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FINANCIAL LITERACY AND RETIREMENT PREPAREDNESS IN SRI LANKA: EVIDENCE FROM THE PRIVATE SECTOR EMPLOYEES

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FINANCIAL LITERACY AND RETIREMENT PREPAREDNESS IN SRI LANKA:
EVIDENCE FROM THE PRIVATE SECTOR EMPLOYEES

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in Family Sciences in the
College of Agriculture, Food and Environment
at the University of Kentucky

By

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2021

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ABSTRACT OF THESIS

FINANCIAL LITERACY AND RETIREMENT PREPAREDNESS IN SRI LANKA: EVIDENCE FROM THE PRIVATE SECTOR EMPLOYEES

The South Asian country of Sri Lanka has a rapidly aging population, but little attention has been paid to individuals and families' financial preparedness for retirement. This study aims to overview the current system of retirement preparedness in Sri Lanka, and to examine financial and pension literacy's role on the retirement preparedness. Specifically, this study evaluated three domains of retirement preparedness: planning for retirement and perceived retirement income adequacy (subjective measures, $n = 142$), and wealth accumulation (objective measure, $n = 115$). Results show that (1) financial literacy had a positive and statistically significant association with retirement preparedness (only with objective measure), (2) pension literacy had a positive and statistically significant association with both subjective and objective measures of retirement preparedness, and (3) there was no synergic effect between financial literacy and pension literacy for retirement preparedness. Important policy implications, suggestions on financial education, and future research implications are discussed.

KEYWORDS: retirement preparedness, financial literacy, pension literacy, Employee Provident Fund

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04/24/2021

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CHAPTER 1. INTRODUCTION

Sri Lanka has the largest aging population in South Asia (Gamaniratne, 2007). In 2015, 14% of the population was over 60, which is expected to increase to 21% by 2030 and 25% by 2040 (Tilakaratna et al., 2019). This demographic change contributes to a high dependency ratio among those over 64 years of age¹ (see Table 1). Due to the relatively high dependency ratio and longevity rate in Sri Lanka, retirees' long-term financial needs increasingly become a burden on the family system. Consequently, elders tend to depend on the government for assistance (Joshua, 2017).

Nevertheless, the economic climate in Sri Lanka already requires an extended government involvement in providing welfare services (Central Bank of Sri Lanka, 2019a). The increase in the dependency on public assistance for retired citizens will lead to more government expenses, creating additional fiscal problems such as increased government debt and monetary instability. As a solution, Sri Lanka's government facilitates a non-contributory pension system for public employees and a contributory pension system for private and informal sector employees to encourage individuals to be financially prepared for retirement.

The present study evaluates retirement preparedness among participants of the contributory pension system (private sector employees). The literature revealed a positive relationship between financial literacy and retirement preparedness among different populations across many countries, including the United States (U.S.) (Clark et al., 2017; Mitchell & Lusardi, 2011; Young et al., 2017). However, the role of financial literacy on retirement preparedness is not studied for the Sri Lankan population. The purpose of this

¹ Dependency ratio is the population over the age 64 as a percentage of the working age.

Table 1 Sri-Lankan Macro-Economic Data in Comparison with Countries in the South Asian Region OECD and US (2018)

| | Sri-Lanka | India | South Asia | OECD^a | US |
|---|------------------|--------------|-------------------|-------------------------|-----------|
| Life expectancy at birth (in years) ^b | 75.3 | 68.6 | 68.7 | 80.1 | 78.69 |
| Fertility rate (%) ^c | 2.0 | 2.3 | 2.5 | 1.7 | 1.8 |
| Dependency ratio of those above 64 years (%) ^d | 14.6 | 8.8 | 8.6 | 25.2 | 22.80 |
| GDP per capita (in U.S. dollars) ^e | 4,102 | 2,015 | 1,905 | 40,352 | 62,641 |
| GDP per capita PPP (in U.S. dollars) ^f | 11,956 | 6,899 | 6,293 | 40,488 | 55,681 |

Note. Adapted from World Bank website: <https://databank.worldbank.org/data/home.aspx>

^a Organization for Economic Co-operation and Development. ^b Average time a human is expected live based on the year of birth. ^c Fertility rate is the average number of children born to a woman over her life time. ^d Population over the age 64 as a percentage of the working age.

^e GDP per capital is the measure of country's economic output for its number of people. study is to examine if financial and pension literacy is related to the retirement preparedness of contributory fund participants working in the private sector in Sri Lanka

CHAPTER 2. LITERATURE REVIEW

2.1 Retirement in Sri Lanka

2.1.1 Demographic factors

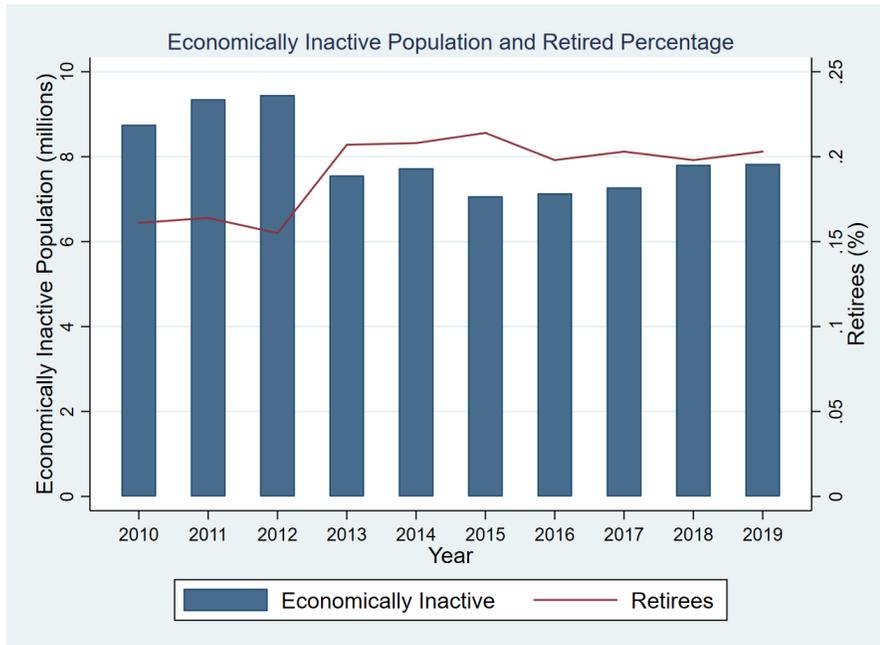
Sri Lanka is a lower-middle-income country (World Bank, 2021) with a population of 21.8 million (Central Bank of Sri Lanka, 2019a) and a labor force participation rate² of 58.6%(World Bank, 2020). Compared to the 72.5% labor force participation rate in the U.S. (World Bank, 2020), Sri Lanka's participation rate is low, possibly due to the high economically inactive population (Department of Census and Statistics, 2019). Despite the decline in the economically inactive population during the past decade, percentage of retirees steadily increased from 16% in 2010 to 21% in 2019 (Figure 1). This rise in the retired population increases the dependency ratio on the labor force.

2.1.2 Employment in Sri Lanka

Since 2010 Sri Lanka maintains an unemployment rate of around 95%(Central Bank of Sri Lanka, 2019a). As presented in figure 2, employment in non-agriculture-related jobs is the highest. Of these non-agriculture-related employees, the private sector is the highest employer of the labor force, employing 48% of the non-agriculture-related employees (Department of Census and Statistics, 2020). While it is essential to look at the overall regulations available to guarantee financial security during retirement for all

² Labor force participation rate is the economically active population between 15 and 64.

Figure 1 Movement in Economically Inactive Population and Retired Population during 2010 – 2019



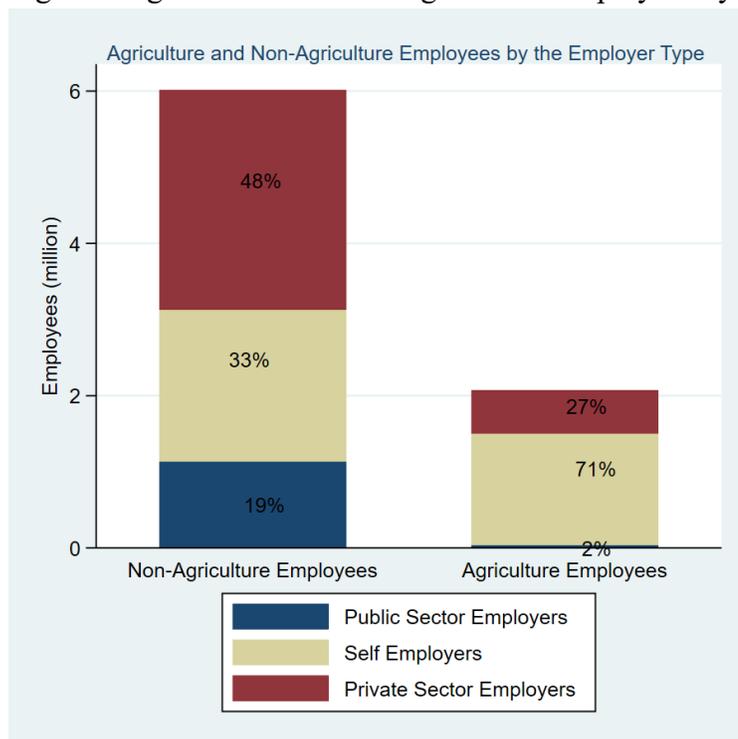
Note. Adapted from Sri Lanka labour force survey - Annual Report - 2019.

employees, this study focuses on the private sector employees, the highest employer of the non-agriculture sector.

2.1.3 Sources of retirement income

During retirement, some of the main income sources are personal savings, retirement benefits received as part of employment benefits, work in the informal sector, and financial assistance from family and friends. Retirement benefits received as part of employment benefits vary based on the employer. Public sector employees receive pension income during retirement (Karunaratne & Goswami, 2002). Financial security for the private sector employees is ensured through mandatory investment in the Employee Provident Fund (EPF) or Approved Private Provident Fund (APPF) for

Figure 2 Agriculture and Non-Agriculture Employees by Employer Type



Note. Adapted from Quarterly report of the Sri Lanka labour force survey: Quarterly report 2020 (Second quarter)

companies that are allowed to operate an APPF (De Mel, 2000; Karunaratne & Goswami, 2002). Suppose an individual employed in the self-employed or informal sector, which is not part of the EPF, has the opportunity to contribute to a Voluntary Retirement scheme operated by the government (De Mel, 2000).

Like in many Asian countries, saving for retirement is not embedded among the Sri Lankan population for several reasons. Two of the most common reasons are, firstly, parents take on their adult children's financial responsibilities, which means that parents will incur expenses such as higher education, marriage, and housing. Therefore, it has a reciprocal effect on children taking their aging parents' financial responsibilities (Bloom et al., 2010; Gupta & Hershey, 2016; Samath, 2019). Secondly, retirement has a negative

connotation, unlike in the U.S. There are limited studies conducted to evaluate the retirement goals of the Sri Lankan population. However, since India and Sri Lanka share the same history and culture, studies conducted among the Indian population will help understand the behaviors and intentions towards retirement among the Sri Lankans. Gupta and Hershey (2016) found a stark contrast among retirement goals among a sample in India and the U.S. In that, in the U.S., individuals view retirement as a form of reward and a time of "giving back" in the form of volunteering. These views on retirement keep individuals in the U.S. engaged in society. But in India, retirement has a negative connotation or is viewed as the last phase of life rather than a reward for decades of labor.

As life expectancy in Sri Lanka has increased from 59 years in 1960 to 75 in 2018, the traditions of being dependent on family for retirement income are also changing (Bloom et al., 2010; Kaluthantiri, 2017). These changes could be due to the increased time spent in retirement, resulting in more extensive financial burdens on adult children. More specifically, the retirement age in Sri Lanka is still at 50 for females and 55 for males. Therefore although a male in the 1960s spent about four years in retirement, today, a male will spend nearly 25 years in retirement. Hence it elevates the importance of financial independence and financial security of the aging population in Sri Lanka.

2.2 Pension System in Sri Lanka

Retirement savings plans are mainly of two types, defined contribution plans (DCP) and defined-benefit plans (DBP). The main difference between a DCP and a DBP is that the employee of a DCP is solely responsible for ensuring there will be sufficient funds for retirement. In contrast, in a DBP, the employer is responsible for compensating the employees during their retirement, regardless of the amount of funds available

(Lusardi & Mitchell, 2014). The public sector employees in Sri Lanka benefit from a DBP. However, the private sector employees are offered a DCP managed by the government (the EPF) or managed privately by the employer (the APPF). EPF is the main source of formal retirement income to 60% of those participating in income security arrangements, while only five percent depend on employer/private managed APPFs (De Mel, 2000; Karunaratne & Goswami, 2002). APPFs are operated individually by the employers with contribution rates, rate of return, and fund management technicalities decided by the individual employer (Karunaratne & Goswami, 2002). While it is essential to understand the operations of APPFs, this study focuses on the retirement preparedness of the EPF contributors, as it impacts the financial security during retirement for 60% of those participating in income security arrangements.

2.2.1 Operations of the EPF

An EPF member account is created for each employee through a contribution of a minimum of 8% of the salary by the employee and 12% by the employer (maximum contribution allowed is employee 10% and the employer 15%) (Gamaniratne, 2007; Karunaratne & Goswami, 2002; Kumara & Pfau, 2012). EPF is the largest single managed fund in Sri Lanka, and it is twice the size of the market capitalization of the Colombo Stock Exchange (the main stock exchange in Sri Lanka) and 30% of the Gross Domestic Product (GDP) in 2009 (Kumara & Pfau, 2012). The Central Bank is responsible for managing the government debt and the EPF, the country's largest fund. Thus, over 90% of the funds in the EPF are invested in government treasury bills and

bonds, earning only a risk-free interest rate³ (Gamaniratne, 2007; Kumara & Pfau, 2012). As a result of investing in government debt instruments, real interest earned⁴ by EPF holders is lower than market rates. This results in a low return on retirement investments and potentially worsening the retirees' poverty rate due to lower wealth accumulation (Gamaniratne, 2007).

Unlike the public pensioners, who are part of DBP, and the informal sector employees, who have the discretion to invest either with the voluntary pension scheme managed by the government or maintain their own retirement fund, the EPF Act No. 15 of 1958 mandates the private sector employees to contribute to the EPF or the APPF (Karunaratne & Goswami, 2002; Kumara & Pfau, 2012). Therefore, the private sector employees need to be financially literate to understand how their retirement savings are managed and understand the sufficiency of the funds accumulated for retirement. If the funds collected at the EPF are insufficient, employees need to take precautionary measures and corrective actions, such as maintaining private savings or working beyond the mandatory retirement age.

2.3 Retirement in the United States

The U.S. has a population of 327 million, and 16% of the population is over 65 years old (World Bank, 2020). The typical ages of retirement for most citizens in the U.S. are between 62 and 67 years. A US citizen's average life expectancy is 78.5 years; thus individuals spend around 11.5 to 16.5 years in retirement. Unlike in the Asian culture, in

³ Risk-free interest is an interest rate lower than the market deposit rate offered by the commercial banks.

⁴ Real interest is the interest earned net of inflation rate.

the U.S., individuals spend their working years in anticipation of retirement (Gupta & Hershey, 2016). Thus, many individuals engage in different saving plans to secure their financial stability during retirement.

In the U.S., financial stability during retirement is achieved mainly through investments in employer-sponsored retirement plans, privately managed retirement savings, and drawing on Social Security and Medicare benefits. The government's Social Security and Medicare benefits are for those over the age of 62 and 65, respectively. These government-sponsored programs are social safety nets funded through mandatory payroll taxes (Social Security – 6.20% and Medicare 1.45%). Some of the retirement saving plans in operation in the U.S. are considered tax-sheltered investments, and the funds grow tax-free. These arrangements show the government's commitment towards encouraging saving for retirement. Compared to the tax-sheltered retirement savings plan in the U.S. situation in Sri Lanka is vastly different, as the employees contribute to the EPF post-tax and the returns on the EPF are taxable (Employee Provident Fund, 2016).

Unlike in Asian culture, the U.S.'s retired population experiences a higher level of independent living or lives in assisted living facilities than living with their children. These living arrangements require a higher level of financial security during retirement. Similarly, as Sri Lanka's population ages, there is a higher probability of seeing older individuals living independently or in assisted living facilities. These changes in elderly living patterns are evident by the rapid increase in assisted living facilities over the past decade (Samath, 2019). Therefore, it is vital for the current workforce in Sri Lanka to change their retirement and saving behaviors to secure financial stability during retirement.

2.4 Empirical Evidence of Factors Affecting Saving for Retirement

Financial security during retirement is dependent on the ability to accumulate wealth (Lusardi, 2007). The ability to accumulate wealth for retirement can be affected by multiple factors. Some of these factors are; age, gender, marital status, number of dependents, education, inherited wealth, shocks or unexpected events during the lifetime, time preferences, self-control, risk preferences, financial literacy level, and institutional factors affecting pension literacy (Ameriks et al., 2007; Martin et al., 2016; Menchik & Jianakoplos, 1997; Smith, 1999).

Individuals are in different families with varying financial situations. Those in affluent families may receive an inheritance that would enable them to avoid debt, invest in human capital and increase their future earning power, helping them have a discretionary income above their expenses. Therefore, an individual who receives inheritance can start saving for retirement earlier than individuals who enter the workforce without estate benefits. For example, Menchik and Jianakoplos (1997) found that inheritance account for 10%-20% of the wealth gap between Black and Whites which was able to be attributed to the difference in family inheritance.

Unexpected events during the life cycle, such as a severe illness of a family member requiring a high level of medical expenses, or the death of an income earner resulting in a sudden loss of income, will result in loss of income without a change in expenses (Smith, 1999). Pelkowski and Berger (2004) found that permanent health conditions have a significant adverse effect on average hourly wages and the number of hours worked. They also found that these adverse effects were largest for individuals whose health problems started during the peak of their life-cycle earning. Moreover,

acute health shocks deplete family wealth (Jason & Dalton, 2016). Thus, health shocks negatively impact an individual's income level; it also consumes family resources affecting retirement decisions and retirement wealth.

Time preference, individuals with a high preference for the present will not be encouraged to save for their retirement. Using the National Longitudinal Survey of Youth (NLSY) for the study, Martin et al. (2016) showed that those who preferred the current consumption accumulated 37% less retirement wealth than those who had a low preference for current consumption. Similarly, individuals with low self-control are less likely to forgo current consumption in anticipation of saving for future consumption. For instance, many studies have shown a statistically significant positive association between accumulated wealth and self-control (Ameriks et al., 2007; Griesdorn & Durband, 2016). Additionally, research indicates that females have a lower risk preference, which leads them to accumulate lower retirement wealth than their male counterparts. More specifically, single females and households headed by females approach retirement with less wealth due to the negative association between risk preference and wealth (Neelakantan & Chang, 2010).

Institutional factors such as pension literacy affect an individual's retirement preparedness. Ekerdt (2002) found in the Health and Retirement Study (HRS) one-fifth of DCP contributors did not know their account balances, and one-tenth did not know the age at which they were eligible to begin drawing on their DCP funds. Additionally, an experimental study done among individuals between the age 60 and 65-year-olds in the U.S. found that, compared to the control group who did not receive educational information about Social Security, those who did, had a four percentile increase in labor

force participation (Liebman & Luttmer, 2015). This study showed evidence of a positive association between pension literacy and a behavioral change related to retirement.

Lusardi and Mitchell (2014) found that increasingly employers are shifting from DBP to DCP retirement saving schemes. A unique characteristic of a DCP is that individuals are responsible for ensuring they have sufficient funds to sustain themselves during their retirement. This process entails identifying how much money is required to sustain during retirement, managing the contribution level, and managing the fund growth through investment return. These activities require an individual to be financially literate to understand concepts such as compound interest, inflation, and risk management. Although there is a significantly high financial literacy requirement, the U.S.'s financial literacy level is between 55%-75%, and it is only at 25%-35% among the Sri Lankan population (Klapper et al., 2014).

Financial literacy is an essential determinant of good financial behavior (Lusardi et al., 2010). Financial illiteracy is a serious problem in developing countries as most households possess a low financial literacy level (Klapper et al., 2014; Lusardi & Mitchell, 2007). Researchers can not fully explain the variation in financial literacy through the differences in education level, age, race, or marital status (Young et al., 2017). But more importantly, strong numeracy and understanding of financial concepts such as compound interest, inflation, and risk management have been able to determine the level of financial literacy (Bönte & Filipiak, 2012; Lusardi & Mitchell, 2014). Empirical research has found a strong association between financial literacy and financial behavior both within the United States (Hershey & Mowen, 2000; Lusardi, 2011; van Rooij et al., 2012) and in various other populations; for example, India (Bönte & Filipiak,

2012), Israel (Segel-Karpas & Werner, 2014) and Rwanda (Sayinzoga et al., 2016). Some of the financial behaviors observed were: maintaining emergency funds, spending and saving habits, using the banking system (Henager & Cude, 2016), and planning for retirement (Clark et al., 2017; Henager & Cude, 2016; Lusardi & Mitchell, 2007). Lusardi and Mitchell (2007) found that those who answered questions on interest rates correctly also planned well for retirement, indicating the potential impact financial literacy has on the individual to plan for retirement. To maintain healthy financial behaviors, individuals should understand the basic financial concepts like interest, inflation, and risk management. Several studies have shown that those who are financially literate approach retirement with higher retirement wealth (Bateman et al., 2012; Lusardi, 2007, 2011; Lusardi & Mitchell, 2007).

2.5 Empirical evidence of factors affecting retirement preparedness in Sri Lanka

Retirement preparedness is an under-researched area in Sri Lanka. Preparedness for retirement is as saving for retirement and having adequate wealth at the time of retirement. Adequate wealth for retirement is having access to 60 - 80% of annual pre-retirement income during one's retirement years (Hanna et al., 2016). However, many studies have shown that individuals in the United States (Henager & Cude, 2016; Lusardi, 2007; Lusardi & Mitchell, 2014; Lusardi et al., 2010) and individuals outside the United States (Sayinzoga et al., 2016; Segel-Karpas & Werner, 2014) lack financial preparedness for retirement. Most studies in Asia, including Sri Lanka, relating to factors affecting an individual's saving focus on broader system factors such as financial inclusion, economic growth, foreign investments, prevailing interest, and the economy's

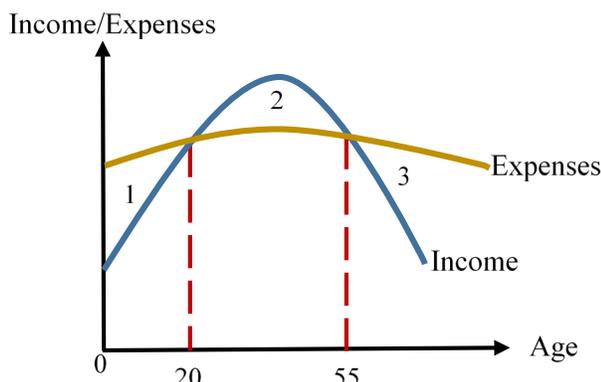
inflation rate (Agrawal et al., 2009; Heenkenda, 2016). The literature lacks empirical evidence evaluating the behavioral factors affecting the individual's savings of the Sri Lankan population. As explained earlier in the literature review, it is evident that financial literacy can alter behavioral factors, such as risk preference, time preference, and self-control and positively impact financial behaviors such as retirement preparedness.

CHAPTER 3. THEORETICAL FRAMEWORK

The life cycle hypothesis (LCH) can provide a theoretical framework to explain how financial literacy relates to financially preparing for retirement. LCH is a well-known economic theory to explain individuals' savings and consumption patterns over their lifetime (Modigliani, 1986; Modigliani and Brumberg, 1954). LCH expects a rational individual to save during their working years and use it as a source of monetary support during retirement to smoothen the utility from consumption over their lifetime (Browning & Crossley, 2001; Griesdorn et al., 2014). Figure 3 depicts the life cycle of consumption and savings under the assumption that income fluctuates with age, but consumption level remains relatively constant regardless of income. People should save during working years (Area 2 in Figure 3) when income exceeds consumption. In contrast, people need to borrow (Area 1) or dis-save (Area 3) to survive when income is not enough for consumption. LCH indicates that age is a crucial predictor in explaining individual behaviors to save for retirement. LCH expects those in the working-age group to save for retirement, whereas those before and after is not. Consequently, LCH suggests that individuals must engage in planning and saving for retirement.

This basic LCH also assumes that individuals know all relevant information when planning and making decisions on retirement savings. Specifically, LCH assumes the cost of acquiring information about the future is not so high or difficult (Warneryd, 1999). All relevant information or information about the future can refer to financial literacy regarding planning and retirement savings decisions. However, this assumption, which is not explicitly considering financial literacy as a major determinant of retirement savings, is far from reality. Commonly defined as understanding financial concepts and applying

Figure 3 Life-Cycle Hypothesis



them to economic decision-making (Huston, 2010), financial literacy can shape financial decision-making and behaviors (Lusardi & Mitchell, 2014).

Financial literacy can affect preparation for retirement savings in several ways through *understanding financial concepts*. For example, if they understand the economic life cycle, they can perceive the need for retirement savings even in the early years. If they understand the benefits of compound interest, they may start early to save for retirement and plan for retirement. If they know inflation and possible decreases in purchasing power, they may consider annual inflation rates in calculating their retirement savings' needs, leading to better preparation. If they understand the concept of risk, they may know their risk tolerance level and possible gains and losses of investment for retirement savings. Financial literacy also affects decisions and behaviors for retirement savings through the *application of it*. Suppose they understand the simple formula of consumption/savings function based on LCH. In that case, they can estimate their savings needs and contribution rates out of income per month or year for retirement savings. Suppose they apply the concept of risk to the preparation of retirement savings. In that case, they can figure out estimated rates of return from financial products that they invest in with different risks. If they tend to be risk-averse and invest in safe assets such as

savings accounts or treasury bills, they may expect low returns from these investments. They may think about more contributions each month to meet the retirement savings needs and vice versa if they are risk-takers.

Based on potential channels addressed above from financial literacy into financial decision-making and behaviors for retirement savings, and empirical findings with a strong association between financial literacy and financial behavior mentioned in the literature review, in this study, it is hypothesized:

Hypothesis 1: Financial literacy is positively associated with retirement preparedness.

Financial literacy is essential for retirement saving at a general level, but it may not provide individuals with pension-specific knowledge. Pension-specific knowledge is the knowledge about pension benefits, contribution rates, the investment strategy, and the eligibility criteria to claim benefit (Adeabah, 2020; Ekerdt, 2002; Mitchell, 1988). Specific knowledge about the pension system or pension literacy will affect retirement preparedness through *altering practical decisions* like changing the contribution rates, investment strategy, or retirement age.

More specifically, pension literacy is important because if they know how much they and the employer contribute to the retirement fund, they will better maximize the contributions. Suppose they know about the investment strategy, whether the fund is investing in fixed income securities, equities, mutual funds, or index funds, they will influence the investment strategy for better retirement fund growth. Additionally, if individuals are aware of the withdrawal method, whether it is possible to receive an annuity or a lump sum will enable them to make appropriate decisions to manage the funds during retirement better. Finally, if they know when they will be eligible to claim

benefits, they could better maximize the benefits by not prematurely claiming their retirement fund.

Based on the above discussion and the empirical evidence of the positive association between pension literacy and retirement preparedness, this study hypothesized that.

Hypothesis 2: Pension literacy is positively associated with retirement preparedness.

CHAPTER 4. METHOD

4.1 Sampling and Data Collection

Individuals attempt to smooth their consumption over the lifetime by saving during working years and dissaving during retirement (Modigliani, 1986). Accordingly, this study includes current employees who contribute to the EPF.

Preceding approval from the Institutional Review Board (IRB), recruited participants through Facebook pages affiliated with a university and a page dedicated to discussing financial matters in Sri Lanka. Obtained prior approval from administrators of the two Facebook pages to post the survey invitation. Furthermore, the administrators disabled commenting on the post to encourage voluntary participation and protect the participants' privacy. The Facebook post included the link to the Qualtrics survey so that participants can directly access the survey on their device. The study collected the consent to participate in the survey by clicking on the "begin" after reading the cover letter. The survey was conducted only in English. The participants had the opportunity to skip answering questions or stop the survey during the study and share their email addresses to enter a raffle to win \$50 worth of gift cards from a grocery store in Sri Lanka. Those emails were kept separately from the participant's data to ensure confidentiality.

Between April 1 and October 31, 2020, 175 private sector employees participated in the online survey. The study excluded fifteen participants who do not meet an inclusion criterion (i.e., do not contribute EPF (10) or did not provide the answer to this question (5)). The current study includes sample sizes of 142 and 115, respectively, for the subjective and objective measures. Conducted the Power analyses to ensure the

sample sizes' appropriateness using G*Power (Faul et al., 2009). The recommended sample size was 161 when using subjective measures of retirement preparedness. The sample size of 161 was arrived based on a one-sided test with a 5% significance level, 80% power, and effect size of 2.3 as odds ratio between pension literacy and retirement preparedness and R^2 of 0.07 for the relationship between other variables (financial literacy and control variables) and retirement preparedness from the previous similar studies (Adeabah, 2020; Lusardi, 2007; Segel-Karpas & Werner, 2014). When using the objective measure, the sample size was 106 based on a one-sided test with a significance level of 5%, power of 80%, and effect size of 0.19 ($R^2/(1-R^2) = 0.16/(1-0.16)$) (Lusardi, 2007) for 13 independent variables. Overall the sample sizes (142 and 115) in this study are reasonable for finding statistically significant effects. It is noteworthy that this sample is not representative of Sri Lanka population. It captures employees who work in the private sectors with more education and higher financial literacy levels.

4.1.1 Missing data management

Table 2 reports the missing data patterns in the relevant independent variables (Panel A), control variables (Panel B), and dependent variables (Panel C). There were missing values between 1 – 69 in the financial and pension literacy variables in Panel A. Missing values in financial and pension literacy-related questions could be due to the participants' lack of knowledge. Deleting these observations could eliminate participants with low financial and pension literacy, known as item non-response bias. In order to reduce item non-response bias, all missing answers for financial and pension literacy were treated as wrong answers as the previous studies suggested (Allgood & Walstad,

Table 2 Missing Data Pattern in Independent and Dependent Variables

| Variable | Frequency | % |
|--|-----------|------|
| Panel A: Relevant Independent Variables | | |
| Compound interest | 4 | 2.5 |
| Inflation | 4 | 2.5 |
| Risk | 19 | 11.8 |
| Withdrawal method | 69 | 43.1 |
| Investment | 2 | 1.2 |
| Contribution | 1 | 1.0 |
| Panel B: Control Variables | | |
| Dependents | 60 | 23.1 |
| Monthly Income | 18 | 11.2 |
| Panel C: Dependent Variables | | |
| EPF Balance | 32 | 20 |

Note: No missing values in the subjective dependent variables

2016; Bucher-Koenen & Ziegelmeyer, 2014). While missing answers in compound interest, inflation (financial literacy), investment, and contribution (pension literacy) were negligible (only 1 to 4 respondents), 19 respondents skipped the question on risk, and 69 didn't answer the EPF withdrawal method (Can you take the EPF as installments?).

Regressions were performed with imputations and with list-wide deletion to check for item non-response bias. While planning for retirement and retirement wealth did not show significantly different regression results, retirement income adequacy had only a minor difference between list-wide deletion ($n = 66$) and using imputations ($n = 142$). Thus in this study, non-response as wrong answers was coded to minimize the loss of information and increase sample size.

Panel B displays the missing data in the control variables used for the analyses; only variables related to dependents (60) and monthly income (18) had missing observations. Because 70% of the sample was below 34 years, treated those who did not report the number of dependents as if they did not have dependents, which is reasonable

given the gradual increase in average age at marriage and childbirth (De Silva, 2013; Department of Census and Statistics, 2012). Because the current sample involves a highly educated group delaying family formation could be further (De Silva 2013). Regarding monthly income, the study used the Little's test of Missing Completely At Random (MCAR) (Johnson & Young, 2011; Li, 2013) to test whether the missing monthly income is random. The test result showed that monthly income is missing completely at random ($\chi^2=9.78, p = 0.99, df = 30$). Previous studies suggested this approach and provided similar results. Smith's (1995) tested and found that those who did not report the net worth behaved differently to those who provided the exact response. In other words, missing values in net worth were MCAR and did not impact the results.

Similarly, monthly income values were not imputed because it was MCAR, and a particular pattern between other variables could not be traced. Consequently, this study used list-wide deletion of 18 observations from the logistic regression analyses resulting in the final sample size of 142 in order to analyze the planning towards retirement and retirement income adequacy. Deleting these missing observations had little impact on the results of the study.

Panel C reports the missing data pattern in the dependent variable. Missing values were present only in the objective measure of retirement preparedness (EPF Balance). Conducted the Little's MCAR test similar to monthly income, and results suggested the EPF balance was MCAR. Thus the study used list-wide deletion of 32 observations due to missing EPF balance. Overall, 45 observations were deleted from the objective measure due to missing values in either monthly income (control variable) or EPF balance (dependent variable).

4.2 Measures

In this study, financial literacy and pension literacy are relevant independent variables, and retirement preparedness is the dependent variable. These constructs are new research areas in the Sri Lankan context, resulting in a lack of measures that evaluate these constructs within Sri Lanka. Thus, the study used measures established within the United States. Beaton et al., (2000) suggested that when using instruments developed in one culture (source culture) for data collection in another culture (target culture), it requires to reach an equivalence between the source and target questionnaire. The questionnaire used in this study had some adjustment by rephrasing financial and pension literacy questions from HRS and SCF surveys such as U.S. dollar amount into local currency or contribution rates to the pension plan. These adjustments to the questions were needed to ensure whether they are equivalent to the original questionnaire in various domains. These domains include item equivalence, semantic equivalence, operational equivalence, measurement equivalence, and functional equivalence (Herdman et al., 1998). Among these domains, semantic equivalence (i.e., transfer of meaning across languages and cultures) and measurement equivalence are not relevant because the adjusted questionnaire is written and administered in English. To test the other domains of equivalences, the adaptation process detailed by Herdman et al. (1998) was followed to evaluate the cultural equivalence of the instrument to be used in Sri Lanka. Two independent translators conversant in Sri Lanka's local culture reviewed the questionnaire, and it was revised according to their recommendations. The developed instrument was then used in a pilot group ($n= 10$, *Female* = 4) to ensure the survey

instrument measured the study's objective. The results of the pilot group verified the adjusted questionnaire precisely captured the objectives of the study.

4.2.1 Dependent Variables

The study measured retirement preparedness both subjectively and objectively. The study adopted subjective measures from the HRS and the SCF surveys. The HRS asked a Likert-type question: "how much have you thought about retirement?" (Lusardi, 2007) with response options of "A lot, Some what, A little, and Hardly at all." The question "how much have you thought about retirement" indicates the extent to which the responder has planned for retirement. The SCF measured the participant's perception of retirement income adequacy. It asked to "rate the adequacy of your anticipated combined income from EPF and other personal retirement savings on a scale of 1 (totally inadequate) to 5 (totally adequate)." The study created two categorical variables to measure retirement preparedness based on the responses to these two questions: a variable with four categories from HRS; a variable with three categories from SCF. The three categories from SCF were low, medium, and high retirement income adequacy. The study coded responses for totally inadequate and inadequate as low retirement income adequacy, satisfactory was coded as a medium retirement income adequacy, and adequate, and totally adequate coded as a high retirement income adequacy. The number of categories in the SCF variable changed to three from five due to very few responses in some categories.

As a measure of objective retirement preparedness, this study used the self-reported EPF balance. This measure has several advantages in the Sri Lankan population with little knowledge on retirement savings and limited availability of individual pension

data. It is one of the most feasible ways to collect data that enables assessing retirement preparedness objectively. Juster and Suzman (1995) and Smith (1995) concluded that those who are unwilling to provide exact net worth values are willing to respond to less direct questions. Therefore, the survey asked for the exact EPF balance or an indirect question "how many times is your current EPF balance as your annual income." The survey asked the indirect question only from those who did not provide the exact EPF balance. Eight out of 115 participants answered the indirect question rather than giving the exact EPF balance. Derived the EPF balances for these eight respondents by multiplying their answers by their reported annual income. For example, if a respondent answered that their EPF balance was equal to 2 times the annual income, and the respondent's monthly income was 50, The study estimated the EPF balance as 1,200 (i.e., $2*50*12$). Subsequently, the EPF balance observations used in this study were 115 by adding eight respondents to 107 who provided the exact EPF balance. The amount of EPF balance was log-transformed to avoid skewness in the data, a common practice for net worth-related variables (Lütkepohl et al., 2012).

4.2.2 Relevant independent variables

Financial literacy was measured by asking three multiple-choice questions with one correct answer. These questions tested the understanding of (1) compound interest, (2) inflation, and (3) risk diversification. Following are the three questions used in the survey. (1) Understanding interest compounding: "Suppose you had Rs.100 in a savings account, and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?" The response options are

"More than Rs102; Exactly Rs102; Less than Rs102; Do not know; Refuse to answer."

(2) Understanding of inflation: "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account?" The response options are "More than today; Exactly the same; Less than today; Do not know; Refuse to answer." (3) Understanding of risk diversification: "Please tell me whether this statement is true or false. 'Buying a single company's stock usually provides a safer return than buying stocks of multiple companies.'" The response options are: "True; False; Do not know." Similar questions are the most commonly used in surveys, such as the HRS and American Life Panel in the U.S. and the English Longitudinal Study on Aging in U.K. (Lusardi & Mitchell, 2009, 2014).

This study created three binary variables to measure financial literacy in each domain from the three financial knowledge questions suggested by Klapper et al., (2013) and Allgood and Walstad (2016): 1 if a respondent correctly answers, 0 otherwise.

HRS included questions to evaluate the respondents' knowledge about the respondent's pension plan (Ekerdt, 2002; Mitchell, 1988). These questions took the form of understanding respondents' knowledge about (1) Pension plan type, (2) Pension contributions, and (3) Pension benefits. Questions were adapted for the Sri Lankan situation by reflecting the program details of EPF and changing the terminology to EPF. Following are the questions included in the survey. (1) Knowledge about the pension plan was tested by asking, "do you know where the EPF invests the contributions collected?" This was a "yes or no" dichotomous question. (2) Understanding of pension contribution was checked by asking, "how much do you and your employer contribute to the EPF?"

This was a multiple-choice question with four options; two correct answers, one incorrect answer, and a don't know answer option. (3) The study tested the knowledge about pension benefits, and the survey asked, "can you take your EPF as installments? The answer options were yes, no, and do not know." Like financial literacy measures, the study created three binary variables for the pension literacy questions: 1 if a respondent correctly answers, 0 otherwise.

The survey asked a range of sociodemographic questions included in the analyses as control variables and the relevant independent variables on financial and pension literacy. These sociodemographic variables included age, gender, and marital status, number of dependents, monthly income, education, and homeownership. Regarding monthly income, 14 out of 143 respondents provided ranges (10 brackets) of income rather than an exact amount. For these respondents (Juster & Suzman, 1995; Smith, 1995), monthly income was a lower amount from a range bracket (e.g., 100 is used from a range of 100 to 110; the higher amount from the range or an average of two amounts were used but showed no difference in the results of regression analyses). Monthly income was log-transformed to minimize the skewness, which is common in income or wealth data (Lütkepohl et al., 2012).

4.3 Analysis

This study is a non-experimental study using the online survey to evaluate financial literacy and pension literacy's roles on retirement preparedness. This study used both ordinal logistic regressions and ordinary least squares (OLS) regressions to test the two hypotheses. The two subjective measures of retirement preparedness are categorical variables with an explicit ordering of the category levels. For the subjective measures,

ordinal logistic regressions were used to estimate potential relationships between financial and pension literacy with the respondents' (n=142) level of planning for retirement and their perception of retirement income adequacy. OLS regressions were used to estimate the role of financial literacy and pension literacy on respondents' (n=115) wealth accumulation toward retirement (objective measure), which is a continuous variable of LKR (Sri Lanka currency).

CHAPTER 5. RESULTS

5.1 Descriptive Statistics

Table 3 presents the sample characteristics. The sample's average age was 33.9, ranging between ages 23 and 73, with over 70% of the respondents being below 34 years. Of the total respondents, 35.9% were females, similar to the overall female labor force participation rate in Sri Lanka (34.5%) (Central Bank of Sri Lanka, 2019). The vast majority (85.5%) of the sample had a college-level degree or above, four times higher than 21.2% of the general population. The mean monthly salary is LKR113,820 (USD615), which is about five times higher than the general population of LKR 22,297 (USD 120) (Central Bank of Sri Lanka, 2019).

5.2 Financial and Pension Literacy Characteristics

The responses to financial and pension literacy questions are summarized in Table 4: Panel A for financial literacy and Panel B for pension literacy. The sample displayed a high financial literacy level across all three financial literacy measures (77% to 86%), compared to both the general population (35%) of Sri Lanka (Klapper et al., 2014), and an American sample (48% to 75%) of National Financial Capability Study (NFCS) used by (Clark et al., 2017). However, the sample displayed limited pension literacy, especially in the withdrawal method. Approximately 82% either gave the wrong answer (38.9%) or skipped answering the question (43.4%) on the withdrawal method. The respondents who missed answering the question presumably did not know if they could withdraw as a lump sum and not receive on installment basis. In terms of where the central bank invests their contribution to pension, only a little over half the sample was

Table 3 Sample Characteristics

| Characteristics | % |
|---|------------|
| Age (years) | |
| Mean (<i>SD</i>) | 33.9 (8.7) |
| 29 or younger | 25.2 |
| 30–34 | 45.3 |
| 35 or older | 29.6 |
| Female | 35.9 |
| Highest level of education | |
| Less than high–school | 0.6 |
| High school | 1.9 |
| Associate college | 11.9 |
| College and above | 85.5 |
| Married | 66.7 |
| Number of dependents including children | |
| 0 | 50.3 |
| 1 | 14.5 |
| 2 | 24.5 |
| 3+ | 10.6 |
| Homeownership | 52.8 |
| Monthly salary ^a | |
| Mean | 113,820 |
| Median | 100,000 |
| Number of respondents | 160 |

^a Sri Lankan rupee (LKR) whose exchange rate per US dollar is currently 185.

aware about it. In sum, the respondents have high financial literacy levels measured by general financial concepts whereas they have relatively low pension literacy with limited practical knowledge on pension system.

5.3 Retirement Preparedness

Table 5 describes the subjective (Panel A and B) and objective (Panel C) measures of retirement preparedness. Panel A shows how much they have thought about retirement, indicating the extent that they have planned for retirement. Approximately

Table 4 Financial Literacy and Pension Literacy

| Panel A: Financial literacy questions | % |
|---------------------------------------|------|
| Compound Interest | |
| Correct | 86.2 |
| Incorrect | 4.4 |
| DK | 9.4 |
| Inflation | |
| Correct | 77.4 |
| Incorrect | 9.4 |
| DK | 13.2 |
| Diversification | |
| Correct | 81.8 |
| Incorrect | 6.3 |
| DK | 11.9 |
| Panel B: Pension literacy questions | % |
| Withdrawal method | |
| Correct | 17.6 |
| Incorrect | 38.9 |
| DK | 43.4 |
| Investment | |
| Correct | 52.8 |
| Incorrect | 45.9 |
| DK | 1.3 |
| Contribution | |
| Correct | 89.3 |
| Incorrect | 3.1 |
| DK | 7.6 |

Note. DK = don't know including missing

50% of the respondents reported that they thought more than somewhat on retirement, with 24.1% of a lot. The other half of them responded to a little (30.3%) or hardly (19.6%). Panel B shows how they perceive their adequacy of retirement savings. A 25.3% of respondents perceived their retirement income as highly adequate, followed by medium (47.5%) with 27.2% of low adequacy. Panel C presents the distribution of the EPF balance. It shows a high variability with a mean of 1.8 million. The mean EPF

Table 5 Measures of Retirement Preparedness

| Panel A: Retirement Planning | | |
|---|----------|---------------------|
| How much have you thought about retirement? | Response | % |
| | A lot | 24.1 |
| | Somewhat | 26.0 |
| | A little | 30.3 |
| | Hardly | 19.6 |
| Panel B: Retirement Income Adequacy | | |
| Rate the adequacy of your anticipated income combined from EPF and other personal savings | Response | % |
| | High | 25.3 |
| | Medium | 47.5 |
| | Low | 27.2 |
| Panel C: EPF Balance | | |
| | | Amount ^a |
| | Mean | 1,870,950 |
| | 5% | 50,000 |
| | 10% | 100,000 |
| | 25% | 400,000 |
| | 50% | 900,000 |
| | 75% | 1,757,293 |
| | 90% | 5,000,000 |
| | 95% | 9,000,000 |

^a Sri Lankan rupee (LKR) whose exchange rate per US dollar is currently 185.

balance is markedly higher than the mean EPF balance in the general population (45,500) (Employee Provident Fund, 2016).

5.4 Retirement Preparedness by Financial and Pension Literacy Levels

Table 6 presents the relationship between retirement preparedness across all three measures (Panel A and B with subjective, Panel C with objective), and financial and pension literacy. Overall, financial literacy has a positive relationship with retirement preparedness (objective measure only) whereas pension literacy is strongly associated

Table 6 Retirement Preparedness by Financial Literacy and Pension Literacy

| Panel A: Planning for retirement (%) | A lot | Some what | A little | Hardly | χ^2 |
|--|-------|-----------|---------------------|-----------------------|----------|
| Financial Literacy | | | | | |
| Compound Interest | 87.1 | 89.6 | 82.9 | 86.8 | 0.87 |
| Inflation | 87.1 | 75.0 | 75.6 | 76.3 | 2.13 |
| Risk | 87.1 | 83.3 | 78.1 | 81.6 | 1.16 |
| Pension Literacy | | | | | |
| Withdrawal method | 22.6 | 22.9 | 14.6 | 10.5 | 2.90 |
| Investment | 67.7 | 39.6 | 53.7 | 29.0 | 12.84*** |
| Contribution | 83.9 | 93.8 | 92.7 | 84.2 | 3.33 |
| Panel B: Adequacy of retirement income (%) | | High | Medium | Low | χ^2 |
| Financial Literacy | | | | | |
| Compound Interest | | 85.0 | 84.0 | 93.0 | 2.04 |
| Inflation | | 75.0 | 77.3 | 81.4 | 0.44 |
| Risk | | 87.5 | 76.0 | 88.4 | 4.00 |
| Pension Literacy | | | | | |
| Withdrawal method | | 17.5 | 20.0 | 13.9 | 0.70 |
| Investment | | 60.0 | 46.7 | 32.6 | 6.81** |
| Contribution | | 92.5 | 90.7 | 83.7 | 2.04 |
| Panel C: EPF Balance | | | Correct answers (M) | Incorrect answers (M) | $t(111)$ |
| Financial Literacy | | | | | |
| Compound Interest | | | 2,196,042 | 2,080,714 | 0.00 |
| Inflation | | | 2,506,561 | 926,647 | 1.66** |
| Risk | | | 2,450,227 | 818,973 | 1.60** |
| Pension Literacy | | | | | |
| Withdrawal method | | | 3,422,391 | 1,894,824 | 1.79** |
| Investment | | | 3,145,039 | 1,281,671 | 2.57*** |
| Contribution | | | 2,170,812 | 2,353,750 | -0.46 |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$

with subjective and objective retirement preparedness measures. Panel A shows a pattern that the more respondents had financial literacy and pension literacy, the more they prepared for retirement. However, this association was statistically insignificant for financial literacy but significant for pension literacy, specifically about investment knowledge. For example, 66.7% of respondents who think a lot about retirement planning correctly answered the question on investment, but 39.6% somewhat, 53.7% of a little, and 29.0% of hardly. Panel B shows a similar pattern that adequacy of retirement income had no significant association with financial literacy but statistically significant with pension literacy on investment. Panel C reports that the respondents with the correct knowledge on financial and pension had a higher EPF balance than those with incorrect knowledge. In financial literacy, EPF balances were significantly higher in those who answered the inflation and risk related questions correctly (about LKR 2.4M to 2.5M) than incorrectly (LKR 818k to 926k). In pension literacy, those who knew how much is contributed and where the central bank invests their contributions had significantly higher EPF balance (LKR 3.1M to 3.4M) than those who didn't know (LKR 1.8M to 1.2M).

5.5 Regression Analyses

The study performed three sets of regression analyses for retirement preparedness. The study used ordered logistic regression to evaluate the categorical dependent variables

of planning for retirement (Table 7) and adequacy of retirement saving (Table 8). It used OLS regression to assess the EPF balance (Table 9). In all three sets of regressions, the study performed a basic regression for retirement preparedness on control variables in model 1. This is extended successively by including additional determinants of retirement preparedness, financial literacy, pension literacy, financial and pension literacy, and the interaction term between financial and pension literacy, respectively, in Models 2 through 5. A significant R^2 across all models, even after controlling for demographic factors, highlights the importance of financial literacy (objective measure only) and pension literacy on retirement preparedness.

5.5.1 Retirement Planning

Table 7 reports regression results to test the association between financial/pension literacy and retirement planning. Overall, the results of models 2 to 5 tell that 1) financial literacy was not related to retirement planning, 2) pension literacy was significantly related to retirement planning, and 3) there was no synergic effect on retirement planning between financial literacy and pension literacy. In models 2 and 4 with financial literacy, none of the financial literacy measures was statistically significant. In models of 3 and 4 with pension literacy, EPF investment knowledge (i.e., aware of where the Central Bank is investing their EPF contributions) was significantly and positively associated with retirement planning. Quantitatively, those who knew where to invest their contributions had about 1.9 times higher odds of retirement planning than those who did not know. In model 5, an interaction term between financial and pension literacy was not statically

Table 7 Ordered Logit Regression Results for Retirement Planning

| | Planning for retirement | | | | |
|---------------------------|-------------------------|------------------|-----------------|-----------------|-----------------|
| | (1) | (2) | (3) | (4) | (5) |
| | OR (SE) | OR (SE) | OR (SE) | OR (SE) | OR (SE) |
| Demographics | | | | | |
| Age | | | | | |
| 30-34 | 1.00 (.44) | .97 (.43) | 1.14 (.51) | 1.08 (.49) | 1.04 (.48) |
| Above 35 | 1.55 (.86) | 1.54 (.86) | 1.47 (.83) | 1.44 (.82) | 1.35 (.77) |
| Male | 2.43** (.86) | 2.55*** (.92) | 2.44** (.86) | 2.52** (.92) | 2.46** (.90) |
| Married | .87 (.31) | .86 (.31) | .90 (.33) | .89 (.32) | .89 (.33) |
| Homeowners | 1.51 (.51) | 1.62 (.56) | 1.47 (.49) | 1.60 (.55) | 1.66 (.58) |
| Have dependents | 1.13 (.36) | 1.10 (.36) | 1.18 (.38) | 1.17 (.38) | 1.25 (.42) |
| College educated | .50 (.25) | .49 (.27) | .46 (.24) | .41 (.23) | .41 (.23) |
| Log monthly income | 1.46 (.35) | 1.43 (.35) | 1.46 (.36) | 1.42 (.35) | 1.40 (.35) |
| Financial Literacy (FL) | | | | | |
| Compound interest | | .95 (.53) | | 1.15 (.66) | 1.22 (.71) |
| Inflation | | .77 (.37) | | .76 (.36) | .80 (.38) |
| Risk | | 1.55 (.78) | | 1.76 (.91) | 1.96 (1.04) |
| Pension Literacy (PL) | | | | | |
| Investment | | | 1.89** (.61) | 1.90** (.62) | 2.14** (.74) |
| Contribution rate | | | .69 (.37) | .64 (.35) | .65 (.35) |
| Withdrawal method | | | 1.76 (.73) | 1.86 (.77) | 2.56* (1.33) |
| FL PL interaction | | | | | .41 (.35) |
| Overall model evaluation | | | | | |
| Likelihood Ratio chi2(15) | 22.8*** | 23.8** | 29.1*** | 30.4*** | 31.5*** |
| Pseudo R ² | .06 | .06 | .07 | .08 | .08 |
| Observations | 142 | 142 | 142 | 142 | 142 |

Note. Reference is age below 30, female, not married, non-homeowners, no dependents, no college education.

*** p<.01, ** p<.05, * p<.1

significant, indicating no synergic or moderating effects between them on retirement planning. Interestingly, in model 5, another measure of pension literacy (knowing withdrawal method) turned statistically significant, although it is at a 10% significant level. Among demographics, only males were statistically significant and had about 2.5 times higher odds of retirement planning than females in all five models.

5.5.2 Retirement Income Adequacy

Table 8 shows regression results to estimate the relationship between financial/pension literacy and retirement income adequacy. Similar to the pattern in Table 5, the results across all five models show no association between financial literacy and retirement income adequacy (models 2 and 4), positive association with pension literacy leading to about 1.8 times higher odds of feeling adequate retirement income (models 3 and 4) and no interaction or synergic effect on retirement income adequacy between financial literacy and pension literacy(model 5). Out of the demographics controlled in the analyses (models 1 to 5), married individuals and homeowners had statistically and significantly higher odds (about 2 times) of feeling their retirement savings were adequate. Those with dependents had about 50% lower odds of feeling their savings were adequate than those without dependents.

5.5.3 Retirement Wealth

The results of OLS regression to predict the relationship between financial/pension literacy and EPF balance for retirement savings are shown in Table 9. The results are similar to Tables 7, and 8 using subjective measures of retirement preparedness in that pension literacy had a positive relation with EPF balance (models of

Table 8 Ordered Logit Regression Results for Retirement Income Adequacy

| | Retirement income adequacy | | | | |
|---------------------------------|----------------------------|-----------------|-----------------|-----------------|-----------------|
| | (1) | (2) | (3) | (4) | (5) |
| | OR (SE) | OR (SE) | OR (SE) | OR (SE) | OR (SE) |
| Demographics | | | | | |
| Age | | | | | |
| 30-34 | .77 (.34) | .82 (.38) | .71 (.34) | .77 (.37) | .76 (.37) |
| Above 35 | 1.06 (.58) | 1.23 (.69) | .92 (.51) | 1.08 (.61) | 1.06 (.60) |
| Male | 1.67 (.62) | 1.79 (.67) | 1.65 (.62) | 1.79 (.68) | 1.74 (.67) |
| Married | 2.11** (.80) | 2.14** (.81) | 2.12** (.80) | 2.12** (.81) | 2.11** (.81) |
| Homeowners | 1.85* (.64) | 2.00** (.70) | 1.81* (.63) | 1.92* (.68) | 1.99* (.71) |
| Have dependents | .45** (.15) | .40*** (.14) | .45** (.15) | .39*** (.14) | .42** (.15) |
| College educated | .64 (.33) | .74 (.41) | .62 (.33) | .75 (.43) | .77 (.44) |
| Log monthly income | 1.29 (.32) | 1.33 (.34) | 1.32 (.34) | 1.37 (.37) | 1.35 (.37) |
| Financial Literacy (FL) | | | | | |
| Compound interest | | 1.15 (.70) | | 1.13 (.71) | 1.21 (.76) |
| Inflation | | .44 (.23) | | .43 (.23) | .43 (.24) |
| Risk | | 1.40 (.70) | | 1.29 (.67) | 1.42 (.75) |
| Pension Literacy (PL) | | | | | |
| Investment | | | 1.86* (.63) | 1.84* (.63) | 2.05* (.76) |
| Contribution rate | | | 1.91 (1.04) | 1.96 (1.10) | 1.96 (1.11) |
| Withdrawal method | | | 1.03 (.43) | 1.08 (.46) | 1.47 (.83) |
| FL PL interaction | | | | | .48 (.42) |
| Overall model evaluation | | | | | |
| Likelihood Ratio chi2(15) | 22.0*** | 24.8*** | 27.5*** | 30.3*** | 31.0*** |
| Pseudo R ² | .07 | .08 | .09 | .10 | .10 |
| Observations | 142 | 142 | 142 | 142 | 142 |

Note. Reference is age below 30, female, not married, non-homeowners, no dependents, no college education.

*** p<.01, ** p<.05, * p<.1

Table 9 OLS Regression Results for Retirement Pension Balance

| | log (EPF balance) | | | | |
|---------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | (1) | (2) | (3) | (4) | (5) |
| | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) |
| Demographic | | | | | |
| Age | | | | | |
| 30-34 | 1.25*** (.37) | 1.16*** (.37) | 1.36*** (.37) | 1.28*** (.37) | 1.27*** (.37) |
| Above 35 | 2.19*** (.44) | 2.14*** (.44) | 2.16*** (.44) | 2.12*** (.43) | 2.13*** (.43) |
| Gender | -.28 (.31) | -.28 (.30) | -.36 (.30) | -.36 (.30) | -.35 (.30) |
| Marital Status | .27 (.31) | .21 (.31) | .31 (.31) | .25 (.31) | .10 (.30) |
| Homeownership | .14 (.29) | .06 (.29) | .18 (.29) | .10 (.29) | .10 (.29) |
| Dependents | -.40 (.26) | -.36 (.27) | -.35 (.26) | -.30 (.26) | -.33 (.27) |
| Education | 0.00 (.38) | -.23 (.42) | -.04 (.37) | -.33 (.41) | -.44 (.41) |
| Log monthly income | .53*** (.19) | .46** (.19) | .53*** (.19) | .44** (.19) | .45** (.19) |
| Financial Literacy (FL) | | | | | |
| Compound Interest | | -.44 (.53) | | -.29 (.53) | -.33 (.54) |
| Inflation | | .13 (.45) | | .02 (.44) | .02 (.44) |
| Risk | | .92** (.46) | | 1.14** (.45) | 1.08** (.47) |
| Pension Literacy (PL) | | | | | |
| Investment | | | .55 ** (.27) | .62** (.26) | .56* (.29) |
| Contribution Rate | | | .16 (.53) | .11 (.54) | .12 (.54) |
| Withdrawal Method | | | .47 (.33) | .55* (.32) | .41 (.43) |
| FL PL interaction | | | | | .33 (.67) |
| Constant | 6.28*** (2.08) | 6.76*** (2.07) | 5.79*** (2.14) | 6.26*** (2.10) | 6.67*** (2.12) |
| Overall model evaluation | | | | | |
| F test | 8.56*** | 6.92*** | 7.06*** | 6.37*** | 5.92*** |
| R-squared | .39 | .42 | .43 | .47 | .47 |
| Observations | 115 | 115 | 115 | 115 | 115 |

Note. Reference is age below 30, female, not married, non-homeowners, no dependents, no college education.

*** p<.01, ** p<.05, * p<.1

3 and 4), and there were no synergic effects between financial and pension literacy (model 5). However, there was also a difference in that financial literacy had a statistically significant relationship with EPF balance, unlike in Tables 7 and 8. In models 2 and 4, knowing risk as a measure of financial literacy was influential in retirement savings, even after controlling for demographic, pension literacy, and other financial literacy measures. The coefficients of risk were 0.92 or 1.14, indicating that those with knowledge about risk have 1.5 to 2 times (i.e., $[\exp(0.92 \text{ or } 1.14) - 1] * 100$) more EPF balance than those without it. Similar to previous analyses of subjective retirement preparedness measures, knowledge about where the central bank invests the EPF contributions had statistically significant coefficients of 0.55 and 0.62 respectively in models 3 and 4 and a coefficient of 0.55 for knowledge of withdrawal method. In other words, 70% to 85% ($[\exp(0.55 \text{ or } 0.62) - 1] * 100$) higher EPF balance is associated with pension literacy measures investment and withdrawal. Among demographics, age and income had a statistically significant association with a higher EPF balance. Compared to the 29 or younger group, EPF balances of 30-30 and 35+age groups were 2.3 to 7.2 times tall ($[\exp(1.2 \text{ or } 2.1) - 1] * 100$). A 1% increase in monthly income can result in an approximately 0.5% increase in the EPF balance (the coefficient of 0.44 in model 4: $\text{percentage change in EPF balance} / \text{percentage change in monthly income}$). Practically, it suggests that when monthly salary increases by LKR1,138 (1% of the mean: LKR113,820 in Table 1), EPF balance increases LKR9,354(0.5% of the mean: LKR1,870,950 in Table 5).

5.5.4 Sensitivity Analysis

Table 10 displays the sensitivity analysis for financial/pension literacy and the interaction with the dependent variables retirement planning, retirement income adequacy, and EPF balance for the models 4 and 5 tested in the previous regression analyses (Tables 7, 8, and 9). In summary, the results are similar to the findings in Tables 7, 8, and 9. In that even though the regression analyses used financial and pension literacy indices in place of the individual measures of financial and pension literacy, financial literacy did not have a statistically significant association, pension literacy had a statistically significant association with all models except for in model 5 of retirement planning, and using a categorical interaction term instead of the continues variable did not change the previous findings in Table 7, 8, and 9.

Table 10 Sensitivity Test of Financial Literacy and Pension Literacy Measures

| | Retirement Planning | | Retirement Income Adequacy | | log (EPF balance) | |
|-----------------------------|---------------------|----------------|----------------------------|------------------|-------------------|-----------------|
| | (4) | (5) | (4) | (5) | (4) | (5) |
| | OR | OR | OR | OR | OR | OR |
| | (SE) | (SE) | (SE) | (SE) | (SE) | (SE) |
| FL Index | 0.99 (0.22) | 1.15 (0.53) | 0.8 (0.19) | 0.88 (0.43) | 0.17 (0.19) | -0.17 (0.43) |
| PL Index | 1.51* (0.32) | 1.38 (0.38) | 1.56** (0.34) | 2.05** (0.61) | 0.42** (0.19) | 0.28 (0.26) |
| Interaction | | | | | | |
| FL(Correct) PL(Correct) | | 0.78 (0.86) | | 0.32 (0.36) | | 1.29 (0.93) |
| FL(Correct) PL(Incorrect) | | 0.83 (0.67) | | 0.90 (0.78) | | 0.58 (0.75) |
| FL(Incorrect) PL(Correct) | | 3.62 (4.06) | | 0.44 (0.52) | | -0.41 (1.06) |
| FL(Incorrect) PL(Incorrect) | Reference group | | | | | |

Note. All other variables in Table 5 6 and 7 included in the analyses.

*** p<.01, ** p<.05, * p<.1

CHAPTER 6. DISCUSSION

This study examined financial and pension literacy's roles in people's retirement preparedness in Sri Lanka using a convenient sample collected via an online survey. In particular, this study asked two questions: To what extent are financial literacy in general and pension literacy in specific related to financially preparing for retirement? The retirement preparedness was examined subjectively with respondents' behavior (i.e., think about retirement) and perception (i.e., feel about retirement income adequacy) and objectively with the current balance of retirement savings. Overall, the results show that 1) financial literacy (understanding risk in particular) had a positive relationship with retirement preparedness, 2) pension literacy (where the Central bank invest in particular) had a positive and statistically significant association with all three retirement preparedness measures, and 3) there was no significant synergy effect between financial and pension literacy on retirement preparedness. These findings indicate unique and separate roles of financial literacy and pension literacy for retirement preparedness.

6.1 Financial Literacy and Retirement Preparedness

The first question was whether financial literacy is positively associated with retirement preparedness. The findings answered yes: financial literacy was positively related to the objective measure of retirement preparedness (EPF balance). Specifically, those with knowledge about risk had 1.5 to 2 times higher EPF balance than those without it after controlling for demographics and pension literacy. This finding is new with a Sri Lankan population but not surprising in the United States studies. Previous studies in the U.S. showed that those with a higher financial literacy approached retirement with higher assets. This hypothesis was tested with various populations,

including young adults (Lusardi & Mitchell, 2007), educated African Americans (Young et al., 2017), and older Americans (Lusardi, 2007; Mitchell & Lusardi, 2011).

Interestingly, only risk had a positive, statistically significant association with EPF balance out of the three financial literacy measures (i.e., interest, inflation, and risk). A possible explanation is that risk may not be easy to understand compared to interest and inflation concepts. It may indicate a better measure for differentiating between those with high and low financial literacy (Lusardi & Mitchell, 2014; Olivia S. Mitchell & Lusardi, 2011). These results denote that those who correctly answered the risk question might have made human capital investments, enabling a higher monthly EPF contribution to offset the negative impacts of low return earned by the EPF. These findings are unique because there are limited studies within the Sri Lankan population that evaluated the association between financial literacy and retirement preparedness. Another significant result says no: financial literacy had no relationship with subjective measures of retirement preparedness, indicating that regardless of their financial literacy levels, their subjective thinking or perception of retirement preparedness is the same. This result is somewhat different from the previous studies in the U.S. and other countries. For example, several studies found a statistically significant association between planning for retirement and financial literacy (Lusardi, 2007; Olivia S. Mitchell & Lusardi, 2011; van Rooij et al., 2012), and retirement income adequacy and financial literacy (Reyers, 2018; Segel-Karpas & Werner, 2014; Van Dalen, Henkens, & Hershey, 2010). However, it is important to note, Kim and Hanna (2015) found a high level of inconsistency between objective and subjective measures of retirement preparedness, specifically among those who had inadequate savings. It may be possible that there is some degree of

overestimation in the self-assessed/perceived retirement preparedness. Further studies are needed to understand better the gaps between subjective and objective measures, and Sri Lanka and U.S.

6.2 Pension Literacy and Retirement Preparedness

The second question was whether higher pension literacy is associated with higher retirement preparedness. An answer from significant findings says yes: a positive relationship between pension literacy and retirement preparedness across all subjective and objective retirement preparedness measures. In particular, those who know where the Central bank invests their contributions than those who don't know had 1.9 times higher odds of planning for retirement, 1.8 times higher odds of retirement income adequacy, and about 70% higher EPF balance even after controlling for a range of demographics and financial literacy. These findings are also the first in Sri Lanka but similar to the results in the studies done in developed and developing countries, such as the U.S. (Ekerdt, 2002; Liebman & Luttmer, 2015; Mitchell, 1988), Ghana (Adeabah, 2020), and Chili (Landerretche & MartÍNez, 2013) with a few experimental studies showing no differences (Finseraas & Jakobsson, 2014; Finseraas et al., 2017; Mastrobuoni, 2011). However, these findings may need to be understood under EPF fund management system by the Central Bank of Sri Lanka. Almost all EPF contributions are invested in government debt instruments such as treasury bills and bonds, causing return rates to be far below employees' expectations from stock markets or diversified portfolios. Those who know this "no-choice" investment system earns lower return rates may consider this in their retirement preparedness, enhance monthly contributions and eventually perceive a higher retirement income adequacy and retirement savings.

However, the withdrawal method showed a statistically significant association only with EPF balance and not the subjective measures of retirement preparedness. That is, only those who knew EPF could be withdrawn only on a lump-sum basis had about 70% statistically greater EPF balance than those who did not know. The withdrawal method is critical information in pension literacy because unawareness of the withdrawal method can prevent effective management of the windfall retirement income intended to provide financial security during retirement. Ineffective management of retirement income could cause retirees to outlive the lump sum received at retirement.

6.3 Synergy Effect

Lastly, findings show no significant synergy effect between financial and pension literacy on retirement preparedness, indicating that the roles of financial literacy and pension literacy are unique to improve retirement preparedness. In other words, either financial or pension literacy is not sufficient, and both are necessary for retirement preparedness.

6.4 Implications

This study highlights the importance of financial and pension literacy on retirement preparedness among private-sector employees in Sri Lanka. The current research suggests several important implications for further studies, policy for retirement savings, and financial education in Sri Lanka. Existing research mostly assumes that higher financial literacy will eventually lead to higher pension literacy due to improved financial behavior (Ekerdt, 2002). But the current study detects that, among highly educated and financially literate private-sector employees in Sri Lanka, a higher pension literacy was associated with higher retirement preparedness even after controlling for

financial literacy. In line with this finding, it is vital to conduct further research on the association between pension literacy and retirement preparedness. It is also noteworthy that risk was the only financial literacy measure that had a significant association with retirement preparedness (objective measure). This indicates the importance of incorporating advanced financial literacy measures in the survey instrument, especially when the sample contains a higher education level (Mitchell & Lusardi, 2011).

The most significant implication for policymakers is to consider diversifying the EPF investments, increasing all employees' EPF balance even without their active engagement to enhance financial literacy, pension literacy, and human capital (for increased earnings). The current study involved mostly the high-income-earning, college-educated respondents, who are financially capable of making investments to enhance their skills. Diversifying the portfolio to include a higher-yielding investment strategy will benefit all private-sector employees. Although the Central bank and employers regularly communicate about the EPF, the employees are still unaware of the EPF. The government should share and disseminate information on investment and its rates of returns to employees, such as a hierarchical hypertext structure in brochures and educational materials, as suggested by Nell et al., (2018).

In line with promoting financial preparedness for retirement in South Asia's fastest aging country, pedagogy is vital. First, it is essential that workplace financial educators include retirement preparedness, pension literacy, and financial literacy in the training material. In particular, it needs to include specific information such as where the Central Bank invests, its rates of return, potential investment cost, when to withdraw, or how to withdraw. Second, it is pivotal that this education is not limited to a single

workshop. The educators need to create methods to continuously engage their audience with pension literacy material because training led mostly to short-term behavioral changes and not long-term (Finseraas et al., 2017; Liebman & Luttmer, 2015).

6.5 Limitations

Users of this research should use the findings of this study should with caution. The sample was a convenient sample, administered online and only in English. This excludes a segment of the population that is not tech-savvy or English speaking, most likely with less financial and pension literacy (Volpe, Kotel, & Chen, 2002). Additionally, the survey recruited participants only through two Facebook groups (a page of a university and a page discussing financial matters in Sri Lanka); this resulted in a sample with mostly college-educated (85%) and a high financial literacy (interest – 86%, inflation – 77%, risk – 82%).

Additionally, this study only used the three basic financial literacy measures, but advance financial literacy measures would have been able to more effectively differentiate the financially literate and illiterate respondents (Bumcrot, Lin, & Lusardi, 2013; Mitchell & Lusardi, 2011; van Rooij et al., 2011). While this study is one of the initial studies in the area of retirement preparedness in Sri Lanka, objective measure of retirement preparedness could be further improved. In that, developing a retirement income replacement ratio that considers the Sri Lankan living cost would enable a more objective analysis of retirement preparedness (Kim & Hanna, 2015; Kim et al., 2014). Thus, it is necessary to create a replacement ratio that reflects the Sri Lankan living expenses and culture.

Finally, it is noteworthy that this study has not explicitly incorporated the behavioral aspects such as time preference, risk, and self-control relevant for effective financial management. However, future studies need to consider these behavioral aspects in addition to financial and pension literacy when evaluating the determinants of retirement preparedness.

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