasons for high net savings for retirement is due to the responses of the elderly regarding their savings to uncertainty, rendering their savings for retirement far exceeding the act dissaving. Meanwhile, another possible reason in the context of precautionary motive comes from the weakness of the capital and insurance market, as well as the deficiencies of social insurance schemes consisting of unemployment insurance, health insurance, and welfare schemes. Along with the rapid population ageing, a high rate of the elderly population brings about high individual and household savings due to their retirement and precautionary motives. However, Horioka and Watanabe's study is reliant upon planned data as opposed to actual data.

Accordingly, Loayza et al. (2000) have utilised large cross-country time-series macroeconomic data on savings and demographic factors in exploring the determinants of private savings across and within selected countries over time. As a result, the study found significant negative impacts of children and elderly dependents on private savings, while the influence of elderly dependency ratio on private savings was twice bigger than that of youth dependency ratio. These outcomes are consistent with the Life Cycle Hypothesis. Regardless, the study successfully implemented the largest panel data available and solved the issues of simultaneity and country heterogeneity commonly found in previous works before estimating the empirical equations. Indeed, the study estimated a variety of savings regression models for worldwide contexts and each of the industrial and developing country samples to provide relevant inferences regarding the impacts of policy and non-policy variables on private savings, rather than simply describing their relationships.

Based on the evidence obtained regarding the highest level of private savings across the four fastest-growing economies of Indonesia, Malaysia, Singapore, and Thailand in Southeast Asia, Faruquee and Husain (1998) have identified the factors contributing strongly to a positive performance over the period of 1970 - 1992. Here, an error correction model was employed to examine the short-run and long-run effects of the explanatory variables on the private savings recorded for each country. The empirical result further indicated the shift in population age structure as the key factor contributing to a sustained increase in private savings across all four economies over the past 20 years. Henceforth, the demographic transition yielded a



relatively large size of working-age population, thus aiding the increase of private savings in these countries. Besides, other factors such as prevention funds and compulsory saving schemes were less clearly prevalent among them, wherein compulsory pension funds merely brought little impact on private savings in Malaysia. Meanwhile, Singapore observed the strongest effect of this element on its private saving in the long-run.

In another study, Kraay (2000) has employed a variety of statistical analysis tools and subjected them to a provincial panel data sourced in China during the period of 1978 - 1995 to investigate the influence of dependency ratio on household savings. Furthermore, the scholar further explained the reasoning behind China's unusually high national savings rate compared to its income level, wherein the high economic growth rate and low elderly dependency ratio emerged as the determinants contributing positively to it. Interestingly, the findings also indicate that the high dependency ratio enters with a positive sign despite the small estimated coefficients of relationship between the children and elderly dependency ratios and the savings rate in either rural or urban households, which are not significantly different from zero. The findings are contradictory to previous studies, which have confirmed the negative associations of the dependency ratios with savings rate. Nevertheless, the average time-series of savings cannot be underpinned in alleviating the time-varying nature of the measurement error, rendering it incapable of clarifying the frequency determinants of savings.

Similarly, Horioka and Wan (2007) have utilised the provincial panel data sourced from China's household survey over the period of 1995 - 2004 instead to determine the factors amplifying the growth rate of Chinese household savings. As a result, it unearths the significant and negative influence of the youth dependency ratio on the household savings rate, while the impact of elderly dependency ratio on the same variable is not significant. Besides, income growth has a significantly positive effect on the household savings rate, indicating that Chinese households will show a sustainably high savings rate along with the high growth rate of income and lower rate of youth dependents.

In the case of Banerjee et al. (2010), a sample of household savings in 19 cities has been sourced from the Urban Household Survey in China to answer whether the high Chinese household savings rate could be explained by the Life Cycle Hypothesis. The subsequent findings successfully affirm that the exogenous reduction

in fertility rate due to the family planning policy imposed in the country causes a significant increase in Chinese household savings rate, which is especially apparent in those where parents have the first daughter child as opposed to first son child. Accordingly, a strong evidence is positioned thus in explaining the matter throughout the recent decades, in line with the Life Cycle Hypothesis in terms of the negative relationship between the lower fertility rate (i.e. lower youth dependency ratio) and higher household savings rate. Nevertheless, the limitation identified in the study is the application of empirical estimations without additional assumptions made to implement the adjustments for the life cycle model, rendering the latter unfitting for the data perfectly.

In the context of African countries, Apergis and Christou (2012) have employed time-series cross-sectional data encompassing 16 nations across the period of 1960 - 2005 to analyse the short-run and long-run relationships between dependency ratio and domestic savings rate (i.e. a share of GDP). The resulting empirical outcomes substantiate the presence of a statistically significant and negative impact of dependency ratio on the domestic savings rate and the causality running from dependency ratio to savings rate. However, the Life Cycle Hypothesis is less applicable in these countries due to their cultural peculiarities, such as income uncertainty and greater prevalence of intergenerational transfer within the families.

In terms of consumer perspectives, Erlandsen and Nymoer (2008) are of the opinion that the burden of children and elderly poses a negative impact on private savings due to the dependents not contributing to the family income, while their consumption is entirely reliant upon the income of working-age members. Hence, the more the dependency burden, the less the private savings. Likewise, Kinugasa and Mason (2004) have provided robust evidence of a negative linkage between dependency burden and private savings in which over three-quarter of growth in private savings rate are reliant upon enhancements in old age survival than the declining burden of children. Agrawal and Sahoo (2009) have similarly proven that the youth and elderly dependency ratios function as the determinants and pose significantly negative effects on private savings. Such negative associations have been particularly observed in most developing countries due to their struggles with big issues such as poor development, lower fertility rate, and higher rate of elderly dependents, rendering the people less motivated to save. This is especially seen in the process of population

ageing in which a higher number of elderly consumers have a lower income but still consume normally post-retirement, causing their private savings to starkly decrease (Thanon & Baharumshah, 2005; Agrawal et al., 2009).

On the contrary, Heller and Symansky (1998) and Lee et al. (2000) have found an opposite result in the context of developed countries, wherein a positive connection is seen between elderly dependents and private savings. The scholars attribute longevity extension and significant population ageing in the near future as the reason why people tend to save more during their work period for a better retirement life; thus, the involvement of elderly population in the declining private savings is insignificant. Besides, Attanasio and Banks (1998) have revealed that the effect of retiree dependency burden on private savings differs across countries. For example, a case of higher ratio of retirees in the population as seen the United States reveals a decline in the private savings rate, whereas the United Kingdom shows a steadily rising rate.

In the context of less-developed countries, Jorgensen (2011) has underlined the positive but insignificant association between the elderly dependency ratio and private savings in both the short-run and long-run. The positive relationship is attributable to sustainably high elderly savings in their old ages. As a result, this contradicts the negative relationship between dependency ratio and private savings in developed countries but remains true for developing countries.

In a recent study by Brookins et al. (2015), the panel data in households of Pakistan, India, and Bangladesh sourced over the period of 1970 - 2010 has been implemented to examine the impact of population ageing on savings rates. The scholars thus note that the young dependency ratio has a significant and negative impact on the household savings rate, whereas the elderly dependency ratio insignificantly affects household savings. Similarly, Wong and Ki Tang (2013) have opted for the fixed-effects approach by using panel data spanning from 1961 to 2010 to further affirm the lack of discernible effect for the elderly dependency ratio on savings for 22 Organisation for Economic Co-operation and Development (OECD) countries.

Looking into the previous studies available, clearly a significant relationship can be observed between population ageing (i.e. youth and elderly dependency ratios) and private savings. However, a remarkably limited number of studies has implemented modern time-series methods in analysing the relationship, especially in developing

countries, thereby underlining the need for works applying cointegration techniques in investigating the impact of dependency ratios on private savings within the Life Cycle Hypothesis framework.

In the case of China, Modigliani and Cao (2004) have applied regression analysis to China's time-series data for the period of 1953 - 2000 to determine the determinants of household savings, thereby revealing significant linkage between dependency ratio and Chinese household savings rate. Here, a higher household savings rate is resulted from the faster economic growth and demographic transition. The high value and dramatic increase in household savings rate in the recent decades are attributable to primarily declining birth rate as a result of the family planning policy imposed in the country or lower child dependency ratio, as well as the higher savings acquired by the working-age population compared to the dissaving of their elderly counterpart.

Meanwhile, another research has been conducted by Zhu (2011) by using the cointegration and Granger causality analyses to test the connection between dependency ratios and private savings rate in China throughout the period of 1978 - 2007. The findings obtained are momentous: for example, a negative correlation is observed between the total dependency ratio and private savings rate in China, wherein 1% decrement of in China's total dependency ratio yields 0.39% GDP increment of private savings rate consistent with Modigliani's Life Cycle Hypothesis. Meanwhile, the scholar further notes the high private savings rate over the recent years to be due to the declining total dependency ratio similar to the findings of Modigliani and Cao (2004), which occurs following the implementation of one-child policy in China in the late 1970s. However, separating the model into the impacts of child and elderly dependency ratios, respectively, on the private savings rate yielded two opposite outcomes (Zhu, 2011). In particular, the youth dependency ratio is negatively associated with private savings rate, while elderly dependency ratio is positively related to the same variable. Moreover, the impact level of elderly dependency ratio on private savings rate is larger than that of the child dependency ratio, wherein a 1% decrement in the latter led to an increased private savings rate by 0.37% of GDP. By contrast, the elderly dependency ratio increased by 1%, the private savings rate increased by 3.94% of GDP in China.

In the case of Japan, Horioka (1997) has applied the cointegration analysis on the time-series data sourced during the

period of 1955 - 1993 to examine the effect of dependency ratio on Japanese household savings, yielding a significant relationship between the variables. In particular, the ratios of youth and elderly dependents to the working-age population pose a significantly negative impact on the household savings rate, which emerge as strong evidence confirming the possible application of Life Cycle Hypothesis in the country, wherein it may be less applicable as a result of cultural peculiarities, such as the prevalence of intergenerational transfer. Similar to the studies of Modigliani and Cao (2004) and Zhu (2011), Japan's high savings rate in the recent decades is arguably explained by the higher ratio of working-age population compared to dependents population as noted by Horioka (1997). However, in the future, the older population will grow further, rendering the household savings rate to decrease.

Unlike the time-series study of Horioka (1997), Horioka and Watanabe (1997) have instead utilised the microeconomic data obtained from the Survey on Financial Asset Choice of Households of the Japanese Government in 1994 and focused on the saving motives for Japanese households. Here, an opposing result was obtained regarding the association between the elderly population and the savings of the population and of Japanese households. Specifically, the high elderly dependency rate attributable to the population ageing contributes to a high net savings of both populations due to their retirement and precautionary savings motives. This implies a positive relationship present between the elderly dependency rate and private and household savings rates in Japan.

In contrast to the study of Horioka (1997), Koga (2006) has opted for the cointegration analysis on time-series data in Japan in the period of 1981 - 2003 to analyse the demographic dynamics in Japan and explore the causes of a sharp decline in the household savings rate. As opposed to implementing the youth and elderly dependency ratios, the scholar's focus is placed on both child and aged dependency ratios and other age groups in investigating the impact of demographic factors, thus revealing the elderly dependency ratio as the main factor causing a sharp decline, which occurred in the 1990s. besides, the study offers a prediction that the effects of age groups on the Japanese economy can be described as a hump-shaped curve, which is also consistent with the Life Cycle Hypothesis.

Meanwhile, Thornton (2001) has emulated Horioka's (1997) study in Japan and applied cointegration techniques to the time-series

data sourced regarding private savings rate and population age structure in testing a simple life cycle model of savings. This was done in context of the United States across the period of 1956 – 1995, whereby the empirical analyses presented significant and negative impacts of the youth and elderly dependency ratios on the private savings rate. Besides, it was predicted that as the elderly population grew, the country would experience a decline in the private savings rate.

Alternatively, Jogernsen (2011) has adopted the Error Correction model and implemented a sample size of 38 observations to test the Life Cycle Hypothesis in the context of Brazil, thereby finding no evidence of the hypothesis as the dependency ratio positively affects private savings. Likewise, Vector Error Correction Model (VECM) has been employed by Chipote and Tsegaye (2014) to explore the determinants of household savings and estimate the long-run linkage between age dependency ratio and savings rate by assessing South African data for the period of 1990 - 2011. However, the age dependency ratio was found to positively and insignificantly affect household savings, thereby refuting the applicability of the Life Cycle Hypothesis. By contrast, Uddin et al. (2016) have also applied the same model to investigate the impact of population age structure and savings on economic growth by using Australian data sourced in the period spanning 1971 - 2014. The scholars have thus underlined a negative association between dependency ratio and savings rate, thereby supporting the Life-Cycle Hypothesis.

### 2.3 Influence of life expectancy on private savings

The Life Cycle Hypothesis positioned by Modigliani and Brumberg (1954) assumes that increasing longevity associated today leads to the working-age people's tendency to save more during their work period, which is due to the longer retirement period in the future and synonymous with the initial rise of private savings. Upon the point when the elderly population is significantly higher than the working-age (active) population, private savings will be reduced. In contrast, the standard life cycle theory supports the negative relationship between life expectancy and private savings, wherein people would look forward to the future and desire to save more for their future expenditure. Accordingly, the aged lives in the second period of the life cycle or the

retirement period; hence, their savings should be low, implying that longevity negatively impacts their savings at older age.

Some recent studies by Li et al. (2007), Li et al. (2012), Prettnner (2012), and de Freitas and Martins (2014), for example, are in support of the positive relationship between an increased life expectancy and private savings. Specifically, Li et al. (2007) have underlined a positive connection between the increment and higher savings at private, household, and aggregate levels, thus explaining that people who are expected to live longer tend to save more for their longer duration of live after retirement. Similarly, Li et al. (2012) have confirmed the positive impact in the context of China in the period of 1985 – 2005, while Prettnner (2012) and de Freitas and Martins (2014) have insisted that the longer life expectancy implies that one would have longer time span for savings and resulting in an increased private savings. However, Doshi (1994) has utilised cross-country data and found mixed results regarding the association between life expectancy and private savings in 129 countries. For the less developed countries, the study observed a positive relationship between life expectancy and private savings, whereas the developed countries yielded a negative association. Besides, the scholar has detailed that the former type of nations shows a tendency to save more for their longer lives after retirement, while the latter do not need to save more for their future expenditures, leading to a decline in private savings.

#### 2.4 Influence of social insurance system on private savings

Feldstein (1974) is highlighted as the first scholar to consider the impact of pensions on private savings in the life cycle savings theory, which denotes the pension system towards two effects on private savings, namely the asset substitution and retirement effects. The first effect refers to having pension insurance in the society, allowing employees to receive pension benefits from the public pension plan and causing them to reduce their savings associated with the retirement during their working life. By contrast, the retirement effect aligns with the pension insurance benefit mechanisms that may encourage workers to retire early; for the advantage of early retirement, they would raise their savings to gain financial security post-retirement. If pensions are considered a substitute for income, then people would not need to save up for the purpose of becoming wealthy for and during their retirement period, meaning that pensions would decrease their

private savings. In contrast, pensions are considered as an incentive for early retirement, rendering private savings would be higher and longer. Besides, Feldstein (1974) has mentioned that the pension system may 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, the relatively low savings rate in the young period resulting from the pension system causes the fluctuation of savings rate that is much smaller than that in the case of no-pension system. Furthermore, a lower degree of ageing in developing countries has render the development of pension system in developing countries to be weaker than that in developed ones. Thus, the system's role will be reflected more in developing countries, to be more specific, as its improvement would be more beneficial to boost consumption and hence decreasing the private savings.

Following this, recent research works on the association between social insurance system and private savings have yielded mixed results. For example, Börsch-Supan et al. (2006) have stated that pension diminishes private savings in three European countries with large pay-as-you-go pensions systems: France, Germany, and Italy. Similarly, Edwards (1996) has utilised a panel data of 36 Latin American countries in the period of 1970 - 1992 to confirm the negative impact of the pensions system on private savings. In contrast, Bailliu and Reisen (1998) have identified a positive effect of pension funds on private savings in six OECD and four non-OECD countries. In OECD countries, in particular, the fast ageing process requires higher savings among employees for their retirement, whereas emerging economies with slow ageing process demands higher savings for sustainable finance investment and economic growth. Thus, the emerging countries have promoted the development of pension funds to increase the private savings in their economy.

### **3.0 Methodology**

#### **3.1 Data sources for econometric analysis**

This study utilised time-series data sourced from Vietnam in the period of 1986 - 2018. Private savings (% of GDP) was calculated through the identities of national accounts, which were obtained from the General Statistics Office of Vietnam.



Similarly, the data for the youth and elderly dependency ratios were taken from the General Statistics Office of Vietnam; they refer to the ratio of dependents (i.e. those aged below 15 and above 60 years, respectively) to the working-age population (i.e. those aged 15 – 60 years).

Meanwhile, life expectancy is referred to as the average number of years that a newborn is expected to live in the condition of the current mortality rates that remain constant in the future (World Health Organisation, 2006), which is also collected from General Statistics Office of Vietnam.

Finally, social insurance funds equal to social insurance revenues minus its expenses; they were collected from Vietnam Social Security and then transferred as a percentage of GDP.

### 3.2 Model specification

The relationship between population ageing, i.e. youth and elderly dependency ratios (*YDR and ODR*), life expectancy (*LFE*), and social insurance funds rate (*SIF*) on private savings rate (*PSR*) can be modelled as follows:

$$PSR_t = \alpha_0 + \alpha_1 * YDR_t + \alpha_2 * ODR_t + \alpha_3 * LFE_t + \alpha_4 * SIF_t + \mu_t \quad (2)$$

- Where,  $\alpha_0$  = Constant.  
 $T$  = Time period.  
 $PSR_t$  = Private savings rate (% of GDP).  
 $YDR_t$  = The youth dependency ratio.  
 $ODR_t$  = The elderly dependency ratio.  
 $LFE_t$  = Life expectancy.  
 $SIF_t$  = Social insurance funds rate (% of GDP).  
 $\alpha_1, \alpha_2, \alpha_3, \alpha_4$  = The coefficients of  $YDR_t$ ,  $ODR_t$ ,  $LFE_t$ , and  $SIF_t$ , respectively.  
 $\mu_t$  = The error term at time  $t$ .

### 3.3 Empirical methodology

The unit root test, cointegration analysis, and Error-Correction Model (ECM) were utilised in this study. In specific, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were firstly applied to detect the stationarity of each time-series implemented for the purpose of avoiding spurious regression problems. After confirming the variable stationarity in the same order, the Johansen cointegration

approach was employed to determine the presence of cointegration relationship among the variables and the number of cointegrating vectors. If no cointegration exists, the vector autoregressive (VAR) model was estimated. By contrast, the presence of one or more cointegration vectors would require the Vector Error Correction Model (VECM) to be conducted in identifying the long-run relationship and short-run dynamics between the variables. The simple Error Correction Model (ECM) is as follows:

$$\Delta y_t = \alpha ECT_{t-1} + \gamma \Delta x_t + u_t \quad (3)$$

Where  $u_t$  is independently and identically distributed (i.i.d.);  $\Delta y_t$  and  $\Delta x_t$  are the first difference of  $y_t$  and  $x_t$ , respectively; and  $ECT_{t-1}$  is one period lagged value of the residuals from the estimation of the equilibrium error term. The coefficient ( $\alpha$ ) of the error correction term (ECT) in the VECM presents the speed of adjustment towards the long-run equilibrium and is deemed reasonable if its coefficient is in negative number and not lower than -2 (Loayza & Ranciere, 2005).

The simple ECM (3) above can be applied in the multivariate system. In this research, the ECM can be developed in the following equations:

$$\begin{aligned} \Delta PSR_t &= \alpha_0 + \alpha_1 \Delta PSR_{t-1} + \alpha_2 \Delta YDR_{t-1} + \alpha_3 \Delta ODR_{t-1} + \alpha_4 \Delta LFE_{t-1} + \alpha_5 \Delta SIF_{t-1} + \alpha_6 ECT_{t-1} + u_{1t} \\ \Delta YDR_t &= \beta_0 + \beta_1 \Delta PSR_{t-1} + \beta_2 \Delta YDR_{t-1} + \beta_3 \Delta ODR_{t-1} + \beta_4 \Delta LFE_{t-1} + \beta_5 \Delta SIF_{t-1} + \beta_6 ECT_{t-1} + u_{2t} \\ \Delta ODR_t &= \gamma_0 + \gamma_1 \Delta PSR_{t-1} + \gamma_2 \Delta YDR_{t-1} + \gamma_3 \Delta ODR_{t-1} + \gamma_4 \Delta LFE_{t-1} + \gamma_5 \Delta SIF_{t-1} + \gamma_6 ECT_{t-1} + u_{3t} \\ \Delta LFE_t &= \phi_0 + \phi_1 \Delta PSR_{t-1} + \phi_2 \Delta YDR_{t-1} + \phi_3 \Delta ODR_{t-1} + \phi_4 \Delta LFE_{t-1} + \phi_5 \Delta SIF_{t-1} + \phi_6 ECT_{t-1} + u_{4t} \\ \Delta SIF_t &= \sigma_0 + \sigma_1 \Delta PSR_{t-1} + \sigma_2 \Delta YDR_{t-1} + \sigma_3 \Delta ODR_{t-1} + \sigma_4 \Delta LFE_{t-1} + \sigma_5 \Delta SIF_{t-1} + \sigma_6 ECT_{t-1} + u_{5t} \end{aligned}$$

Where  $ECT_{t-1}$  is the lagged error correction term, which is derived from the long-run cointegration relationship between these variables.

$$ECT_{t-1}^1 = PSR_{(-1)} - \Omega_1(YDR_{(-1)}) - \Omega_2(ODR_{(-1)}) - \Omega_3(LFE_{(-1)}) - \Omega_4(SIF_{(-1)}) \quad (4)$$

In the  $ECT_{t-1}$  model, the coefficient ( $\Omega$ ) estimated the long-run effects of any independent demographic variables on private savings as the independent variable increased by 1 per cent. Besides, all coefficients in the VECM measured the short-run impact of any independent variables on private savings as this variable increased by 1 per cent. Indeed, the VECM helped in correcting any disequilibrium

in the short-run by estimating the speed of adjustment at which the dependent variable would return to the equilibrium as a response to a change in the independent variables.

## 4.0 Empirical results

### 4.1 Unit root test

This study employed the ADF statistics to investigate the stationarity in variables by testing the unit root. It denotes the following: if the data of the corresponding variable have unit roots, the variable is not stationary, and vice versa.

Table 1 : The results of Augmented Dickey-Fuller unit root test

Variab les	ADF in level form	PP in level form	Critical value	ADF in first difference	PP in first difference	Critical value	Level of integration
PSR	-1.735195	-1.629586	-2.960411	-4.068754	-4.094611	-2.963972*	I(1)*
YDR	-0.013810	-0.030807	-2.963972	-4.788530	-4.792267	-2.963972*	I(1)*
ODR	-1.695923	-1.609429	-2.960411	-6.006648	-6.006648	-2.963972*	I(1)*
LFE	-2.474746	-2.214239	-2.960411	-4.374541	-4.398090	-2.963972*	I(1)*
SIF	-1.519839	-1.798752	-2.960411	-4.345820	-4.235293	-2.963972*	I(1)*

Source: Author's calculation using EViews 8.

Note: \* denotes the rejection of the null hypothesis of unit root at the 5% significance level. The corresponding critical values for the ADF and PP unit root tests are collected from MacKinnon's (1996) one-sided values.

For both ADF and PP unit root tests, the test statistic values of the variables, in absolute value, were smaller than its corresponding critical values at the level form; thus, the presence of unit root for the variables at the level form could not be rejected. However, checking the stationarity in first difference for the series at the 5% significance level revealed that the series was stationary.

### 4.2 Cointegration test

The first important step in the Johansen cointegration test is to determine the optimal lag length since it is necessary to formulate the appropriate error term and produce valid estimation. A wrong choice might lead to inconsistent estimates of a VAR model. Due to the small data sample, it was only possible to estimate an unrestricted VAR model with all variables from lag 1 to lag 4 in selecting the optimal

length based on the minimised values of both Akaike information criterion (AIC) and Schwarz criterion (SC) (Gutierrez et al., 2007).

Table 2 : AIC and SC for the optimal lag length in the unrestricted VAR model

Lag Length	1	2	3	4
Akaike AIC	8.878564	9.270667	8.870101	4.940792
Schwarz SC	10.30593	11.88750	12.67640	6.468048

Source: Author's calculation using EViews 8.

Table 2 indicates that the optimal lag length for the unrestricted VAR model is 4, which is determined by the minimised values of both AIC and SC criteria. Then, Trace and Maximum Eigenvalue statistics were conducted to determine the number of cointegrating vectors.

Table 3 : The results of the Trace and Maximum Eigen Value Tests

Hypothesised No. of CE(s)	Trace Statistic	5% Critical value	Max-Eigen Statistic	5% Critical value
None	197.0827*	69.81889	114.7331*	33.87687
At most 1	82.34957*	47.85613	37.20326*	27.58434
At most 2	45.14632*	29.79707	26.08831*	21.13162
At most 3	19.05801*	15.49471	18.94348*	14.26460

Source: Author's calculation using EViews 8.

Notes: \* denotes rejection of the null hypothesis for the Trace and Maximum Eigenvalue tests at the 5% significance level.

If the computed value of the statistics is greater than its corresponding critical value, the null hypothesis of at most  $r$  cointegrating vectors is rejected. The results given in Table 3 show that the computed values of both Trace and Maximum Eigenvalue tests are greater than their critical values at the 5% significance level when the hypothesised number of cointegration equation(s) equals to *none*, *at most 1*, and *at most 2*. However, the null hypothesis of at most three cointegration vectors could not be rejected due to the computed values of Trace and Maximum Eigenvalue tests at  $r = 3$ , which were 19.05 and 18.94; they were both less than their respective critical values (i.e. 15.49 and 14.26) at the 5% significance level. This further confirmed the existence of three cointegration vectors among these  $I(1)$  variables. In this case, the spurious and inconsistent regression problems, which usually occurred with the regression of non-stationary data series, could be avoided. Besides, the existence of cointegrating relationships

among the five I(1) variables confirmed that the VECM could be applied to disaggregate the short-run and long-run relationships between population ageing and private savings in Vietnam.

#### 4.3 Vector Error Correction Model (VECM)

Since the Johansen cointegration test results indicated that the cointegration vectors existed among the stationary variables (I(1)), the long-run regression model was estimated accordingly. The first normalised equation below provides the long-run linkage between the dependent variable (i.e. private savings, *PSR*) and four explanatory variables, namely the youth and elderly dependency ratios (*YDR*, *ODR*), life expectancy (*LFE*), and social insurance funds rate (*SIF*).

Table 4 : The first normalised equation

Variable	Coefficient	Standard error	t-statistic
Constant	1734.566	-	-
PSR	1.000000	-	-
YDR	-2.669635	0.16106	-16.5749
ODR	-43.29043	2.00091	-21.6354
LFE	-16.27093	0.79382	-20.4971
SIF	-11.78639	0.75960	-15.5165

Source: Author's calculation using EViews 8.

The first normalised equation given in Table 4 can be rewritten in the regression model as follows:

$$PSR = -2.67*YDR - 43.29*ODR - 16.27*LFE - 11.78*SIF + 1734.56$$

The value and sign of coefficients show how the explanatory variables affect the dependent variable (significant or insignificant, positive or negative effect). The common rule regarding the degree of significance for a relationship is as follows: when the coefficient value of the variable is double its standard error value, the relationship is significant.

The highest negative coefficient for ODR was 43.29, which signified a strongly negative effect of the elderly dependency rate (ODR) on private savings rate (PSR) in Vietnam, whereby a 1% increment in the variable would lead to a greater decrease in the private savings rate by 43.29%. The statistically significant expected sign of

the ODR coefficient further implies that the elderly dependency rate is an important factor in determining private savings in Vietnam. Similarly, the youth dependency rate (YDR) had a significantly negative effect on private savings rate (PSR), suggesting that in the long-run, a 1% increment in the former would yield a reduced value for the latter by 2.67%. Compared to the other three explanatory variables, the coefficient of YDR was the smallest, indicating that in the long-run, the effect of YDR on PSR would be modest. This finding is suitable with the ageing context of Vietnam, where population ageing is becoming a problem with demographic transformation occurring due to the rapid decline in fertility rate and an increased elderly rate, along with higher longevity.

With regard to life expectancy, the results revealed its significantly negative impact on the private savings rate, whereby a one-unit change alone would lead to the decline by 16.27%. This finding can be explained through the standard life cycle theory, whereby the elderly lives in the second period of life cycle that negatively affects their savings behaviour and reflects their tendency to save less in older age. Thus, a longer life expectancy will reduce their savings in old age, thereby causing a decreased private savings. Indeed, the negative linkage between an increment in life expectancy and private savings rate could be caused by the weak incentives from underdeveloped social security and private insurance systems in Vietnam, along with the weak motivations of its elderly population for savings accumulation in view of their retirement period.

Likewise, the social insurance funds rate yielded a significantly negative influence on the private savings rate, whereby a 1% increase would result in a decreased private savings rate by 11.79%. The negative value of the correlation coefficient between both variables in the context of Vietnam is in accordance with the asset substitution effect of Feldstein's life cycle savings theory (1974).

#### 4.4 Short-run analysis

The VEMC not only identifies the cointegration (long-run) relationship, it can also aid in detecting the short-run dynamics between these variables. It also indicates whether the latter dynamics are affected by the estimated long-run relationship—Table 5 below presents the results of the dynamic error-correction model.

Table 5 : The results of the short-run VECM

	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
ECT	-0.349616	0.084633	-4.130959	0.0017
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
R-squared	0.785101		F-statistic	2.511674

Source: Author's calculation using EViews 8.

Based on the above results of VECM estimates, the private savings equation is rewritten as follows:

$$D(PSR) = -0.349*[PSR(-1) + 2.67*YDR(-1) + 43.291*ODR(-1) + 16.271*LFE(-1) + 11.786*SIF(-1) - 1734.566] + C(2)*D(PSR(-1)) + C(3)*D(PSR(-2)) + C(4)*D(PSR(-3)) + C(5)*D(YDR(-1)) + C(6)*D(YDR(-2)) + C(7)*D(YDR(-3)) + C(8)*D(ODR(-1)) + C(9)*D(ODR(-2)) + C(10)*D(ODR(-3)) + C(11)*D(LFE(-1)) + C(12)*D(LFE(-2)) + C(13)*D(LFE(-3)) + C(14)*D(SIF(-1)) + C(15)*D(SIF(-2)) + C(16)*D(SIF(-3)) + 1.404 + \epsilon_t$$

Where:

$$ECT = \mu_{t-1} = PSR(-1) + 2.67*YDR(-1) + 43.29*ODR(-1) + 16.27*LFE(-1) + 11.78*SIF(-1) - 1734.56$$

The ECT in a VECM represents the speed and tendency of adjustment at which the dependent variable adjusts to changes in the independent variables in moving towards the long-run equilibrium. Therefore, its coefficient value in this study was negative (-0.349) and significant as its p-value was 0.0017, which was less than the 0.05 significance level and implied that the annual speed of adjustment for private savings from its disequilibrium was at 34.9% per year.

The lagged coefficients of explanatory variables, meanwhile, captured the short-term influences on the dependent variable (D(PSR)). The results in Table 5 reveal the short-run negative coefficient values of three lagged explanatory variables of YDR, ODR, and PSR with different estimated values and signs, indicating that these lags of all three variables have significant short-run impacts and can explain the changes on the private savings rate. More specifically, only one negative short-term relationship was seen between the second lag of the youth dependency ratio  $D(YDR(-2))$  and private savings rate, with the coefficient value of -0.58 at the 10% significance level. This denotes that short-term-wise, a 1% increment in the youth dependency ratio causes a decline in private savings in Vietnam by 0.58%. Similarly, the first and second lags of the elderly dependency ratio ( $D(ODR(-1))$  and  $D(ODR(-3))$ ) yielded statistically significant and negative short-run effects on private savings rate with the coefficient values of -10.10 and -5.47 at the 5% significance level, respectively. This suggests that in the short-term, a 1% rise in the elderly dependency ratio leads to a decline in private savings in Vietnam by 10.10% and 5.47%, respectively. Likewise, the first and second lags of social insurance funds rate ( $D(SIF(-1))$  and  $D(SIF(-2))$ ) resulted in significantly negative influences on private savings rate with the coefficient values of -4.69 and -3.21, respectively. Therefore, in the short-run, a 1% increment in social insurance funds rate would lead to a decline in the private savings rate in Vietnam by 4.69% and 3.21%, respectively. By contrast, the lags of life expectancy did not pose any short-term effect on the private savings rate, denoting that in the latter would be non-responsive to life expectancy in Vietnam.

Furthermore, the statistical values of F statistics and R-squared identified the overall significance of the model. In specific, the R-squared of 0.785 indicated that 78.5% of the variation in the private savings rate in Vietnam could be explained by the variable variations of the youth and elderly dependency ratios, life expectancy, and social insurance funds rate. Meanwhile, the estimated F-statistics of 2.51 at  $p = 0.0017$  suggested that the variables could jointly explain changes seen in the private savings rate.



#### 4.5 Block Exogeneity Wald Test for testing the short-run causality

To confirm the short-run relationship and indicate the causality between private savings and the explanatory variables involved in the VECM, Block Exogeneity Wald test was applied.

Table 6 : VEC Granger Causality/Block Exogeneity test

<b>Dependent variable: D(PSR)</b>			
<b>Excluded</b>	<b>Chi-sq</b>	<b>df</b>	<b>Prob.</b>
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

Source: Author's calculation using EViews 8.

Table 6 indicates the presence of a causality running from the youth dependency ratio, elderly dependency ratio, and social insurance funds rate to private savings rate in Vietnam. This was positioned due to the lags of two excluded variables D(ODR) and D(SIF) that were rejected at the 5% significance level, while D(YDR) was rejected at the 10% significance level. Therefore, the Block Exogeneity Wald results were in favour of the short-run VECM results. Furthermore, the joint block exogeneity test revealed that the Chi-square statistic value ( $\chi^2$ ) was significant at the 0.1 significant level. Therefore, all lags of the excluded variables D(YDR), D(ODR), D(LFE), and D(SIF) were indicated to possibly influence the endogenous variable D(PSR) in the long-run.

## 5.0 Conclusion and policy recommendations

### 5.1 Summary of research and conclusion

The main finding in this study underlined the significantly negative long-run relationship between youth and elderly dependency ratios, life expectancy, and social insurance funds with private savings rate accordingly. The significantly negative associations of the youth and the elderly dependency ratios with private savings rate in Vietnam, in particular, were in line with the Life Cycle Hypothesis by Modigliani (1970) and conformed to the priori expectations. Furthermore, the substantial decline of youth dependency ratio seen in Vietnam coupled with a practical stagnation of the elderly dependency ratio resulted in

relatively high savings and high growth in the past. However, a decline of the children dependency ratio was likely to be much slower, while the elderly dependency ratio would tend to increase, following which the economic growth was likely to slow down as the households started to deplete their savings pool. This negative correlation has been found by most recent studies, including the studies of Horioka (1997) for Japan, Thornton (2001) for the United States, Modigliani and Cao (2004) for China, and Uddin et al. (2016) for Australia. Likewise, the negative long-run influence of life expectancy on private savings rate favoured the standard life cycle theory and caused by the weak incentives from underdeveloped social insurance systems and weak motivations of the Vietnamese elderly for savings accumulation for retirement period. This would be difficult for them to save for the future in case of low income and poor living standards. This finding is thus similar to the study by Bloom et al. (2007). Similarly, social insurance funds have a negative long-run influence on private savings rate in Vietnam, which is in accordance with the asset substitution effect of Feldstein's life cycle savings theory (1974). This evidence can be explained by the fact that pensions are considered a substitute of income; as a result of Vietnam's pension scheme development, people know that they will receive higher pension benefits from the public pension scheme after retirement, causing them to reduce their savings efforts during their working life.

With regard to the short-run relationship, both the VECM and Block Exogeneity tests showed three negative short-run influences of the lags for the youth dependency ratio, elderly dependency ratio, and social insurance funds rate on the private savings rate. However, no short-run influence was seen for the lags of life expectancy on private savings rate in Vietnam.

## 5.2 Policy implications and recommendations

The important contribution of this study can be attributed to the policy implications, wherein it is aspired to drive the level of private savings in Vietnam. The government can rely on the following indicators of dependency ratios and social insurance funds to affect the level of private savings. In fact, the government should mobilise its resources, for instance, in opening opportunities of production or investment for the institutions in the market via rule liberalisation in

order to stimulate economic growth. This would lead to increased income and elevate private savings.

Secondly, the Vietnam government can promote private savings by taking advantage of the golden population structure and limiting the effects of elderly dependency ratio, namely by offering attractively beneficial programmes for the population. They should be provided with the opportunities to increase their productivity and thus contribute to higher economic growth consistent with the increasing income per capita; this will empower citizens to have higher savings, contributing to the amplified amount of private savings.

Thirdly, motivating older employees and self-employed individuals nearing their retirement age can be done by the government's efforts to reform the pension system, encourage and facilitate the financial institutions to start the elderly benefit schemes in order to bring higher benefits for the elderly and spur 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 participated individuals' income. With an increased income, the individuals have a higher ability to save, thereby increasing their savings.

According to Long (2012), Vietnam's designated social security fund is predicted to suffer implicit pension debts (IPDs) during the period of 2000 - 2050. If its government fails to reform the current publicly-managed pay-as-you-go defined-benefit (PAYG DB) pension system, the fund will be depleted and even dipped into deficit condition, thereby threatening the government budget and private savings. Therefore, the scholar (Long, 2012) has further suggested four ways to reform the pension scheme. *First*, the Vietnam government needs to cut the benefits of rich pensioners and increase their pension income tax, while still maintaining benefits of other pensioners equipped with the sufficient pension income to sustain the inter-generational equality. Instead of paying the benefits through statutory wage, the government would need to adjust the benefits by relying on changes of consumption price index (CPI); the index is deemed a reflection of the costs behind maintaining a certain standard of living for these pensioners. *Second*, it would be a better decision if they transfer the pension scheme from the current PAYG DB pension system to a partially funded scheme, before shifting to a fully funded scheme to boost private savings. Prior to this transfer, however, the government must consider solving the

IPDs. Here, the “double burden” is shouldered by the participants of the current PAYG scheme; they have to pay not only for themselves but also for the current members of the pension scheme. Therefore, the government can learn from the experiences of Friedman et al. (1996) and Estelle (1998) as applied in Latin American countries and other transitional economies: these governments have utilised the revenues or assets from the privatisation process of state enterprises and co-finance fiscal requirements for current pensioners. Meanwhile, Kunieda (2001) has recommended that the government should allocate a part of personal pensions to notional defined contribution pension, and thus commit to bringing back the return rate equivalent to the economic growth rate for current contributions. *Third*, a transition will bring a larger burden and threaten the fiscal viability of the government; regardless, the Vietnamese pension scheme is in dire need of further reform as soon as possible. This is especially true in the difficult situation of the current PAYG pension system, where it now covers 20% of the workforce or only nearly 10% of the total population, whereas the first contributing group of the post-1995 pension scheme would only begin receiving their benefits in 2015 onwards. *Fourth*, the government should manage the pension fund concurrently with enacting favourable policies that encourage the diversification of investments for the purpose of maintaining and developing said fund. This must be undertaken with the principle of avoiding its use to cover expenditures or any budget deficit. Moreover, the government is recommended to maintain its budget under control, recover, and solve the budget deficit step-by-step by carefully making investments in profitable areas. Additionally, carefully investing in profitable projects is highly necessary to overcome the individuals’ fear that is preventing them from savings, and encourage their savings activity. Similarly, the necessity of establishing a sound regulatory framework that spurs the participation of Vietnamese employees in the private sector and stimulates the voluntary scheme cannot be denied.

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