THE ROLE OF FINANCIAL LITERACY AS A PREPARATORY TOWARDS FACING HOUSEHOLD FINANCIAL CRISIS: THE CASE FOR JAPAN

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

(4) The word count of this research report is 17,476 .

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
BLUE	Best Linear Unbiased Estimator
CPI	Consumer Price Index
DBT	Household Debt
DSP	Difference Stationary Process
EA	Euro Area Nations
GDP	Gross Domestic Product
GE	Greenspan Era
HQC	Hannan-Quinn Criterion
OLS	Ordinary Least Square
PP	Philip-Perron
Pre-VE	Pre-Volcker Era
SBC	Schwarz Bayesian Criterion
SPD	Household Spending
SVG	Household Savings
TAX	Income Tax
TOL	Tolerance
TSP	Trend Stationary Process
VE	Volcker Era

VIF	Variance Inflation Factor

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PREFACE

The importance of financial literacy for individuals and households has been a significant issue that concerns many researchers to examine the actual role of financial literacy in preventing financial crisis. One of the major questions that individuals and households are desperate to solve is what makes them financially literate. Also, this assists the debate on whether enhanced financial literacy can minimize the chances for individuals and households from facing internal financial catastrophe and consequent outcomes. Apart from the studies undertaken by previous research, we found that Japan would be the country for the study due to its wide financial and economic history that has been through the best and worst periods. The role of financial literacy can be examined by understanding how the households in Japan rebounded to make the country one of the top economies in the world in a matter of decades after its slump.

In this study, the relationship between household savings with household debt, household spending, income tax, inflation rate, and economic growth rate (GDP) will be analyzed in details and the findings will be discussed for further interpretations.

This study can provide greater views to the fields of finance and economics as well as financial management and financial planning. It will also incorporate an improved research model to overcome the gaps from previous researches by implementing some recommendations suggested. The variables used are integrated with the theories applied to the course of this study. Ultimately, the significance of financial knowledge among households in order to better manage and plan their funds can be reviewed.

ABSTRACT

This study aims to determine the factors affecting household savings in Japan from year 1980 to 2018, which consists of annual data for 39 consecutive years. Similarly, this study will review past literatures completed by previous researchers in order to gain a more comprehensive understanding on the background of this research along with the issue that is concerning researchers about the financial literacy standards in Japan. The significance of this study to the policymakers and Japanese households will be emphasized. Apart from that, this study will also explore the extensive definitions of financial terms to clear the doubts of readers. A theoretical framework is constructed to investigate the relationship between household savings with the independent variables which are household debt, household spending and income tax as well as control variables which are inflation rate and economic growth rate. This study will focus on the Autoregressive Distributed Lag (ARDL) model by discussing on unit root testing method and the steps required to follow in order to run ARDL approach. Descriptive statistics will be applied to simplify the large amount of data while diagnostic checking will be used to ensure reliability of analyzed results. Furthermore, the results will be presented along with elaborated explanations for a complete understanding of the implemented methods and unbiased results obtained. This will be followed by a thorough discussion on the findings from this study in addition to the implications. Lastly, accompanying limitations will be recommendations suggested based on this study for future research which will highlight the elements that can be improved on.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

The act of understanding as well as applying either basic or advanced financial management skills has been a fundamental measure within a household. Due to the ever-changing and incalculable traits of the economy, the emphasis on familiarising with some principles of financial management and planning is vital for households to adapt. This enables households to better handle and organize their financial resources during crises or in times of adversity, as well as scheming some informed financially sound decisions to preserve the financial capability of the household. This chapter includes eight sections that will commence the introductory of this research including research background, definition of terms, problem statement, research questions, research objectives, significance of study, chapter layouts and conclusion. The background of study will serve as an overview of the area of research that will be focused on. Definition of terms is the key towards comprehending some complicated financial terms that will be frequently applied in this research. Next, problem statement will portray the current major issue of the research topic that is taking place for better perception. The initial idea and conceptions will be translated into research questions which is essential to execute our research objectives which serve as the overall purpose of this research. Under significance of study, the importance of this research to policymakers and stakeholders will be expressed. Following that is the brief outline of the chapters that will be included in this study. This chapter ends with a brief summary.

1.1 Research Background

Financial management can be defined as an individual's ability in managing the financial situation to achieve financial independence. It can also define how individuals manage their income in their daily lives. Generally, financial

management can be structured into two categories which are personal financial management and organization financial management (Munohsamy, 2015). The role of personal financial management is to help individuals in managing their personal finance daily such as saving, budgeting, investment, debt management, and so on (Munohsamy, 2015). On the other hand, personal financial management describes how an individual conduct a financial plan to manage and control their income and expenses. An individual need to learn personal financial management to manage finance systematically. Financial management does help an individual to create a safer and greater future and more freedom on spending money under appropriate measures (Munohsamy, 2015). Financial management maintains a household's standard of living and decreases the percentage and probability of households in facing financial crisis. It is also beneficial to the household in the sense of enabling a well-informed financial decision on savings, investments which can indirectly reduce debts and poverty. To have greater financial management, financial literacy is a must to perform financial management well.

According to Krechovska (2015), financial literacy can be defined as the ability in managing personal income, ability in making decision on monthly expenditure, understanding the consequences for every decision made, either on current or future income. Kozina and Ponikvar (2015) claimed that financial literacy is a part of human capital that might help an individual in developing financial activity to increase an individual's welfare. Moreover, Mahdzan and Tabiani (2013) stated that financial literacy is an important skill and knowledge that must be learned by individuals so that individuals can survive in the modern society. On the authority of Ibrahim, Haru and Isa (2009), financial literacy can be used to measure an individual's knowledge and understanding on personal financial skills, and how individuals apply these skills and knowledge into their daily lives. Lusardi and Mitchell (2014) reported that the definition of financial literacy can be an individual's ability in strategic financial planning, debt, and pension funds by using economic information before making an informed decision. While Remund (2010) claimed that financial literacy can be explained by four common operational meanings which are budgeting, saving, borrowing, and investing.

Somehow, after many studies and research have been conducted in recent years, the term financial literacy does not have one definite or specific meaning. Some researches which encompass skills and knowledge on financial literacy shows that individuals should be able to make informed financial decisions. According to the most basic definition of financial literacy, it is an individual's ability in managing its finance (Isomidinova & Jugindar, 2017). Financial literacy is an important tool for an individual to survive in the current modern society, it is not only a piece of knowledge but a survival tool. By gaining knowledge on financial literacy, an individual may empower itself and fully utilize its knowledge on decision making in choosing the most beneficial financial products and services in investment. Financial literacy is one of the most important components for an individual to master financial management.

According to past researches on financial literacy, the importance of financial literacy has been emphasized as an alternative solution in the complex financial landscape. Past studies claimed that financial literacy plays an important role in individual financial behaviour. Those individuals with lower financial literacy are facing difficulties in managing debt as compared to an individual with higher financial literacy (Isomidinova & Jugindar, 2017). One of the studies on financial literacy done by Stango and Zinman (2007) claimed that individuals with lower financial literacy will lack financial planning towards their future. Therefore, financial literacy is important in aiding an individual in decision making for any financial activity without taking into account the occupation of the individual (Isomidinova & Jugindar, 2017).

An individual that has financial literacy's knowledge must be proficient in core competency and obtain opportunities in a compatible environment to gain the benefits (Patil, 2016). An individual must be proficient in numerical ability such as day to day calculation when purchasing goods, paying bills, interest, and so on. Other than that, the individual should be proficient in budgeting such as perfectly utilize personal income, while avoiding unnecessary spending to raise self-satisfaction. Moreover, borrowing is also a financial literacy competency. The example of borrowing is car loan and mortgage loans. There are a few criteria for an individual to borrow money from the bank such as individual personal income,

savings, credit score and collateral (Patil, 2016). The bank must examine an individual personal income, savings and credit score before approving any loan or borrowing since the bank must make sure that an individual has the ability to repay the debt every month. Other than that, an individual may use their asset as a collateral to secure the loan, the bank will approve the loan according to the value of the collateral. An individual, being a financially literate, must be proficient in borrowing which means that the individual must understand the debt and can repay the debt (Patil, 2016). Investment also plays a role in the key feature of financial literacy and an individual must utilize its knowledge in investing and choosing the most suitable investment portfolio so that the individual can receive the highest benefits from the investment without neglecting the risks faced.

Household savings play an important role in the competency of financial literacy. Household savings can be measured by deducting household consumption expenditure from household disposable income and change in pension funds entitlements. Household disposable income includes household monthly salary plus interest from receipt, dividends, social benefits and deducts taxes, interest, and social contribution (OECD Data, n.d.). While household consumption expenditure includes expenses on household goods, utilities, transportation fees, debts such as credit card payment, and monthly loan instalments such as mortgage loan and education loans. To have sustainable long-term economic growth, household savings must be consistent since it is the main source of funds in financing capital investments. Household savings can be used to represent how much the household saves its income and how much of this income has increased its net wealth (OECD Data, n.d.). Household savings is an important tool to be used during an emergency or crisis when an unexpected event affects the economy which may lead to a household financial crisis. Income tax has an impact on household savings. Theoretically, income tax defines as the tax charge on the individual income by the government (OECD Data, n.d.). Personal income tax brings benefit to the government since the higher the income tax rates, the higher the tax revenue for the government. On the other side, higher income tax rates directly decrease household disposable income, which means household has less money to spend and low household savings rate. As a result, personal income tax plays a critical role in affecting household savings rate.

A household financial crisis can be defined as the state where a household or family is facing difficulties in financial capability. Another term for the financial crisis is financial distress. When household financial crisis occurs, the household might not have the ability to repay outstanding debts or even faces difficulties in settling daily life needs such as food or accommodation fees. The reason that causes household financial crisis is the lack of knowledge on financial management in the allocation of monthly income and poor decision making in spending money on unnecessary goods and services. There is also another reason that leads to a household financial crisis such as unemployment or lower monthly income. For example, many households face a household financial crisis during the COVID-19 outbreak because most of the companies cannot operate regularly and some are forced to shut down the business. Thus, it causes unemployment for many individuals. Illness and accidents are also unexpected situations that lead to household financial crises since both illness and accidents require high expenses for medical and recovery purposes. Furthermore, extensive household debts also lead to household financial crisis. Household debt is a debt or liability owed by a household. Nowadays, majority of household face debts every month. Most of them are facing debt financing such as education debt, car loans, mortgage loans and credit card payment which restricts their financial capability every month. For example, according to Japan Household debt data, Japan has accounted 59.3 percent of household debt at the end of the year 2019.

It is important for every household in preventing financial crisis in order to have a better living environment. As a result, the role of financial literacy must be adopted by each household as a preparatory towards facing household financial crisis. Financial literacy should be provided to every individual since they are young. Financial literacy is important for an individual to survive in this modern society since it can secure a greater living style for them. It provides knowledge on how an individual should think before deciding on any financial transaction.

There are many past studies and researches done on financial literacy based on different countries and industries. For example, Isomidinova & Jugindar (2017) researched financial literacy with financial education, financial socialization, and money attitude. Moreover, Beckmann (2013) carried out studies on financial

literacy with interest rate, risk diversification, inflation, and cross consistency. Not only that, Sekar and Gowri (2015) conducted a research on financial literacy with gender, education and age. There are several pieces of research related to financial literacy also conducted in Japan. For example, Yoshino, Peter, and Long conducted a research on the determinants and impact of financial literacy with educational level, income, age and occupational level. Another research on financial literacy in Japan is conducted by Kadoya & Khan (2017) on the relationship between financial literacy, demographic and social-economic factors. Other than that, Sekita (2011) conducted a research on financial literacy and retirement planning with interest rate, inflation and risk and diversification. Moreover, Fujiki has conducted a research on the relationship between cash demand and financial literacy. Watanapongvanich, Binnagan, Putthinun, Khan and Kadoya conducted a research on the relationship between gambling behaviour and financial education and financial literacy. Moreover, the Central Council for Financial Services Information conducted a survey to examine the financial literacy in Japan with financial literacy, decision making skills in financial activities. A research conducted by Kadoya focus on how financial literacy in reducing anxiety during old age. This survey is conducted to individual age between 18 to 79. Most of the researches carried out are to test the significant impact of financial literacy. There is a smaller number of researches carried out to examine the role of financial literacy as a preparatory towards household financial crisis. The reason for using Japan as the examiner country is because Japan household suffer in financial crisis for the past ten years such as bubble economy and lost decade. The tactical focus on financial literacy in this research is to examine the importance of it in the sustainability of households and determining the role of financial literacy in preventing household financial crisis.

1.2 Definition of Terms

In this part of the chapter, the crucial terms that will be repeatedly used in this study which are financial literacy and household financial crisis will be defined and explained.

1.2.1 Financial Literacy

Financial literacy is the competency to comprehend and rightfully execute financial management skills to overcome or avoid a potential problem or issue (Kenton, 2020). According to Kenton (2020), some requisites of financial literacy include proficiency in financial planning, debt management, interest rate calculations, budgeting and expenditures tracking. Mastering these components of finance makes one a financial literate which prevents mistakes in financial decision making.

1.2.2 Household Financial Crisis

Household financial crisis is the state in a household or family where difficulties are faced when paying off outstanding debts. It is also known as a recession in a household as the financial capability faces a downturn (Andersen, Duus & Jensen, 2016). This is due to being in a financially shortage caused by poor decision makings and allocation of funds. Household financial crisis is a common issue faced by people worldwide due to the lack of awareness on the importance of financial management.

1.3 Problem Statement

The importance of financial literacy has widely been discussed and concerned by the public especially after an unexpected financial depression. A sufficient savings is vital for a household to meet daily expenses as well as for debt financing. Low financial management and low attention on financial knowledge could result in short of savings (Kim & Yuh, 2018). According to Mauldin, Henager, Bowen, & Cheang (2016), financial concepts is a motivating factor for people to have saving behaviour, especially for people with low-income level. Studies also show that proper financial literacy is essential for households to know the importance of saving behaviour as financial literacy could result in the saving ability of people (Kim & Yuh, 2018).

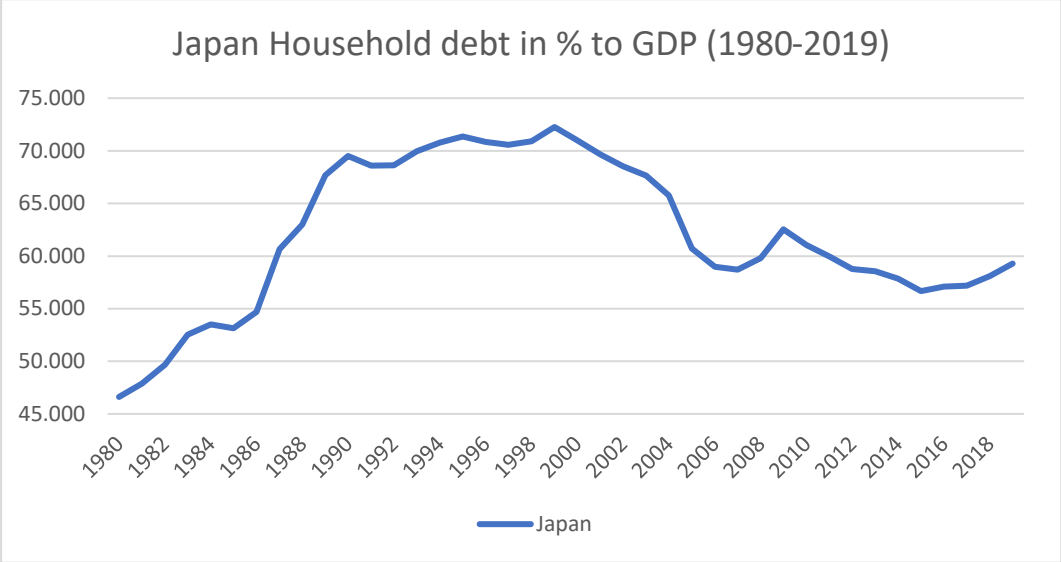


Figure 1.1. Household Debt in Japan

Figure 1.1 shows the household debt of Japan in percentage to GDP. From 1980 to 1990, Japan is said to have experienced "**Economic Miracle**" and **bubble economy** in which there is a significant growth in real estate and stock prices. Besides that, the standard of living of Japanese is considerably high among the countries in the world and Japan was the world's largest creditor nation (Colombo, 2012). Japan and America are accounted for an approximately 40 percent of the worldwide economy (Impoco, 2008). Furthermore, the unemployment rate is extremely low with an average of 2.5 percent. However, the **bubble economy of Japan eventually burst** mainly due to Plaza Accord and overconfidence and weak monetary policy of Bank of Japan (BoJ). From 1990 to 1999, Japan household debt to GDP ranges from 68.61 percent to 72.26 percent (peaked at 1999) which reflected a tremendous growth in the household debt to GDP in Japan. That is, in the period of **1991 to 2001**, Japan's **Lost Decade** happened, and Japan experienced a serious economic downturn and price deflation, which causes Japan to suffer from liquidity trap and credit crunch (Nielsen, 2020). After the collapse of the market in Japan, financial institutions faced severe profit downturns, decline of real estate price as well as slump of Tokyo Stock Price Index (Lise, Sudo, Suzuki, Yamada, & Yamada, 2014). This phenomenon can be proved by the bankruptcy of Hokkaido Takushoku Bank, Long-Term Credit Bank of Japan and Yamaichi Securities. During the period of the Lost Decade, there are other economic crisis arise which are Asian Currency Crisis

in 1997 and 1994 Mexican default (Abe, 2010). Apart from that, Bank for International Settlements launched capital adequacy requirements to control overload loans (Abe, 2010). In 2000, Japanese believed that the worst situation had finally over; however, the problem loan still accounts a huge obstacle in restructuring the economy. The bad debt crisis affected the operations of banks as well as brokerage firms. Moreover, the unemployment rate of Japan increased from 2.1 percent in 1990 and peaked at 5.4 percent in year 2002 and household spending significantly declined. Thereafter, unemployment rate gradually dropped to 3.9 percent in 2006 but rose back to 5.1 percent in 2009 as a result of the financial crisis from 2007 to 2008 (Lise, Sudo, Suzuki, Yamada, & Yamada, 2014).

As shown in Figure 1.1, the household debt to GDP in Japan increases back to 62.43 percent in 2009 from 59.79 percent (2008). This may be attributed to the reason of debt accumulation to support economic growth from the financial crisis 2008. Thereafter, the percentage of household debt declined steadily and increased from 2015. The growth of household debt percentage is unfavourable, and Japan may be at risk of new financial crisis. The recent COVID-19 pandemic brought stress to the labour market as a result of job losses and omission of overtime pay (Leussink, 2020). Japan, the world's third largest economy is expected to have worst post-war decline throughout June 2020. The economy downturn causes Japanese household spending to slump at a speed similar to that as in 2001 in which the household consumption plunged by 2.1 percent in May 2020 as compared to 2019 (Leussink, 2020).

According to Turner (2015), the world's debt increased enormously by $57 trillion which was more than the growth of GDP since financial crisis 2007-2008. To recover the living of people, Japan Government finance debt heavily which results in recession in economies and bank bailouts. Simultaneously, household debt grows dramatically in many countries, including Japan. The debt generated is mainly used to sustain economic development especially after the recession which could benefit the country. In addition, household debt improves people's standard of living with better accommodation, meal and transportation. Household debt allows people to have higher liquidity which in turn, contributes to the pursuit of skills and interests as well as educational level. However, excessive household debt may result in the

creation of new financial crisis. This may be attributed to the high risk of loan default, especially for people who do not have stable income and adequate financial knowledge.

Despite the impact of debt brought to the Government of Japan, households also suffer intensively from the crisis whereby the households rely more on leverage (Turner, 2015). In this case, the cause of gradual increasing household debt may be caused by lack of financial literacy (Dhesi, 2019). Besides, studies show that the level of financial literacy is rather low in many developed countries (OECD, 2016). Adequate financial literacy can help households in managing and planning for their pension savings as well as their financial assets. According to JiJi (2018), Central Council for Financial Services Information directed a survey in 2016 with the association of Bank of Japan. The result of the survey shows a 62.4 percent of Japanese aged 18 or above believe that schools should provide education about financial literacy to students whereas only 12.9 percent of students feel that it is not necessary. The survey results show that the Japanese have gained enhanced awareness of the importance of financial literacy. In addition, a professor in Kyorin University claimed that he received many inquiries in the Q&A session after class about the asset management concepts (JiJi, 2018). During the class, students are more eager to learn about financial literacy when they realize the difference of disparity between the reality and the future life they want to have.

1.4 Research Questions

General Research Question

What are the factors affecting household savings in Japan?

Specific Research Questions

i. What is the effect of household debt on household savings in Japan?

ii. What is the effect of household spending on household savings in Japan?
iii. What is the effect of income tax on household savings in Japan?
iv. What is the effect of inflation rate on household savings in Japan?
v. What is the effect of GDP growth rate on household savings in Japan?

1.5 Research Objectives

General Objective

To determine factors affecting household savings in Japan.

Specific Objectives

i. To determine the effects of household debt on household savings in Japan.
ii. To determine the effects of household spending on household savings in Japan.
iii. To determine the effects of income tax on household savings in Japan.
iv. To determine the effect of inflation rate on household savings in Japan.
v. To determine the effect of GDP growth rate on household savings in Japan.

1.6 Significance of Study

This research aims to indicate the role of financial literacy in combating household financial crisis in Japan from year 1980 to 2018. Household savings can be a preparatory towards facing personal financial crisis. It is extremely essential to investigate the effect of financial literacy on household savings. According to Amponsah (2015), a household with adequate financial literacy is more likely to present better saving behaviours. Therefore, household savings is set as the

dependent variable in this research. Meanwhile, household budgeting, household investments and debt financing are set as independent variables in this study. A household with proper financial management skills could manage debts, investments and spending wisely. Macroeconomic factors such as inflation rate and GDP growth rate are also added as control variables in this research.

The findings of this study could be useful for Japanese policymakers in amending relevant policies to combat household financial crisis likewise encourage household savings. In Japan, there are rooms for improvements in executing a successful financial education system in junior high schools or high schools. A conducted by Japan Securities Dealers Association (2014) recorded a high percentage of responses agreed that available teaching time for financial and economic education was somewhat insufficient. Policymaker in Japan should consider stressing education about financial management for Japanese students. Based on the findings of this research, Japanese policymakers could develop a specific education system such as budgeting classes to manage spending, debt management and tax management. Majority of the educators recognize the importance of educating financial knowledge. However, many are found lack of expertise in teaching related subjects (Japan Securities Dealers Association, 2014). It is suggested that qualifications of financial educators should be improved. Also, the Bank of Japan could raise interest rate to encourage savings behaviours among Japanese.

Moreover, stakeholders which are households in Japan are also beneficiaries from the findings of this study. According to Lusardi (2006), high financial literacy and well-equipped financial information will improve household's saving ability and secure retiree's comfortable retirement. However, people with low literacy often lack comprehensive retirement planning and may face mid-life financial crisis. This research allows Japanese households to gain proper knowledge of the relationship between financial literacy and personal financial crisis. As a result, future generations could be imparted with adequate knowledge to manage financial resources wisely since young. According to Japan Securities Dealers Association (2014), majority of the teachers agreed that students could rarely link their financial knowledge learned from schools with actual lives. Perhaps home education develops better understandings among the young Japanese.

1.7 Chapter Layouts

The prevailing parts of this paper will extend on more in-depth groundwork sorted out into chapters. Chapter 2 focuses on the literature review of past studies on the importance of financial literacy and its role as a measure to avoid financial crisis among households. In Chapter 3, the research methodology will be reviewed since secondary data are put into use. Chapter 4 is the part where the results and analysis will be debated for better realization of the outcome of this research. The paper will be concluded in Chapter 5 where some comments and recommendations will be included to mark the completion of the research.

1.8 Conclusion

In summary, this chapter defines the introduction of the overall research, briefly explained on financial management, financial literacy from broad to narrow view, household savings and household financial crisis. This chapter also explained the term financial literacy and household financial crisis which provides a clear understanding on this research. Other than that, chapter one included problem statement, research objectives and the significance of study of this research. In order to have an effective financial management, the household must be financially literate. Financial literacy can be defined as the competency to comprehend and rightfully execute financial management skills to overcome or avoid a potential problem or issue. It is important for an individual to obtain financial knowledge for the purpose of managing money in a systematic way and better decision making in financial activities. As a result, households must obtain financial knowledge on household savings, household budgeting, debt financing, and investment. Therefore, the following chapter will discuss on the role of financial literacy from past researchers.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Chapter 2 embeds the theoretical framework that will assist throughout the analysis of this study. It will be followed by an in-depth review of the past empirical studies on each of the variables that is used in our study. Along with that, the hypotheses of this study will be described. Next, the conceptual framework will be portrayed for better understandings. This chapter will end with a brief summary as conclusion.

2.1 Theoretical Framework

This part of the chapter will introduce and explain some theories that are the fundamentals to this research. The theories can hold and support the structure and framework of this study in terms of reasoning to achieve our research objectives.

2.1.1 Savings and Consumptions Theory

A standard microeconomic perspective of the saving and consumption commitments proposes that an individual who is financially literate would definitely allocate his high-income in a way that he spends lesser than the amount he earns (Lusardi & Mitchell, 2014). This is so that the excess will be saved for consumption in case the individual's income were to fall in the future. A few good examples of income fall will be retrenchment, resignation and retirement.

Furthermore, the neoclassical economic theory states that a rational individual with financial knowledge would organize his savings in this fashion in order to regularize the lifelong marginal utility (Deaton, 2005). Also, these individuals would organize their funds as appropriate as possible to suit their accumulation and consumption

patterns through financial management and planning (Friedman, 1957). This includes devoting more attention to some microeconomic factors such as daily expenditures, debt financings and taxes incurred as it is vital for households to be clear of their financial standings before making any financial decision.

According to Lusardi (2008), the theory states that a consumer's goal is to maximize the estimated lifelong benefits which depends on the intertemporal financial resources' limitations. A few elements that play an important role in this theory as well as manipulating saving decisions are the financial resources available, the allocation of these resources and the existence of a life cycle. The life cycle hypothesizes that individuals who have abundant pension funds are not obligated to accumulate as much private savings compared to individuals who are expecting lower lifetime income that need to borrow to ease off their consumptions (Hinga, 2012). Young households usually experience negative saving due to the low average income and the outstanding debts and taxes payable. According to Hinga (2012), as these household advance to mid-life, these households will mature reflected by their savings which will begin to show positive figures as they save for the later stage of life. Upon retirement, these savings will be utilized and consumed for day-to-day expenditures which proves a U-shaped saving and consumption pattern (Modigliani & Ando, 1957).

Conceptually, a household would face two types of taxes, namely, income tax and consumption tax. The effect of these taxes on the household savings depends on the preceding interest rate impact (Tanzi & Zee, 1998). Consequently, the income elasticity of consumption plays an important role towards the impact of tax on household savings in terms of how households respond to the changes in taxation. This can be simply explained with the fact that increase in taxes will impact a household's savings in terms of its disposable income negatively. At the same time, the impact on the household's consumption would also decrease proportionately lesser than the decline of household disposable income holding other factors constant. Another relationship to note is the interest elasticity of savings. A positive elasticity signifies that the impact of income tax on household savings is more significant than the effect of consumption tax (Tanzi & Zee, 1998).

However, in general, this theory assumes that individuals fully understand the complexity of the economy and the financial market as well as are able to perform sound financial decisions on a daily basis (Hinga, 2012). According to Lusardi and Mitchell (2014), this theory even presumes that individuals have the ability to plan their own financial usage and reserves which makes this study worth exploring as the breach between the theory and the reality persists. It is undeniable that the hassle to acquire the necessary financial knowledge begins with the costs it holds. One of the reasons financial knowledge is lacking in many individuals is that the economic environment in the past has been plotted and enforced by the government and regulators (Lusardi & Mitchell, 2014). Therefore, individuals did not take the initiatives to understand the schemes that the government had composed for them to administer their financial position. A good example is the retirement pensions which most workers used to not devote their attention on. The consequence is simply unsatisfaction when pensions do not meet their needs when decumulation for retirement begins.

2.1.2 Life-cycle Theory

Like other economic variables, savings is subject to a few components in the macroeconomic context. Some factors that can influence savings are interest rates and inflation. Economic growth reflects the health of the economy of a country which links directly to the rate of savings and how the savings are utilized through investments. This theory assumes that individuals aim to gain the most from the present value of lifetime utility conditional on the budget limitations (El-Seoud, 2014). According to El-Seoud (2014), lifetime income is vital in the application of this theory as it estimates the consumption during a period and influences the saving decisions made by an individual in order to maximize the utility. Thus, the theory suggests that a life cycle can be divided into two major periods which are the younger generation saves while working period and the older generation consumes during retirement period. In economic terms, high-income per capita leads to a higher aggregate savings rate as the younger generation can accumulate more savings due to higher earnings as compared to the older generation. As a result,

countries with high economic growth rate tend to expect an increase in income per capita, eventually, the national savings rate surpasses those economies that grow at a slower rate.

Via another point of view, the life-cycle theory can explain that there is no one definite effect that the change in interest rate can influence savings. According to Investopedia (2019), there are two effects which are substitution effect and income effect. Substitution effect can be defined as the upwards shift in price of goods due to an increase in the interest rates which leads to positive effect on savings. Income effect can be described as an increase in purchasing power due to increase in interest rate which leads to rising consumption patterns. As a result, this will affect the savings negatively. Therefore, theoretically, savings ratio can only be improved if the substitution effect overtakes the income effect. However, in the actual economy, disparity between the real and financial sides will influence the benefits of the increase in interest rates negatively and eventually the advantage on household savings cannot be fulfilled (El-Seoud, 2014).

In the economic life-cycle model, inflation is capable of influencing savings through the control that it has on the real return to savings which is related to the real interest rate. As stated by El-Seoud (2014), the model assumes that there is no disparity in the actual effect on inflation and inflation neutrality exists. This makes the model debatable due to two inferences that stand on the side of households. One of them is inflation can cause more savings as households are more aware of the situation and will take preventive measures through savings. This is due to the fact that the economy is unpredictable, and uncertainty exists. The other reason is inflation can influence real wealth indirectly through savings. Inflation encourages households to preserve a high volume of household wealth made up of liquid assets. This can benefit households as inflation raises the value of their savings.

2.2 Literature Review

Financial literacy assists households in building better saving behaviours. Microeconomic determinants of household savings in Japan are represented by household debt, household spending, and household debt. Meanwhile, macroeconomic determinants are represented by GDP growth rate and inflation rate.

2.2.1 Household Debt

According to OECD (2015), household debt (consumer debt) refers to the total liabilities owned by households in which households are required to repay the principals and interest payment to creditors at a pre-specified date. The major components of liabilities for household include mortgage loans, consumer credit and loan. Household indebtedness also refers to the ratio of household debt to disposable income. Household debt allows the household to allocate their resource more efficiently and improve their standard of living by using debt for investment and private consumption purpose. However, household debt is not always considered beneficial for the household as well as the aggregate economy. It is because the mounting level of household debt is normally followed by financial crisis and economic depression in the history (Azmin, Zaidi & Mohamad, 2019).

There is an **expected negative relationship** between household savings rate and household debt. Barba and Pivetti (2009) claimed that the household indebtedness has a dramatical growth in developed countries from 1984 to 2009. The rise in household debt enhanced consumption of the country and eventually resulted in fall of household savings rate. According to Barba and Pivetti (2009), U.S. is one significant example with considerable rise in household indebtedness following by decline in household savings rate. In the early 2000s, there is a substantial growth in household debt in Korea (Chung, 2009). Korea economy fluctuated which is caused by the heavy load of debt repayment. As a result, household savings rate started to decline, thereby contributing to volatile private consumption in the household sector. Chung (2009) also found that the household savings rate in Korea

was stable with an average savings of 15 percent to 16 percent before the financial crisis. However, it plumped to 9.9 percent in year 2000 and to 2.0 percent in 2002 which is the lowest among the savings rates from 1996 to 2006. Ncwadi & Malindini (2016) claimed that household savings in South Africa plunged at the early 1980s with the association of greater consumer credit. In 1980s, there is no interest and credit control in South Africa. The situation in South Africa is referred to as financial liberalization which influences significantly on household indebtedness. People in South Africa gained greater access to credit thereby increasing the debt amount. As a result, there is an increase in mortgage loan in 1991 which causes a surge in debt. Rising household debt prompted deficit in savings in South Africa and resulting in low savings ratio. In this case, Ncwadi & Malindini (2016) recommended South African to get financial education in order to manage their asset more effectively as they are well-equipped with adequate financial knowledge. Specifically, financial literacy could raise awareness of people with the importance of savings and financial knowledge. Wong (2016) claimed that mounting household debt caused the volatility in household sector. The vulnerability to the economy may influence the household disposable income, spending as well as the mortgage prices. As a result, household consumption and savings will be negatively affected.

On the other hand, Han, Jurzyk, Guo, He and Rendak (2019) believe that higher household debt will lead to excess savings which indicates a **positive relationship between household debt and savings**. That is, cross-country analysis shows that a great level of household debt may cause GDP growth to be lower and restrict the spending growth in the future. The housing price may in turn be affected as the demand for housing and bank borrowing are reduced due to heightened credit risk. The fiscal sector may be riskier due to the decline in public support for mortgage ownership. As a result, there may have an excess savings in the household sector. Furthermore, Mason (2018) claimed that high household debt usually causes high household savings. In general, household debt is not only used to generate house ownership, but it is also connected to the household's labour such as wage-earning. Households normally finance the assets such as house, vehicle and education with debts in their earlier life. Specifically, the purpose of the debt accumulation is not for current consumption purpose. It means that increase in household debt does not

contribute to decrease in household savings since the mortgage financing involves a huge proportion of early payment and asset acquisition.

However, Dynan (2012) found that **household debt does not have significant effect on raising household savings rate**. Specifically, the study by Dynan (2012) indicates that reduction in debt does not serve an important role in raising household savings rate since the rising figure of savings rate is too small to be observed. Besides that, Blanc, Porpiglia, Teppa, Zhu & Ziegelmeyer (2015) indicated that saving is an attitude or a personal trait rather than a cause-and-effect action. That is, household saving does not necessarily imply a specific purpose. According to Blanc, Porpiglia, Teppa, Zhu & Ziegelmeyer (2015), households save mostly because of their ability, intention or personality. Some who do not save might be due to the reason that they are risk takers or simply due to their impassionate personality.
Since the past studies show mixed results in the relationship between household debt and household savings, our study will continue with the following hypothesis.
H_1: There is a significant effect of household debt on household savings in Japan

2.2.2 Household Spending

Based on OECD (n.d.), household spending refers to the sum of household consumption expenditure that is essential to meet necessities in daily life. The main components of household spending are transportation fees, rental fees, maintenance fees, durable goods, food, clothing, and utilities. According to Peetz & Buehler (2009), the ability to plan one's future expenditures make a significant contribution to a proper financial management. Thus, it is important to realize the way people plan for future spending. The assumption is that the household spending is **negatively correlated** to household savings. Since saving indicates the difference between income and expenditure, greater spending leads to declined savings and vice versa (Pangestu & Karnadi, 2019).

Early in 1954, Modigliani and Brumberg formed the Life Cycle Hypothesis to examine cumulative spending and savings. Up to present, the model is commonly

used to analyse saving intentions among households (Rha, Montalto & Hanna, 2006). The model implies that household savings and spending are planned properly with the aim of allocating spending in the best possible manner over the entire life. Based on the model, the ideal savings amount is determined by the ideal consumption pattern.

Khan & Abdullah (2010) stated that the tendency to save relies on personal spending preference, either one prefer to spend now or save for future consumption. Households who choose to save more now for future use would have greater savings today (Crossley, Emmerson & Leicester, 2012). Ismail & Abu Bakar (2012) studied the nexus between income, household spending, and household savings in Peninsular Malaysia. The findings revealed that households' spending behaviours are significant determinant of how households divide up income, allocate for spending and reserve for savings. Other than household income and macroeconomics factors such as inflation rate and interest rate, household savings rate could be influenced by household spending (Verter and Osakwe, 2014). Given that households have more disposable income on hand, households are likely to increase spending and reduce savings (Verter and Osakwe, 2014). According to Ahmad, Baharudin, Mawar and Johari (2015), an individual who managed to control spending below income and reserve certain amount every period is more likely to save money. Pangestu & Karnadi (2019) concluded that materialism is negatively correlated to savings. Materialism is associated with the act of spending on areas where others perceive to be luxurious. The authors revealed that a materialistic student is likely to spend more; thus, reduce savings.

However, some researchers revealed that there is a **positive relationship between household spending and savings**. This is due to a psychological fact that households are in opinion of spending more now could generate greater savings in the future. In fact, a previous study done by Lee and Chen-Yu (2018) stated that consumers perceive a greater savings amount when discount on price is given. For this reason, households incurred more money now for purchasing more quantities. In this case, households perceived additional spending as additional savings.

Moreover, Katona (1968) claimed a psychological fact that spending refers to purchasing power, as well as the willingness to purchase (Pino, Salvatierra & Vasquez, 2013). In another case, some households are willing to spend more on purchasing durable goods. Theoretically, durable goods cost higher but would last longer. As a result, households could prevent additional spending in short period due to defected products. Javala and Kanonius (2006) studied the impact of spending on durable goods on Euro area (EA) nations and savings rates in Euro area (EA) nations. The authors concluded that investment by spending on durable goods boosts saving rates in Euro area (EA) nations between 6.8 percent to 7.6 percent.

Since past studies show mixed results in the relationship between household spending and household savings, our study will continue with the following hypothesis.

H_2: There is a significant effect of household spending on household savings in Japan

2.2.3 Income Tax

In recent years, income tax has been considered as one of the factors that have impact on household savings. Income tax defines as the tax charge on the individual income by the government (OECD Data, n.d.). Income tax affects the household saving by reducing household disposable income. Each country will have their own income tax rates for local citizens and foreign workers. The government imposed higher tax rate for high-income group since these group generated higher income, while low-income group will be taxed by a low tax rate since these groups of individuals only have limited income every month. Moreover, taxes can be categorized into two structures which are direct tax such as income tax and indirect tax like consumption tax or tax on production. The reason income tax has an impact on household savings is because income tax is directly deducted from an individual income annually while other taxes like consumption tax (indirect tax) can be avoided. Consumption tax can also be defined as tax on goods and services that is implemented by the government in order to increase tax revenue. Consumption tax does not directly affect household savings since not all the goods and services are

taxed by the government. There is an alternative solution for the households to avoid consumption tax which is by purchasing goods and services that are excluded from consumption tax. According to OECD (1994), a survey was conducted to focus on how income tax affects the level and rate of household savings within OECD countries, and the results show that tax does have negative relationship with household savings rate.

Theoretically, there is a **negative sign** between tax and household savings. According to Zheng (2007), every household must pay income tax since they obtained a permanent job. Each household must pay income tax at a fixed rate according to the monthly income. For those households with higher income, they are required to pay higher rates of income tax since they have earned more profits compared to other low-income households (Zheng, 2007). Other than that, income tax has more impact on working-age population. Working-age population means individuals between 25 years old to 60 years old that have full-time jobs with fixed monthly income (Zheng, 2007). These working-age population includes those high-saving age groups who are the ones that pay more proportions of direct tax such as income tax compared to others, while for indirect tax such as consumption tax is distributed more evenly to the households across any income and age groups since consumption tax is fixed for each product. Zheng (2007) reported that household saving is taxed twice by the income taxation. Initially, the income taxation taxes the saving when it is earned by the household. The income taxation then taxes households when the savings generate interest and same goes to any dividend income or gain from capital. According to Fieldhouse (2013), increase in tax lead to low disposable income for the household which causes consumption much more attractive as compared to savings since the opportunity cost of consumption has decreased. As a result, tax can be defined as a factor that decreased household disposable income which directly affects household savings rate (Fieldhouse, 2013). As the income tax increases, household has less disposable income which might cause them to have difficulty in savings since the household have limited budget.

On the other hand, some researchers claimed that there is **positive sign** between tax and household saving. Theoretically, increase in tax on personal income decrease the purchasing power from the household and directly increase the savings of the household, since household tend to spend less and save more in order to have

sufficient funds for future planning. According to Johnston (2014), decrease in income tax causes less savings and investment from the household. Suppose a reduction in income tax would increase household savings because it directly provides higher disposable income for the household (Johnston, 2014). But the criterion is that the income of the household must be higher than the household spending. For example, if the government currently having deficit spending, it might decrease the amount of investment within the country and monthly salary which directly affect household savings since lesser investment profit can be earned by the household (Johnston, 2014). Other than that, reduction in income tax also affects national savings rate since income tax is one of the components. A decrease in income tax will directly decrease government savings since the government has less tax revenue from the household. As a result, government spending does not align with government revenue which will force the government to either increase interest charges on bills which directly increased household expenses and thus household savings rate decline.

On the other hand, Hungerford (2012) stated that increase in tax and increase in household savings related to GDP has a positive relationship, but it is statistically **insignificant**. The author claimed that increase in tax rates are not associated with household savings. Basically, tax does not have an impact on household savings because the household saving behaviour depend on the individual's saving attitude and based on the individual's financial literacy. Majority of the household are not aware of the seriousness of financial crisis such as Covid-19. As a result, it does not have a consistent result to conclude that whether tax has a positive, negative or insignificant effect on household savings. Moreover, a decrease in tax directly increase household spending instead of housing savings because the household have excess funds to purchase unnecessary goods and services. Based on the literature review result, it can be concluded by using tax as the third independent variable for this research with the following hypothesis:

H_3: There is a significant effect of income tax on household saving in Japan.

2.2.4 Inflation Rate

Inflation can be defined as a situation in which the overall price levels are increasing in the economy (Pettinger, 2020). Chen (2020) defined inflation as the increase in the rate of the general level of prices for goods and services. In other words, inflation causes a decline in households' purchasing power as households are unwilling to pay higher prices for similar goods. Inflation is one of the essential constant threats to a country's financial development or economic growth and may be a long-term issue over the decades if it is not well restrained. In order to smooth out the overall economy, central banks attempt to control inflation rate and prevent deflation. According to Chopra (1998), the effect of inflation on savings greatly depends on the way households respond to the rise in inflation rate.

It is assumed that inflation rate has a negative effect on household savings. Past studies revealed that there was a **significant and negative relationship between inflation rate and saving**. According to Heer and Suessmuth (2006), the results of the regression analysis during the Greenspan Era (GE) period from 1988 to 1998 and during the Pre-Volcker Era (Pre-VE) period from 1965 to 1978 revealed that inflation negatively influenced the saving rate. In simpler words, the increase in inflation rate leads to decrease in savings. Miller and Benjamin (2008) stated that the opportunity cost of holding money and the rewards for the search activities in shopping wasting real resources can be increased by a high inflation and thus decreasing the savings. In this case, the opportunity cost of holding money refers to interest forgone on an alternative asset such as nominal interest which is the sum of the real interest rate on an alternative asset and the expected inflation rate. In general, as the interest rate decreases, the inflation increases. The opportunity cost is the nominal interest rate but not the real interest rate because the holding of money leads it to loss in value as there is inflation. In other words, inflation makes money saved today less valuable tomorrow which also leads to the value of money decreases the purchasing power. In general, an increase in production costs or demands of goods and services result to an inflation (Investopedia, 2020). There exists an inflation's condition known as demand-pull inflation which is caused by the higher demands of goods and services by consumers. Demand-pull inflation will

increase the wages and lead to higher consumers spending. As a result, the savings will decrease. According to a study from Khalil and Haider (2013), the results showed that the inflation rate has a negative effect on national saving in both long run and short run. Taye (2017) stated that there is a negative relationship between inflation and savings in the short run. Moreover, a study on determinants of household savings in India conducted by Samantaraya and Patra (2014) concluded that high inflation would create negative impact on household savings. This is because high inflation can ensure the stability of price while low inflation will be advantageous to increase household savings and thus sustain higher economic growth.

However, some studies believe that **the inflation rate has a positive impact on household savings**. According to Cheng and Li (2014), in a cross-section data on inflation rate and savings rate for both developed and developing countries around the world, the results obtained in recent study showed that inflation rate in every country has positive impacts on respective country's savings rate. By studying household savings data in South Africa for 48 years, Syden (2012) found that inflation rate has a positive impact on savings rate of the continent. This is because the result in the study indicated inflation has a positive coefficient which is 6.370956 in a long run relationship. According to Er, Tugcu and Coban (2014), the results of the analysis proved that there has a positive relationship between inflation rate and savings in the long run, and an insignificant relationship in short run in Turkey's economy from the period 2003:1 to 2012:2. In the case of Ethiopia, the trends of inflation and gross national saving and the cross plot of gross national saving displayed the relationship between inflation and saving is significant and positive (Taye, 2017). Besides that, Mundell (1963) and Tobin (1965) applied neo-classical growth theory to explain the positive relationship between inflation rate and saving. The authors concluded that the increase in inflation rate leads to an increase in nominal interest. This could encourage investment and saving behaviours among households as well as reduce household spending. Consequently, capital accumulation rises which stimulates saving and economic growth rate. Furthermore, Dholakia (1995), Mallik and Chowdhury (2001) agreed that there is a positive effect of inflation on savings. In the United States (US) case, the results of the regression analysis from 1979 to 1987 during the Volcker Era (VE) period

showed that inflation positively affects the saving rate (Heer & Suessmuth, 2006). El-Seoud (2014) studied on the effect of Gross Domestic Product (GDP), interest rate, and inflation rate on the national saving rate in the nation of Bahrain over the past 20 years. The results showed that the inflation has a positive impact on Bahrain's saving rate in both long run and short run.

Paul Wachtel (1977) has estimated the impact of inflation on household saving in the long run relationship (Campbell & Lovati, 1979). The findings revealed that uncertainties created by inflation could clarify the consistent increase in savings with the price level increases in the period of 1955 to 1978. By using Wachtel's Model, the results showed that the **inflation has no significant impacts on savings** in the long run. This is because the household assets composition in the terms of savings is adjusted by the changes in inflation rate. In other words, it was suggested that inflation has no real effects on savings. Households become uncertain about the prices in future and real income since they are unable to predict prices exactly.

H_4: There is a significant effect of inflation rate on household savings in Japan.

2.2.5 GDP Growth Rate

Gross domestic product (GDP) is defined as the sum of final value of goods produced and service provided in the country and the goods and service produced within geographic boundaries at a specified time in the country (OECD, n.d.). It is an indicator used to track the economic growth of a country. (Amadeo, 2020). GDP includes few different factors such as personal consumption expenditures, government spending, and business investment (Chappelow, 2019). According to The Balance (n.d.), GDP accounts all domestically produced goods and services inclusive of production by locals and foreigners. The calculation for GDP is done without making deductions in depreciation for fabricated assets or for depletion and degradation of natural resources (The World Bank, n.d.). If total spending increases from one year to next, it is either the economy is producing larger output of goods and services or goods and services are being sold at higher prices. Thus, there are measures to separate two effects which are known as real GDP and nominal GDP.

As to estimate the relationship between GDP growth rate and household savings, we choose GDP growth rate (percent) rather than GDP per capita because GDP growth rate is the single best indicator which is most frequently used to measure the overall size of an economy while the GDP per capita is extensively related with the comparison of living standards over time.

There is an **expected positive relationship between GDP growth rate and household savings**. Tinaromm (2005) conducted a study on the relationship between savings and economic growth in North Africa from 1946 to 1992. He revealed that economic growth has a positive impact on the private savings rate. In addition, Hallaq (2003) analysed and examined the determinants of savings in Jordan during period 1976 to 2000 and the results showed that the GDP growth rate and GDP per capita income have a significant and positive impact on savings. Along with that, El-Seoud (2014) investigated the relationship between real GDP growth rate and national saving and the result showed that there is a direct relationship between these two variables in both long run and short run. The result is sustained by a statement which indicated that the income level is a significant determinant of savings capacity for the countries which are under initial stage of development. The level of GDP per capita will rise as the GDP growth rate become higher than the population growth rate; thus, the national savings will increase subsequently. Samantaraya & Patra (2014) conducted a study on determinants of household savings in India and they concluded that GDP is positively correlated with household savings in India in the long run and short run. Their conclusion was based on their study's results which showed that 1 percent increase in GDP will result in 2.56 percent increase in household savings. Furthermore, El-Seoud (2014) also conducted a study about the long run and short run relationships between private savings and economic growth in Bahrain and the results revealed that there is a significant relationship between real GDP growth rate and saving in both long run and short run. The results represented that the economic growth could lead to the growth of private savings while the private savings can lead to economic growth as well. In other words, the real GDP growth rate could be accelerated by the private savings while the private savings could be stimulated by the real GDP growth in the long run. In East Asian countries, Carroll et al. (2000) found that increase in GDP growth rate will lead to the increase in domestic savings. This indicated that there

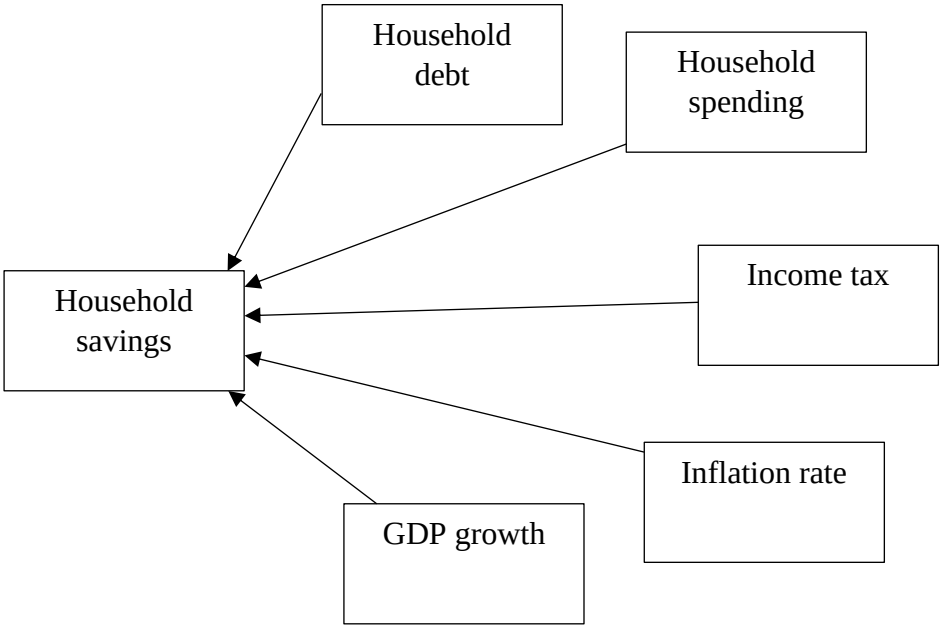
is a substantial and direct relationship between GDP growth rate and saving. Moreover, in the case study of Mexico (Sinha, 1999), Philippines (Sinha, 2000) as well as India (Sinha & Sinha, 2008), they concluded that the economic growth (GDP) can bring impact on the domestic savings growth. In Iran, the results showed that economic growth (GDP) has a remarkable and positive effects on savings (Najarzadeh & Tasan, 2014). Carroll and Weil (1993) also found that savings is caused by the Granger growth, but savings does not cause the Granger growth. Higher growth rate represents higher income per capita which enables people to increase in consumption and saving activities. Hence, the higher economic growth will result in higher savings rate.

Theoretically, there is a positive impact of GDP growth rate on savings which means that higher GDP growth rate leads to higher savings rate. However, some researchers believed that there is a **negative relationship between GDP growth rate and savings**. In case of United Kingdom (UK), the savings rate raised rapidly and it in turn caused the decline in consumer spending. As a result, UK suffered an economic recession from 2008 to 2009 (Pettinger, Slack, Kimberly, Kumar & Abraham, 2019). In this situation, the investment will be decreased since the economic growth is lower and under depression. On the other hand, in terms of impact of GDP growth rate on saving, the country which suffers economic recession are likely to have a rise in unemployment rate and decline in the income level. Hence, households will reduce both savings and spending as the income level is lower and the lower GDP growth rate will eventually contribute to decrease in household savings.

Anderson (1999), Sinha (1996), Mohan (2008), Baharumshah, Thanoon & Rashid (2003) stated that the **relationship between economic growth and domestic savings nexus is insignificant** as they did not find any relationship between both variables. This is because of the difference in the general perception that economic growth can be impacted by saving.

H_5: There is a significant effect of GDP growth rate on household savings in Japan.

2.3 Conceptual Framework



2.4 Conclusion

In summary, Savings and Consumptions Theory and Life-cycle Theory can be adapted in our study. This chapter has covered the reviews of previous literature for the associated dependent and independent variables. In addition to that, the hypotheses for each variable are developed based on previous studies. Following that is a simple presentation of the conceptual framework. In the next chapter, the research methodology for this study will be analysed in detail.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In Chapter 3, the methods and techniques that will be employed in this study will be justified to show the suitability towards providing reliable results and meeting research aims. Research design pronounces the comprehensive strategy that will be implemented to reasonably communicate the research problem. Sources of data displays the origin of the variables' information necessary for running tests as part of this study. Definition of variables provides a comprehensive interpretation of the variables for more accurate understanding. Descriptive statistics states the features and summarizes the study's set of information for analysis. Theoretical framework briefly expresses the structure of our research in terms of the functional model that will be administered. Research methodology itemizes the methods and analyses that will be applied in this field of study for valid results. Diagnostic checking critically inspects this study's validity and reliability by spotting any bias present in the research. Lastly, a summary of this chapter will be included as a conclusion.

3.1 Research Design

Research design refers to the overall strategy which is chosen by the researchers to integrate the different variables of the study in a consistent and logical way in order to ensure the researchers can address the research problem (Purpose of Guide, n.d.). Research design aims to provide an appropriate framework for a study. In general, research design contains two perspectives which are quantitative research design and qualitative research design. Quantitative research design is the use of numbers and statistics to investigate the relationship between the various variables in order to describe and analyse the findings of a study (Yousaf, 2020). In this research, quantitative research design which applies secondary data is being used. There are four types of quantitative research design which are descriptive, correlational,

experimental, and quasi-experimental design research. This study applies experimental design research which is a method used to find out the cause-and-effect relationship between two or more variables. The experimental research design is related with constructing research that has higher causal validity which means that the accuracy of statements about the cause-and-effect relationships between different variables is high. The effect on the dependent variable is observed by manipulating the independent variables.

3.2 Sources of Data

Table 3.1:

Sources of data

Variables	Unit of measurement	Period	Sources
Household Savings	Percent (%) of Disposable Income	1980-2018	National Account, OECD
Household Debt	Percent (%) of GDP	1980-2018	IMF
Household Spending	Percent (%) of GDP	1980-2018	OECD
Income Tax	Percent (%) of GDP	1980-2018	OECD
Inflation	Average Consumer Price	1980-2018	IMF
GDP Growth	Annually in percent (%)	1980-2018	The World Bank

3.3 Definition of Variables

In this part of research, definition of variables such as household debt, household spending, income tax, inflation and GDP growth will be discussed.

3.3.1 Household Debt

OECD (2015) claimed that household debt is known as consumer debt which refers to the total liabilities owned by households in which households are required to repay the principals and interest payment to creditors at a pre-specified date. The major components of liabilities for household include mortgage loans, consumer credit and loan. Household indebtedness also refers to the ratio of household debt to disposable income. Household debt allow the household to allocate their resource more efficiently and improve their standard of living by using debt for investment and private consumption purpose.

3.3.2 Household Spending

According to OECD (n.d), household spending refers to the sum of household consumption expenditure that is essential to meet necessities in daily life. Some main components of household spending are transportation fees, rental fees, maintenance fees, durable goods, food, clothing, and utilities. The ability to manage spending wisely enable households to allocate more financial resources to savings.

3.3.3 Income Tax

Income tax is defined as the tax charged on the individual income by the government (OECD, 2020). Income tax affects the household saving by reducing household disposable income. Each country will have their own income tax rates

for local citizens and foreign workers. The government imposed higher tax rate for high-income group since these group generated higher income while low-income group will be taxed by a low tax rate since these groups of individuals have limited more income every month. Moreover, taxes can be categorized into two structures which are direct tax such as income tax and indirect tax namely consumption tax or tax on production.

3.3.4 Inflation Rate

Inflation is measured by the consumer price index (CPI) and can be defined as the change in the prices of goods and services which the households consume and it also measures the living standards' erosion (OECD, n.d.). According to Pettinger (2020), inflation can be defined as a condition of increasing prices in an economy. He also stated that inflation means an increase in the living cost as the price of goods and services increases. Inflation also means an increase in the rate of the general level of prices for goods and services (Chen, 2020). Central banks attempt to limit inflation, and avoid deflation, in order to keep the economy running easily.

3.3.5 GDP Growth Rate

OECD (n.d.) defines gross domestic product (GDP) as the sum of final value of goods produced and services provided in a country. In other words, it is the goods and services produced within geographic boundaries at a specified time in the country. According to Amadeo (2020), GDP is also the total value of the goods or services that are produced in a certain country over a specific period. It is an indicator that is used to track the economic growth of a country. GDP includes several different factors such as personal consumption expenditures, government spending, and business investment (Chappelow, 2019). According to The Balance (n.d.), GDP takes into account all resident producers including local citizens and foreigners. The calculation for GDP does not consider deductions in depreciation

for fabricated assets or for depletion and degradation of natural resources (The World Bank, n.d.).

3.4 Descriptive Statistics

Descriptive statistics is the method used to describe the characteristics of data in a reasonable and simple way for a study by organizing and summarizing the information of data (Trochim, n.d.). Descriptive statistics helps to present and simplify large amounts of data in a meaningful way. This makes the data interpretation simpler and better especially when there is a high volume of data and information. In general, the descriptive statistics can be categorized into two groups which are measures of spread or variability and measures of central tendency. The measures of spread or variability include variance, standard deviation and others while the measure of central tendency includes mean, median and mode.

3.5 Theoretical Framework

In this part of the research, the theories and concepts introduced in the previous sections will be demonstrated to appropriately relate them to this study.

3.5.1 Research Framework

The model with dependent variable (household savings), independent variables (household spending, household debt and income tax) and control variables (inflation rate and GDP growth rate) is specified as follows:

$SVG_t = \beta_0 - \beta_1 SPD_t - \beta_2 DBT_t - \beta_3 TAX_t - \beta_4 INF_t + \beta_5 GDP_t + \mu_t$ (Equation 3.1)

Where,

SVG_t = Household savings

SPD_t = Household spending

DBT_t = Household debt

TAX_t = Income tax

INF_t = Inflation rate

GDP_t = Gross Domestic Product (GDP) growth rate

μ_t = Error that is present in the collection of data

3.6 Research Methodology

For this part, this study will focus on the Autoregressive Distributed Lag (ARDL) model by discussing on unit root testing method and the steps required to follow in order to run ARDL approach. The result of the approach will be discussed further in Chapter 4.

3.6.1 Unit Root Test

Nkoro & Uko (2016) claimed that non-stationary time series is a random process with unit roots. The existence of unit root indicates that the time series is non-stationary, so unit root is said to be a major source of non-stationarity. A non-stationary process can be differentiated in two forms which are Trend Stationary Process (TSP) or Difference Stationary Process (DSP). In the case of TSP, the divergence of mean is completely stochastic, and it disappear in a quick mode. In DSP, unit root presents and therefore this process required 'differencing'. However, differencing process may cause an impairment of long run information of the relationship between variables. In this case, cointegration can be used to retain the long run information lost from differencing by integrating short run dynamics with equilibrium of long run. In fact, unit root testing is not necessarily required before Autoregressive Distributed Lag (ARDL) cointegration technique. However, Nkoro & Uko (2016) believe that unit root test should be done in order to determine the unit root amount in the time series. In unit root testing, the method that would be applied is Philip-Perron (PP) test.

3.6.2 Philip-Perron (PP) test

Philip-Perron (PP) test acts as one of the methods for unit root testing. PP test is a non-parametric test with a similar null hypothesis and decision making as ADF test (Shrestha & Bhatta, 2017). Besides that, PP test also adjusts the autocorrelation in error term and heteroscedasticity issue, and it is reported to be useful for large volume data analysis (Shrestha & Bhatta, 2017).

PP test:

$\Delta Y_t = \pi Y_{t-1} + \beta_i D_{t-i} + e_t$ (Equation 3.3)

Where e_t is I(0) with mean of zero

D_{t-i} is a component of deterministic trend

Hypothesis testing:

H_0 = The time series is non-stationary, $\pi = 0$

H_1 = The time series is stationary, $\pi < 0$

The null hypothesis will be rejected when test statistic is lower than critical value on a specific significance level. Otherwise, null hypothesis would not be rejected.

3.6.3 Selection of Appropriate Lag Length

According to Nkoro & Uko (2016), it is important to choose the most appropriate lag model for each variable in order to include standard normal error terms in ARDL model. In this case, Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion (HQC) can be used to estimate the lag length suitable for ARDL model. In this research, Akaike Information Criterion (AIC) will be used to determine the lag length for ARDL model. The minimum lag length in AIC criteria graph will be used for the computation of ARDL model.

3.6.4 Bound Test for Cointegration

The first step for ARDL cointegration approach is to compute the Bound F-statistic by using Bound Test in order to test the presence of long run relationship between

the variables (Nkoro & Uko, 2016). If the result indicates that there is one long run relationship between the variables, ARDL model approach can be applied.

H_0 = There is no cointegration among the variables

H_1 = There is cointegration among the variables

The null hypothesis will be rejected when the F-statistic value is greater than upper bound critical value. Otherwise, null hypothesis would not be rejected.

3.6.5 Autoregressive Distributed Lag (ARDL)

According to Nkoro & Uko (2016), majority of researchers often overlook the existing unique features of time series in the data analysis and regression model formulation process. Besides that, it is assumed that the time series should be stationary or minimum to that and a long run relationship exists between the variables. However, most time series have been found to be non-stationary as it was traditionally thought in some research studies. Different time series have different unique features; hence, some time series may differ from their initial value (mean) and these time series is said to be non-stationary. In order to solve the problem of non-stationary time series, cointegration plays a vital role in the analysis process of econometric model. Cointegration is a strong technique used to determine the existence of uniform equilibrium between the variables. Specifically, if cointegration is absent between variables, the regression is said to be untrue and not reliable. In this case, Pesaran and Shin (1999) developed Autoregressive Distributed Lag (ARDL) cointegration technique to detect the long run relationship between non-stationary time series. Instead of OLS or other techniques, ARDL cointegration technique is used in this study because this technique can be used to deal with variables integrated of orders such as I(0), I(1) or mixture of both.

Simple ARDL model approach:

$$Y_t = \alpha + \beta X_t + \delta z_t + e_t \qquad \text{(Equation 3.4)}$$

3.7 Diagnostic Checking

Kuan (2008) stated that diagnostic checking plays an important role in time series model. The purpose of diagnostic checking is to detect the degree of correlation within the time series data. Diagnostic checking provides an accurate information on how the raw data should be modelled. Other than that, diagnostic checking is also used to examine the adequacy of the model and evaluate model residuals (Kuan, 2008). Some examples of diagnostic checking are multicollinearity, heteroscedasticity, autocorrelation and so on.

3.7.1 Multicollinearity

According to Frost (n.d.), multicollinearity occurs when two or more independent variables are correlated to each other within a regression model. In other words, multicollinearity means that one independent variable can be used to estimate and predict the other independent variables. It is a critical issue when there is multicollinearity in a regression model because all the independent variables must be independent. If there is a high degree of correlation among the independent variables, it might affect the findings and the results of the research. There are two types of multicollinearity (Frost, n.d.). The first type is data-based multicollinearity and it occurs due to poorly designed experiments. This means the data collection method cannot be changed or controlled, it is totally observational (Frost, n.d.). Normally, this type of multicollinearity occurs when the researcher obtains the data from observational studies and it might cause the independent variables to correlate although there is no error from the researchers. The second type of multicollinearity is structural multicollinearity. This type of multicollinearity occurs when the researcher creates new terms from the data instead of using the actual data sampled. Stephanie (2015) claimed that there is other reason that also causes multicollinearity such as insufficient data, dummy variable and use of two identical variables within a regression model.

It is important for a researcher to identify multicollinearity in its research. The easiest way to identify multicollinearity is variance inflation factor (VIF). The function of variance inflation factor is to measure the degree of correlation between the independent variables. When the value of VIF is 1, this means that there is no multicollinearity occurs since there is no correlation between two independent variables (Frost, n.d.). When VIF has a value between 1 to 5, it indicates that there is a medium correlation between the independent variables. If the value of VIF higher than 5, it indicates that there is a high degree of multicollinearity between independent variables in the regression model (Frost, n.d.). Other than that, tolerance is an alternative way to identify multicollinearity.

Formula: $VIF = \frac{1}{1-R^2}$ (Equation 3.7)

$TOL = \frac{1}{VIF}$ (Equation 3.8)

Table 3.2:

Benchmark for VIF

VIF Value	Interpretations
1	No multicollinearity between independent variables
1 – 5	Medium degree of multicollinearity between independent variables
> 5	High degree of multicollinearity between independent variables

3.7.2 Autocorrelation

Autocorrelation can be defined as the level of correlation of the value of same variables between two different time period in the same data (Corporate Finance Institute, n.d.). Basically, autocorrelation occurs in time series data because

autocorrelation is used to determine the value of a variable from time to time. It measures the changes of the value of a variable by using the latest version and original version of the data across time interval. Another term for autocorrelation is known as serial correlation. The most common example for autocorrelation is temperatures on different days within the same month are autocorrelated (Corporate Finance Institute, n.d.). Autocorrelation can be either positive autocorrelation or negative autocorrelation. A value of negative 1 indicates a perfectly negative autocorrelation, while positive value of 1 indicates perfectly positive autocorrelation in the data. Positive correlation means the latest time period will increase when the original time interval increases and vice versa (Corporate Finance Institute, n.d.). It is important for the researcher to avoid autocorrelation from the research since autocorrelation affect the accuracy of the data analysis. Other than that, autocorrelation leads to underestimation of standard error which directly affects the findings and results of the research. In order to test autocorrelation, Durbin-Watson test is the most common test carried out by researchers (Stephanie, 2016). Durbin-Watson test will provide the outcome of the results ranging from 0 to 4. If the results of Durbin-Watson test are approximately 2, it indicates that the data has a low degree of autocorrelation (Stephanie, 2016). While for the results around 0, this indicates high degree of autocorrelation and outcome around 4 or higher indicates negative correlation in the data.

Formula: Durbin Watson $= \frac{\sum_{t=2}^{T} (e_t + e_{t-1})2}{\sum_{t=1}^{T} e_t^2}$ (Equation 3.9)

H_0 = There is no autocorrelation problem

H_1 = There is autocorrelation problem

3.7.3 Heteroscedasticity

According to Frost (n.d.), heteroscedasticity means unequal variability or unequal variance of error across the data. It is an error term or residuals in the regression analysis. The presence of heteroscedasticity is a problem because OLS (ordinary least square) might assume there is a constant variance for all the residuals obtained from a population. One of the reasons that causes heteroscedasticity is omission of

variables (Statistic Solution, n.d.). The presence of heteroscedasticity will increase the difficulty in establishing confidence interval and hypothesis testing. Other than that, heteroscedasticity affect the value of variance (Statistic Solution, n.d.). It decreases the value of variance as compared to variance in best linear unbiased estimator (BLUE) (Statistic Solution, n.d.). As a result, the presence of heteroscedasticity lead to inaccurate results on significant test such as wrongly concluding the model as significant result when it is supposedly an insignificant result (Statistic Solution, n.d.). According to Bock (n.d.), the most common test used to detect heteroscedasticity is Breusch Pagan test.

H_0 = There is no heteroscedasticity problem

H_1 = There is heteroscedasticity problem

3.7.4 Normality Test

Normality test can be defined as a statistical process that provides the function of identifying whether the group of data fits a normal distribution (ISixSigma, n.d.). Normality test can carry out either in graphically or mathematically. The most common way to test for normality is by running Jarque-Bera test (Stephanie, 2016). It is a type of Lagrange multiplier test that is often used to identify normality. Jarque-Bera test is often used for large datasets because it is more reliable as compared to other tests such as Shapiro-Wilk because this test is not reliable when n is larger than 2000 (Stephanie, 2016). If the result of Jarque-Bera test has a value of 0, it indicates that the errors in the model are normally distributed. Using p-value is an alternative way to test normality (Stephanie, 2016). A small value of p-value and large value of chi-square value indicate that the hypothesis is normally distributed.

Formula: Jarque-Bera test = $n\left(\frac{s^2}{6} + \frac{(k-3)^2}{n}\right)$ (Equation 3.10)

H_0 = The error term is normally distributed

H_1 = The error term is not normally distributed

3.7.5 Cusum and Cusum Square test

According to Tuner (2012), the reason Cusum and Cusum square test is carried out is to identify the stability of parameter. Both Cusum and Cusum square provides different assessment to the model. According to Farhani (2012), Cusum test is used to examine the systematic eventual movements by having the coefficient values to identify whether there is possible structural instability. The model specification should be rejected when there is any breakpoint found. According to Inclan and Tiao (1994), they claimed that Cusum square test is used to test whether there is a change in variance.

3.8 Conclusion

In conclusion, this chapter elaborates in detail the research design, sources of data, definition of variables, theoretical framework together with the functional model, methodologies and diagnostic checking. The research methodologies include unit root test using Philip-Perron (PP) test, bound test for cointegration, autoregressive distributed lag (ARDL) and selection of appropriate lag length. The diagnostic checking include multicollinearity, autocorrelation, heteroscedasticity test, normality test as well as Cusum and Cusum square test. The stated methods and tests will be carried out and presented in an organized format in the next chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter focuses on research analysis using the data that has been collected. The analyses utilize EViews as the software to conduct the inspections, as discussed in Chapter 3, and find out relevant plus useful results for the purpose of this research. Appropriate discussions on the results will also be included for better understanding and interpretation of the generated results. The chapter will be segregated into two major sections namely descriptive analysis and inferential analysis.

4.1 Descriptive Analysis

In this part of the research, descriptive statistics such as mean, median, maximum value, minimum value, standard deviation and Jarque-Bera value of both dependent and independent variables will be computed and further discussed. Household savings is represented in percent of disposable income. Meanwhile, household debt, household spending and income tax are represented in percent of GDP.

Table 4.1:

Descriptive Statistics

	Household savings (Percent of Disposable Income)	Household Debt (Percent of GDP)	Household Spending (Percent of GDP)	Income Tax (Percent of GDP)
Mean	9.0138	62.0868	54.5010	5.8428
Median	10.5349	60.7266	54.4115	5.7220
Maximum	18.4000	72.2610	58.9601	7.8430
Minimum	0.07630	46.6148	50.6773	4.2950
Standard Deviation	5.7509	7.2798	2.3612	0.8855
Jarque-Bera	4.0301 (0.1333)	1.9970 (0.3684)	1.9347 (0.3801)	1.4307 (0.4890)

Note. The figure in parenthesis (…) represents p-value.

The mean and median of household savings are computed as 9.0138 and 10.5349 percent of disposable income, respectively. The standard deviation is reported as 5.7509 percent. The p-value obtained is 0.1333. Throughout the period of 1980 to 2018, household savings recorded a maximum value of 18.4000 percent of disposable income, and a minimum value of 0.0763 percent of disposable income. This is due to the economic downturn in the 1990s, also referred as Lost Decade in the Japanese Economy. Households in Japan were discouraged from savings in such unfavourable economic conditions.

On average, household debts are amounted to 62.0868 percent of GDP. The median is computed as 60.7266 percent of GDP. Throughout the period, the value of household debts ranges from 46.6148 percent of GDP to 72.2610 percent of GDP.

Household debt recorded the highest standard deviation among all the variables, which is 7.2798 percent. Also, the p-value for household debt is 0.3684.

On the other hand, household spending has a mean value of 54.5010 percent of GDP. At the same time, the median falls which puts it at 54.4115 percent of GDP. The maximum and minimum values for household spending are recorded as 58.9601 percent of GDP and 50.6773 percent of GDP, respectively. Household spending has a standard deviation of 2.3612 percent and p-value of 0.3801.

Throughout the period, income tax has an average value of 5.8428 percent of GDP. Likewise, the median value is computed as 5.7220 percent of GDP. Overall, income tax recorded a maximum value of 7.8430 percent of GDP. At the same time, it has a minimum value of 4.2950 percent of GDP. Consequently, the standard deviation is computed as 0.8855 percent, while p-value is equivalent to 0.4890.

4.2 Inferential Analysis

In this part of the research, the research methodology used in this research will be further discussed by demonstrating and interpreting the results generated from EViews software.

4.2.1 Unit Root Test

Table 4.2:

Unit Root Test (PP test)

PP	Level		1st Difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
SVG	-1.3326	-1.5143	-4.6844***	-4.8147***
	(0.6044)	(0.8070)	(0.0006)	(0.0022)
DBT	-2.1230	-2.0215	-3.2362**	-3.6842**
	(0.2371)	(0.5712)	(0.0257)	(0.0361)
SPD	-1.1784	-1.7473	-4.7551***	-4.7356***
	(0.6738)	(0.7101)	(0.0005)	(0.0027)
TAX	-1.3946	-1.5536	-4.8857***	-4.8458***
	(0.5747)	(0.7924)	(0.0003)	(0.0020)
GDP	-3.6839***	-4.8688***	-18.0663***	-19.2708***
	(0.0084)	(0.0018)	(0.0001)	(0.0000)
CPI	-5.0464***	-4.5690***	-7.2988***	-9.9830***
	(0.0002)	(0.0041)	(0.0000)	(0.0000)

Note. ***, ** and * denote significance level at 1%, 5% and 10% respectively. The figure in parenthesis (…) represents p-value.

Table 4.2 represents the unit root test by using Philip-Perron (PP) test. In Table 4.2, SVG stands for Household Saving, DBT represents for Household Debt, SPD indicates Household Spending, TAX refers to Income Tax, GDP represents GDP growth rate, and CPI represents inflation rate.

Based on Table 4.2, it shows that household savings, household debt, household spending and income tax are non-stationary at level form with both intercept and intercept and trend. On the other hand, GDP growth rate and inflation rate reported to be stationary at level form for both intercept and intercept and trend. Furthermore, the result of first difference form in Table 4.2 indicates that household savings, household spending, income tax, GDP growth rate and inflation rate variables are stationary at 1% significance level for both intercept and intercept and trend despite household debt variable is stationary at 5% significance level.

Based on the results shown in Table 4.2, there is I(1) order presenting for household savings, household debt, household spending and income tax at level form with both intercept and intercept and trend which shows that current data is affected by past data. On the other hand, GDP growth rate and inflation rate in level form for both intercept and trend and intercept as well as all the variables have I(0) order in first difference form for both intercept and intercept and trend.

Since there are I(0) and I(1) orders in the variables, ARDL Bound test will be employed to determine the presence of long run relationship between household savings, household debt, household spending and income tax in Japan.

4.2.2 Autoregressive Distributed Lag (ARDL) Approach

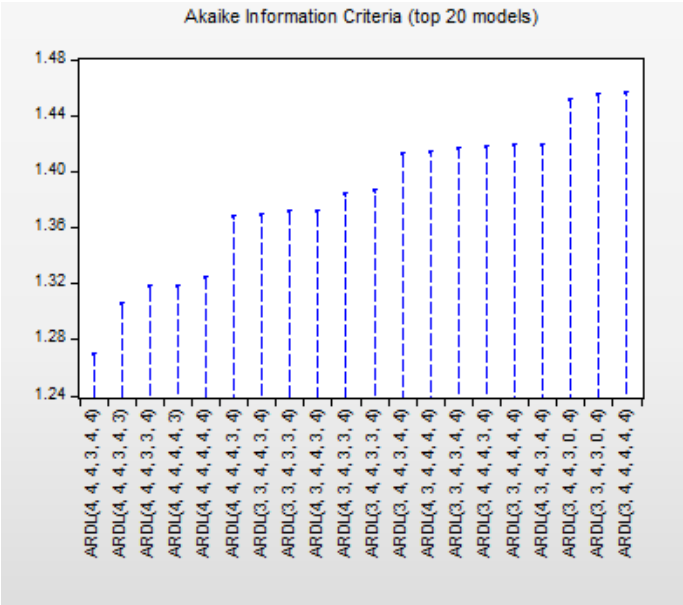


Figure 4.1: Criteria Graph for ARDL

Figure 4.1 represents the criteria graph for ARDL. As shown in Figure 4.1, the minimum lag length ARDL (4,4,4,3,4,4) will be selected as the lag length in the computation of ARDL model.

4.2.3 Bound Test for Cointegration

Table 4.3:

Bound Test

F-statistic = 4.4659		
	Bound critical values (unrestricted intercept and no trend)	
Significance level	I(0)	I(1)
1%	3.06	4.15
5%	2.39	3.38
10%	2.08	3.00

As the results shown in Table 4.3, the computed F-statistic of Bound test is 4.4659 which is higher than the upper critical values of 3.00, 3.38 and 4.15 at significance level of 1%, 5% and 10% respectively. Based on the computed result, it is concluded that there is a cointegration and long run relationship between the variables and ARDL model approach can be employed.

4.2.4 Autoregressive Distributed Lag (ARDL) Approach

SVG = 84.2831 + 0.1827DBT – 1.6566SPD – 1.5096TAX – 0.3910GDP + 0.1398CPI (Equation 4.2)

Table 4.4:

ARDL Coefficient for Long-run Elasticity

Lag Structure	(4,4,4,3,4,4)	
Dependent variable	SVG	
Independent Variables	Coefficient	t-Statistics (p-value)
DBT	0.1827	1.0968 (0.3148)
SPD	-1.6566	-5.4640*** (0.0016)
TAX	-1.5096	-2.3376 (0.0580)
GDP	-0.3910	-2.2918 (0.0618)
CPI	0.1398	0.5470 (0.6040)
C	84.2831	2.4694* (0.0485)
R-squared		0.9985
Adjusted R-squared		0.9917

Note. ***, ** and * denote significance level at 1%, 5% and 10% respectively.

In ARDL approach, the computed results are presented in Table 4.4. In this part of research, the lag structure of (4,4,4,3,4,4) as this is the best of which chosen in the criteria graph as shown in Figure 4.1. Household savings (SVG) is used as the dependent variable in the research and household debt (DBT), household spending (SPD), income tax (TAX) will act as the independent variables; while Gross Domestic Product (GDP) growth rate and inflation rate (CPI) act as control variables.

Based on Table 4.4, there is a **positive and insignificant long run relationship between household savings and household debt**. The computed long run relationship is supported by Han, Jurzyk, Guo, He and Rendak (2019) who claimed that high household debt will cause excess savings in a country. It is because cross-country analysis revealed that a rising household debt may result in lower GDP growth which in turn restricting the spending growth in the future. Consequently, the housing price may be affected as the demand for housing and bank borrowing declined due to significant credit risk. The fiscal sector may be perceived high risk due to reduced public support for mortgage ownership. Therefore, there may have an excess savings in the household sector. Moreover, the positive relationship between household savings and household debt is consistent with the study by Mason (2018) who found that household debt is not only used for current consumption purpose as the financing of asset such as mortgage financing required a significant amount of early payment and asset acquisition. Furthermore, the insignificant relationship between household savings and household debt is found to be consistent with the research by Blanc, Porpiglia, Teppa, Zhu & Ziegelmeyer (2015) who believed that saving is an attitude or a personal trait rather than a cause-and-effect action and the household saving action is mostly attributed to their intention and ability which is irrelevant to specific purpose.

As shown in Table 4.4, there is a **negative and significant long-run relationship between household savings and household spending**. This long-run relationship is supported by Ismail and Abu Bakar (2012) who revealed that household saving behaviour can be significantly determined by the household spending behaviour. Moreover, the relationship is also found to be consistent with the findings of Verter and Osakwe (2014) who believed that increasing spending will reduce savings on

hand. Moreover, Ahmad, Bharudin, Mawar and Johari (2015) and Pangestu and Karnadi (2019) also supported the computed long run relationship by suggesting that controlling household spending behaviour will help in enhancing household saving amount.

Referring to Table 4.4, there is a **negative and insignificant relationship between household saving and income tax**. The negative relation between variables is supported by Zheng (2007) who claimed that household saving is negatively correlated with income tax because income tax reduces household disposable income and therefore contributing to lower household savings. Besides that, the negative relationship is also consistent with the findings by Fieldhouse (2013) who suggested that a rise in income tax would significantly reduce the household saving by increasing the consumption desire due to decrease of disposable income. Furthermore, the insignificant relationship between household saving and income tax is supported by Hungerford (2012) who found that household savings can least be impacted by income tax as he believed that individual saving attitude depends greatly on financial literacy.

Table 4.4 shows that there is a **negative and insignificant relationship between household savings and GDP**. This result is found to be consistent with the study conducted by Pettinger, Slack, Kimberly, Kumar and Abraham (2019) who found that a country with economic recession is likely to have high unemployment rate and low-income level and thus contributing to reduced household saving rate. Furthermore, the insignificant relationship between household savings and GDP is proven by Anderson (1999), Sinha (1996), Mohan (2008), Baharumshah, Thanoon & Rashid (2003) who claimed that there is a difference in general perception that economic growth can be influenced by savings. More specifically, this general perception difference appears to create a significant issue which is the suitability of using domestic saving as an objective for economic development and progress. Besides that, the insignificant relationship is consistent with the study by Jappelli and Pagano (1994) and Sinha and Sinha (1998) who found that there are no causality flows in any direction between economic growth and savings in the bivariate causality test and the results might be misleading.

Based on Table 4.4, there is a **positive and insignificant relationship between household savings and inflation rate**. This result is supported by Mundell (1963) and Tobin (1965) who found that rising inflation rate will result in higher nominal interest which would encourage saving behaviour. Furthermore, the computed result is found to be consistent with studies and research conducted by Taye (2017), Er, Tugcu and Coban (2014) and Dholakia (1995), Mallik and Chowdhury (2001) who found that there is positive correlation between household savings and inflation rate. Moreover, Campbell and Lovati (1979) supported the insignificant relationship between household savings and inflation rate by suggesting that savings in terms of household asset composition is adjusted by changes in inflation rate. That is, there is no real effect of inflation rate on household savings.

As shown in Table 4.4, the R-squared value 0.9985 indicates that 99.85 percent of the variation in household savings can be explained by the variation in household debt, household savings, income tax, GPD and inflation rate. Apart from that, the adjusted R-squared value of 0.9917 indicates that 99.17 percent of the variation in household savings can be explained by the variation in household debt, household savings, income tax, GPD and inflation rate by taking the degree of freedom into account.

4.2.5 Diagnostic Checking

Table 4.5:
Results for Diagnostic Checking

Type of Test	SVG	DBT	SPD	TAX	GDP	CPI
VIF	-	1.9705	3.6386	2.3343	1.8152	2.2987
Tolerance	-	0.5075	0.2748	0.4284	0.5509	0.4350
Durbin-Watson			3.3356			
Breusch-Pagan			2.1152 (0.1774)			
Jarque-Bera			1.5407 (0.4628)			
Cusum Test	The model is stable as it is within the significance level					
Cusum Square	The model is stable as it is within the significance level					

Note. The p-value for diagnostic test in parentheses.

The model is tested by undergoing diagnostic checking to examine the robustness of the model to ensure the quality of the research. The diagnostic checking tests include VIF and TOL for detecting multicollinearity, Durbin-Watson to identify autocorrelation, Breusch-Pagan as heteroscedasticity test, Jarque-Bera to verify normality in the distribution of the model as well as Cusum test and Cusum of Squares test to assure the stability of the model.

The results for diagnostic checking are as shown above in Table 4.5. Referring to the results above, the degrees of VIF obtained for the variables is more than 0 as well as fall between 1 and 10. Hence, this model does not face serious multicollinearity problem (any degree above 10). The estimated parameters are proved to be unbiased, efficient and consistent.

Similarly, the degree for TOL reflected by the results shown above indicates that there is no multicollinearity problem in the model. Since none of the degree of TOL is below the 0.1 mark (serious multicollinearity problem), the statistical inference of the model is reliable.

Durbin-Watson test result shows that the model does not face any serious serial correlation problem. Furthermore, Breusch-Pagan test for heteroscedasticity also indicates that the problem is not present in the model. Moreover, the result for normality test that is utilised which is Jarque-Bera test reflects that the data in the model is normally distributed.

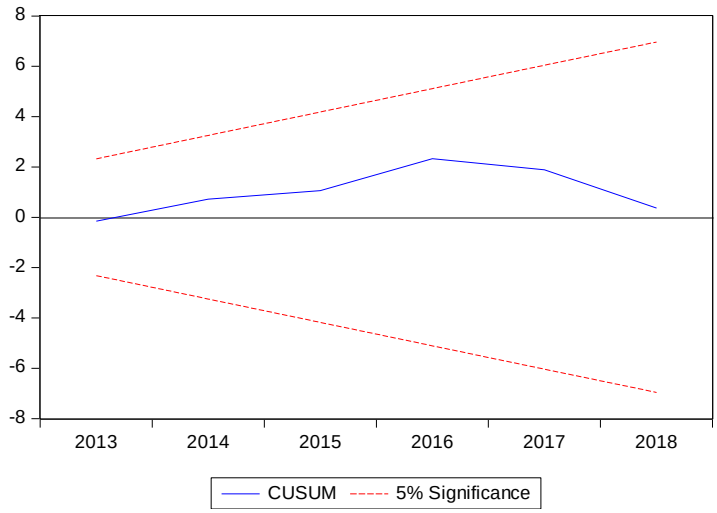


Figure 4.2. Cusum test graphical results

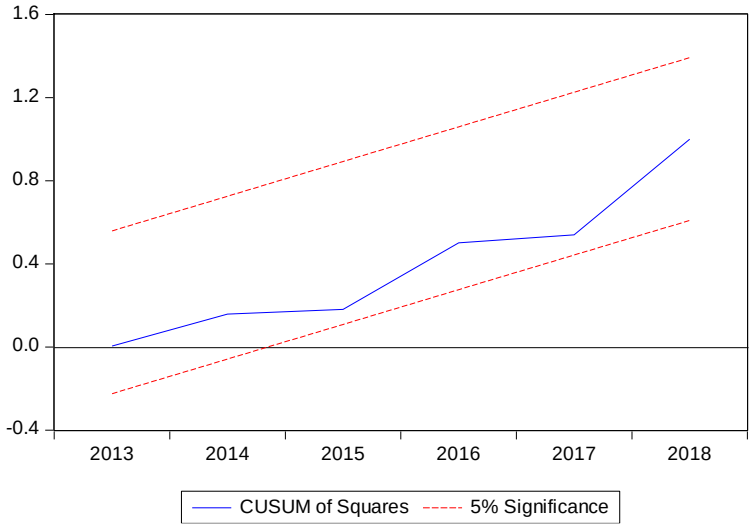


Figure 4.3. Cusum Square test graphical results

The results for Cusum test and Cusum of Squares test as shown in Table 4.6 are deducted according to the graphs evidenced in Figure 1 and Figure 2. The graphs infer that there is structural stability in the short-run and long-run for the estimated parameters selected in the sample period. These tests signify that the estimated parameters of the model are capable of generating a dependable estimation.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

This chapter will put the findings of this research on the pivot based on the deductions made from the previous chapter. The first part of this chapter will relate the results of the analysis to the outcome of this research. This will be followed by the discussion on the implications of this study based on the major findings. The chapter will conclude with some suggested recommendations to future studies of the same area led by the limitations faced in this research.

5.1 Discussion of Major Findings

This research attempts to identify how financial literacy influences the amount of household savings. The aim of this research intends to fabricate a better understanding on the impacts of each variables' influence on the amount of household savings in Japan. Therefore, this research comprises the analysis of data from year 1980 to 2018 for household debt, household spending and income tax. In order to obtain a higher accuracy result, the research channeled plenty of focus to analyze the long run relationship for the independent variables and dependent variable by using Autoregressive Distributed Lag (ARDL) and Unit Root Test which is Phillip Perron (PP) test.

According to the result that is obtained from the ARDL test, it has revealed that there is a **positive but insignificant relationship** between household debt and household savings. The positive relationship indicates that the higher the household debt amount, the higher the amount of household savings. The insignificant long run relationship result obtained from ARDL test reveals that household debt has limited effect towards household savings. According to Dynan (2012), the promotion or reduction in household debt does not have any major impact in raising

household savings rate since the rising figure of savings rate is too small to be observed. Besides that, Blanc, Porpiglia, Teppa, Zhu & Ziegelmeyer (2015) indicated that saving is an attitude or a personal trait rather than a cause-and-effect relationship. This computed that household savings does not have any cause-effect relationship with household debt. Elmundorf (1996) stated that household debt does not have any impact on household savings because the reason that affects household savings is interest rate and not household debt itself. Basically, households require to repay its debt along with interest rates. Debt is the total amount that the household borrows from any of the institutions, but the high interest rates is the main factor that causes the household savings to decrease.

Moreover, the results obtained from Table 4.5 provide a strong evidence to prove the assumption of the research, as per stated in Chapter 2, because the result shows that household spending and household savings are **negatively correlated and significantly** affect household saving. This means that the higher the household spending, the lesser the amount of household savings in Japan. According to Pangestu & Karnadi (2019), saving indicates the difference between income and expenditure, greater spending leads to declined savings and vice versa. The rise in household spending enhanced consumption of the country and eventually resulted in fall of household saving rate. Aside from that, Barba and Pivetti (2009) stated that household spending improves the consumption of a country but will eventually influence the household savings by decreasing the household savings rate since household spends most of their income.

With the exception of that, the ARDL test also reveals a **negative long run relationship** between income tax and household savings. The results for household spending and income tax shows that income tax is **negatively correlated** and **insignificant** in influencing household savings rate in Japan. The insignificant long run relationship result obtained from ARDL test reveals that income tax has limited effect towards household savings. According to Hungerford (2012), income tax does not directly influence household savings rate because household saving behaviour depends on the individual's saving attitude and based on the individual's financial literacy. The reason that income tax does not have any impact on household savings is because Japanese citizens pay income tax annually which

means that every Japanese household only pay once for the tax on personal income depending on the income level. The higher the income level of the individual, the higher the individual must pay for the income tax.

5.2 Implications of the Study

The purpose of this research is to investigate the relationship between household debt, household spending, income tax and household savings. Based on this research, there is a **positive and insignificant** relationship between household debt and household savings. When household debt increases, household savings rate will increase and vice versa. The insignificant relationship indicates that household debt does not have much impact in influencing household savings rate. Some examples of household debt are education loan, car loan, credit card payment, bills and so on. In order to improve household savings rate, government plays an important role. For example, government should lower down the interest rate for all car loan and housing loan. Most of the households who struggle financially are indebted with house and car loans. Therefore, the government should lower down the interest rates of these loans. When government implement lower loan interest rates, household will tend to demand more loans as the cost of borrowings became cheaper. Apart from that, reducing the interest rates may also stimulate economic growth by encouraging households to invest more. It is because cross-country analysis revealed that a rising household debt may result in lower GDP growth, which in turn, restricts the spending growth in the future. Consequently, the housing price may be affected as the demand for housing and bank borrowing declined due to significant credit risk. The fiscal sector may perceive high risk due to reduced public support for mortgage ownership. Therefore, there may exist an excess savings in the household sector.

In addition, household spending plays a critical role in influencing household savings. Based on the research findings, it reveals that an increase in household spending will cause a significant decrease in household savings rate. This means that household spending has **negative correlation and significantly** influence

household savings. As a result, the government should include financial education in schools. Financial education provides knowledge such as basics of money management including how to monitor household spending, budgeting, investment and so on. It is important for an individual to acknowledge the importance of financial literacy. Individuals that is financially literate will have the ability to control their spending by segregating and distributing their income according to fulfilment of needs and avoiding unnecessary expenditures. When household spending decreases, this indicates that the household savings will increase and vice versa.

Throughout the research, income tax is found to have a **negative and insignificant relationship** with household savings. The insignificant long run relationship that the research obtained from the ARDL test stipulates that there is limited effect that income tax has over household savings. It indicates that income tax does not have much impact in influencing household savings rate. However, government should consider in decreasing tax rates. Lower tax rates provide extra income for household, which increases the possibility for most households to save more money. Increase in tax rates will only lead to lower household savings rate and lower household spending which might restrict economic growth.

5.3 Limitations of Study

As corresponding to other research, this study also faces some limitations. One of the limitations is the use of only quantitative variables. This includes data which can be obtained from online databases such as The World Bank, OECD and others. Thus, the research may have omitted qualitative variables for the study which can provide a better representation of the actual household thinking and idea. Besides, by including quantitative variable can help the research in dealing with a larger sample size and the results to be less biased.

Besides, another limitation of this study is the microeconomics factors being overly focused on the process of determining the factors which can influence the household

savings rate. Therefore, there is a possibility of obtaining inexactitude data through inadequate variables which might also lead to the testing result become bias. Macroeconomic elements have been excluded in this research which may have restrained some understandings on their link with the variables of this research model.

In addition, the other limitation of this study is the use of only secondary data. The secondary data used in this research can be obtained from online sources such as journals, articles and websites. Since the secondary data are obtained from online sources, the research may have inadvertently ignored some data which might have affected the study when running the analysis of data and cause a biased testing result.

5.4 Recommendations for Future Research

Referring to the limitations as discussed above, there are some suggested recommendations that will be useful for the future research within the same area.
Firstly, it is commended for future studies to include qualitative variables in the research to obtain more specific data which contributes to results with higher precision. The qualitative data can be obtained from observation, focus groups and interviews. For instance, information on age, gender, occupation, marital status and number of dependents can be collected through these methods. This enables the researchers to have better understanding and conception towards a household's spending behavior and management of funds through decision making.

Moreover, instead of only including microeconomics variables in conducting the study, it is that suggested future research should include macroeconomics variables. For instance, unemployment rate, interest rate and national trade. These variables can be used in the future study as an essential element that may affect the household savings levels and enable the researchers to have more understandings on the importance of savings towards financial crisis.

Furthermore, apart from only using secondary data in the research, it is commended that future studies can use mixed data which are combination of both primary and

secondary data. This is because primary data and secondary data do not have similar coverage of contents and details. The primary data is more accurate and reliable since it is objective, specific to researchers' need and can be collected directly from the original sources such as historical documents and official statistics. While the secondary data is the data that have been collected from primary sources in the past and solid reasonings of relevant findings. The only difference of these two data is the way to collect, apply and analyze them.

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APPENDICES

Appendix 4.1: Descriptive Statistics (Adapted from EViews Version 10)

	SVG	DBT	SPD	TAX
Mean	9.013756	62.08680	54.50101	5.842795
Median	10.53490	60.72660	54.41150	5.722000
Maximum	18.40000	72.26100	58.96010	7.843000
Minimum	0.076300	46.61480	50.67730	4.295000
Std. Dev.	5.750874	7.279796	2.361219	0.885473
Skewness	-0.000835	-0.282562	0.267981	0.389656
Kurtosis	1.425182	2.046280	2.049559	2.477403
Jarque-Bera	4.030090	1.997039	1.934714	1.430707
Probability	0.133314	0.368425	0.380086	0.489019

Appendix 4.2: Unit Root Test: Phillip-Perron Test (Adapted from EViews Version 10)

Null Hypothesis: SVG has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.332614	0.6044
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: SVG has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.514316	0.8070
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(SVG) has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.684365	0.0006
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(SVG) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.814718	0.0022
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: DBT has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.123035	0.2371
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: DBT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.021486	0.5712
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(DBT) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.236245	0.0257
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(DBT) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.684190	0.0361
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: SPD has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.178402	0.6738
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: SPD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.747276	0.7101
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(SPD) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.755124	0.0005
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(SPD) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.735637	0.0027
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TAX has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.394592	0.5747
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TAX has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.553561	0.7924
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(TAX) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.885698	0.0003
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(TAX) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.845781	0.0020
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.683932	0.0084
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.868778	0.0018
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Bandwidth: 19 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-18.06627	0.0001
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 20 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-19.27079	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.046358	0.0002
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: CPI has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.568959	0.0041
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.298777	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 20 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.982983	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Appendix 4.3: Bound Test for Cointegration (Adapted from EViews Version 10)

ARDL Long Run Form and Bounds Test
Dependent Variable: D(SVG)
Selected Model: ARDL(4, 4, 4, 3, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 02/16/21 Time: 21:55
Sample: 1980 2018
Included observations: 35

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	84.28306	34.13087	2.469409	0.0485
SVG(-1)*	-0.504066	0.137927	-3.654577	0.0106
DBT(-1)	-0.132608	0.100773	-1.315912	0.2362
SPD(-1)	-1.226170	0.475741	-2.577389	0.0419
TAX(-1)	-0.779638	0.713280	-1.093032	0.3163
GDP(-1)	-0.410504	0.583320	-0.703737	0.5080
CPI(-1)	0.444469	0.612279	0.725926	0.4952
D(SVG(-1))	0.017105	0.232316	0.073628	0.9437
D(SVG(-2))	0.417578	0.170986	2.442177	0.0503
D(SVG(-3))	0.266785	0.231528	1.152281	0.2930
D(DBT)	0.182668	0.166542	1.096825	0.3148
D(DBT(-1))	0.019285	0.125101	0.154152	0.8825
D(DBT(-2))	0.241651	0.092766	2.604953	0.0404
D(DBT(-3))	0.121394	0.103531	1.172538	0.2854
D(SPD)	-1.656573	0.303179	-5.464016	0.0016
D(SPD(-1))	0.961408	0.442598	2.172191	0.0728
D(SPD(-2))	0.089485	0.499816	0.179036	0.8638
D(SPD(-3))	1.024604	0.528029	1.940431	0.1004
D(TAX)	-1.509560	0.645730	-2.337759	0.0580
D(TAX(-1))	-0.284436	0.533585	-0.533066	0.6131
D(TAX(-2))	-0.816624	0.367675	-2.221045	0.0681
D(GDP)	-0.391029	0.170624	-2.291762	0.0618
D(GDP(-1))	0.046551	0.480693	0.096841	0.9260
D(GDP(-2))	-0.100551	0.355106	-0.283157	0.7866
D(GDP(-3))	0.111946	0.137316	0.815245	0.4461
D(CPI)	0.139740	0.255470	0.546992	0.6041
D(CPI(-1))	-0.069728	0.363013	-0.192080	0.8540
D(CPI(-2))	0.078232	0.307834	0.254136	0.8079
D(CPI(-3))	-0.205580	0.268422	-0.765885	0.4728

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.263077	0.209278	-1.257071	0.2554
SPD	-2.432559	0.835298	-2.912205	0.0269
TAX	-1.546698	1.089290	-1.419913	0.2054
GDP	-0.814385	1.191507	-0.683492	0.5198
CPI	0.881768	1.038411	0.849152	0.4284
C	167.2064	58.97460	2.835228	0.0298

EC = SVG - (-0.2631*DBT -2.4326*SPD -1.5467*TAX -0.8144*GDP + 0.88 *CPI + 167.2064)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.465947	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419

Appendix 4.4: Autoregressive Distributed Lag (ARDL) Model (Adapted from EViews Version 10)

Dependent Variable: SVG
Method: ARDL
Date: 02/16/21 Time: 21:35
Sample (adjusted): 1984 2018
Included observations: 35 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): DBT SPD TAX GDP CPI
Fixed regressors: C
Number of models evalulated: 12500
Selected Model: ARDL(4, 4, 4, 3, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
SVG(-1)	0.513039	0.314816	1.629648	0.1543
SVG(-2)	0.400473	0.280430	1.428070	0.2032
SVG(-3)	-0.150793	0.317994	-0.474201	0.6521
SVG(-4)	-0.266785	0.231528	-1.152281	0.2930
DBT	0.182668	0.166542	1.096825	0.3148
DBT(-1)	-0.295991	0.202791	-1.459591	0.1947
DBT(-2)	0.222366	0.179624	1.237957	0.2620
DBT(-3)	-0.120257	0.142985	-0.841043	0.4326
DBT(-4)	-0.121394	0.103531	-1.172538	0.2854
SPD	-1.656573	0.303179	-5.464016	0.0016
SPD(-1)	1.391811	0.682458	2.039409	0.0875
SPD(-2)	-0.871923	0.826978	-1.054348	0.3323
SPD(-3)	0.935119	0.917644	1.019043	0.3475
SPD(-4)	-1.024604	0.528029	-1.940431	0.1004
TAX	-1.509560	0.645730	-2.337759	0.0580
TAX(-1)	0.445487	0.512672	0.868951	0.4183
TAX(-2)	-0.532188	0.565297	-0.941430	0.3828
TAX(-3)	0.816624	0.367675	2.221045	0.0681
GDP	-0.391029	0.170624	-2.291762	0.0618
GDP(-1)	0.027077	0.207659	0.130390	0.9005
GDP(-2)	-0.147101	0.236644	-0.621614	0.5571
GDP(-3)	0.212497	0.256897	0.827167	0.4398
GDP(-4)	-0.111946	0.137316	-0.815245	0.4461
CPI	0.139740	0.255470	0.546992	0.6041
CPI(-1)	0.235002	0.274070	0.857453	0.4241
CPI(-2)	0.147959	0.280304	0.527853	0.6165
CPI(-3)	-0.283812	0.182429	-1.555740	0.1708
CPI(-4)	0.205580	0.268422	0.765885	0.4728
C	84.28306	34.13087	2.469409	0.0485

R-squared	0.998535	Mean dependent var	8.069614
Adjusted R-squared	0.991696	S.D. dependent var	5.283709
S.E. of regression	0.481490	Akaike info criterion	1.269692
Sum squared resid	1.390996	Schwarz criterion	2.558409
Log likelihood	6.780393	Hannan-Quinn criter.	1.714557
F-statistic	146.0115	Durbin-Watson stat	3.335577
Prob(F-statistic)	0.000002		

*Note: p-values and any subsequent tests do not account for model

Appendix 4.5: Variance Inflation Factor (VIF) (Adapted from EViews Version 10)

Variance Inflation Factors
Date: 02/20/21 Time: 15:16
Sample: 1980 2018
Included observations: 39

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
DBT	0.008078	149.0754	1.970543
SPD	0.141782	1993.182	3.638613
TAX	0.646782	106.6437	2.334276
GDP	0.077683	3.205797	1.815246
CPI	0.162349	3.077491	2.298682
C	731.5053	3455.743	NA

Appendix 4.6: Heteroscedasticity test: Breusch-Pagan (BP) test (Adapted from EViews Version 10)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.115185	Prob. F(28,6)	0.1774
Obs*R-squared	31.78038	Prob. Chi-Square(28)	0.2835
Scaled explained SS	0.469686	Prob. Chi-Square(28)	1.0000

Appendix 4.7: Jarque-Bera (Adapted from EViews Version 10)

Series: Residuals
Sample 1984 2018
Observations 35

Mean	2.76e-14
Median	-0.004822
Maximum	0.349126
Minimum	-0.380360
Std. Dev.	0.202266
Skewness	-0.130461
Kurtosis	2.005801
Jarque-Bera	1.540747
Probability	0.462840