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The importance of financial literacy: Evidence from Singapore

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Abstract

In this paper, we examine financial literacy in Singapore. Using data from the SKBI-GFLEC Sustainable Investment Survey, we find that approximately 40% of Singaporeans are financially literate. We also find that financial literacy is low among specific groups such as women, the less educated, and the unemployed. Moreover, we examine financial literacy across Environmental, Social, and Governance (ESG) literacy. We find that those with higher ESG knowledge are also more financially literate, showing that knowledge of these two different financial concepts is positively correlated. Finally, our results show that financial literacy can be linked to investment behavior which may affect financial well-being in the long run.

Keywords: financial literacy; investments; active investors; financial behavior; ESG

JEL codes: G53; D1; I3

1. Introduction

Asian economies have been facing a huge expansion due to advanced technologies and the advent of globalization. However, the increasing uncertainty in the global outlook has important economic consequences on wealth accumulation and financial well-being worldwide. The positive effects of being financially literate, which include dealing with unexpected financial shocks and having sound wealth management, have been widely documented across countries (Lusardi and Mitchell, 2023) but limited evidence is available for the Asian population. So far, only one global survey of financial literacy – the S&P Global Financial Literacy Survey – was conducted in Singapore and nearly ten years ago, in 2014. According to this survey, 59% of the Singaporean population is financially literate compared to only one-third of the total global population (Klapper and Lusardi, 2020). Populations across the Asian continent are understudied in the field of financial literacy.

In this paper, we aim to fill some of this gap by examining financial literacy in Singapore and using the most recent data, which was collected in 2022. With its flourishing economy and highly developed financial markets, Singapore is an interesting country to study. In addition to being one of the world's leading financial centers, it is a major hub for trade, shipping, and logistics management.

Moreover, Singapore is committed to fostering innovation, technological advancement, and attracting multinational corporations and startups. In addition, businesses and

financial institutions in Singapore actively promote and integrate Environmental, Social, and Governance (ESG) considerations into their operations and decision-making processes. The Monetary Authority of Singapore (MAS), the country's central bank, provided guidelines, frameworks, and incentives for financial institutions to implement ESG practices. One of the main initiatives introduced by the government is the Singapore Green Plan 2030,¹ which defines the country's sustainability goals and strategies in various sectors, such as energy, transportation, and waste management.

Singapore's country-specific characteristics make it particularly worthwhile to address the following research questions: How many Singaporeans are financially literate? Who knows the most and who knows the least? How well do Singaporeans understand inflation? What is the relationship between financial literacy and ESG literacy? Does financial literacy matter for good investment behavior in Singapore? To the best of our knowledge, we are the first to address these research questions in Singapore. By using the SKBI-GFLEC Sustainable Investment Survey, which includes the "Big Three" financial literacy questions (Lusardi and Mitchell, 2011b), we also ensure comparability with other studies and across countries.

Our findings show that 40% of Singaporeans correctly answered all Big Three questions. The concepts that people know the most are interest and inflation while risk diversification is what people know the least. We also find that financial literacy is low among specific groups, such as women, the less educated, and those not employed.

We also compare financial literacy across various levels of ESG literacy. Two important studies looking at ESG data in Europe are Anderson and Robinson (2022) and Filippini et al. (2022). The latter show that the understanding of the ESG criteria is low in Switzerland but those who are ESG literate are significantly more likely to own ESG investments. Anderson and Robinson (2022) instead found no correlation between ESG literacy and sustainable investments. However, they did find that investors with higher financial literacy were more likely to invest in sustainable investments. Also, their findings do not support a high correlation between financial knowledge and ESG literacy. In this paper, we further explore the relationship between financial literacy and ESG literacy by using a broad, new measure of ESG literacy developed by Fernandez et al. (2023).

We find that those with basic ESG literacy are also more financially literate compared to those who are not knowledgeable about ESG. This is particularly important considering that our outcome of interest is active investing behavior, meaning we look at the behavior of investors who choose how their money is invested in both employer-provided retirement accounts and other investments. Passive strategies, like leaving money in a savings account that earns little or no interest, can be detrimental to wealth accumulation. It is important to assess whether those who can choose how to invest their money have the skills to do so.

Previous evidence has shown that financially literate people are more likely to invest in the stock market, accumulate retirement wealth, better manage their wealth, and have higher financial well-being (van Rooij et al., 2011; van Rooij et al., 2012; Lusardi and Mitchell, 2011a, 2023; Lusardi et al., 2017; Almenberg et al., 2021; Hasler et al., 2022; Burke et al., 2023). However, little evidence is available for Singapore. Our survey provides a possibility to fill this gap. Using this recent data, we show that active investors are much more financially literate than those who are not, particularly in terms of knowledge of risk. Finally, using multivariate regression analyses we show that financial literacy is positively linked to active investment behavior.

The remainder of the paper is organized as follows. Section 2 describes our data and reports financial literacy measures and summary statistics both across the full sample and

¹ Discover more about the plan at the following link <https://www.greenplan.gov.sg/> (Last retrieved: May 16, 2023).

for those aged 25–65. Section 3 explains our main outcome of interest and summarizes the main findings from our regression analyses. Section 4 concludes.

2. Data overview and summary statistics

In September 2022, we fielded the SKBI-GFLEC Sustainable Investment Survey through YouGov's Global Omnibus online polling service. YouGov is a platform that enables consumer targeting and research while reaching over 9M people in North America, Europe, the Middle East, and the Asia-Pacific.² The survey, administered in English, aimed at collecting information about respondents' knowledge of ESG concepts, preferences toward ESG and other investments, and financial literacy measures, such as the Big Three.³

After cleaning the data to remove missing information, we ended up with a sample of 1,699 observations. Table A1 in the Appendix reports summary statistics of the main demographic variables in our sample. These statistics are mostly in line with the latest census data in Singapore,⁴ some exceptions are discussed below. It is worth noting that in our sample, the minimum age is 23, and the maximum age is 86. For this reason, the average age in our sample is higher (46) compared to the whole population in Singapore (42). People younger than 35 represents 30% of the sample. People whose age is between 36 and 50 represent 29% of the sample. The percentage of individuals aged 51–65 and older than 65 is 26% and 15%, respectively. Overall, the age group 25–65 represents 75% of the sample. The sample is composed of 51% of men and 49% of women.

Considering the characteristics of the Singaporean educational system and the education classification in the survey, we aggregate people in the lowest educational attainment categories (Less than High School and High School) and those in the highest categories (College Degree and Postgraduates). Overall, Singaporeans are well educated (45% of the sample has a college degree or more). In terms of marital status, 56% are married or living with a partner; 36% are single or in a relationship, but not living with a partner; about 6% are separated or divorced; and very few are widowed (1% in our sample versus 4% in the census data).

In line with census data, a large proportion of respondents in our sample are employed (79%). We aggregate under the “not employed/not in the labor force (NLF)” category (12%) those identifying themselves as not working (4%), those not in the labor force (4%), the unemployed (3%), and full-time students (1%). The remaining 9% of our sample consists of retirees. Finally, half of the respondents have at least one child. In the next section, we will explore the level of financial literacy in Singapore, both in the total population and across some of the demographic groups reported above.

2.1. Findings regarding financial literacy

To investigate Singaporeans' financial knowledge, we use the Big Three questions proposed by Lusardi and Mitchell (2011b), which measure basic knowledge of fundamental concepts at the basis of most economic decisions. These questions test one's understanding of interest rates/numeration and of the workings of inflation and risk diversification. The

² YouGov replaced flawed “random sampling” methods with high-quality panels, multiple layers of data, and advanced modeling – living data. Further information on YouGov sampling methodology is available at the following link <https://business.yougov.com/frequently-asked-questions> (Last retrieved: June 1, 2023).

³ These data are part of a bigger project and were already used by the authors for a different study on ESG (see Fernandez et al., 2023). We focus on Singapore because there is little work on financial literacy level in this country.

⁴ Census data are available at the following link: <https://www.singstat.gov.sg/-/media/files/publications/population/population2022.ashx>.

Big Three are included in several international surveys due to their simplicity, relevance, brevity, and ability to differentiate respondents' knowledge. Studies have shown that these three questions are an effective indicator to measure financial knowledge levels both within a country and across countries (Lusardi and Mitchell, 2011b, 2014). Moreover, the questions do not require difficult calculations and allow respondents to say they "do not know" the answer (DK) (they can also "refuse to answer" (RF)). These answer choices provide an additional source of information that is worth exploring in order to better understand financial knowledge. Below we report the wording of the Big Three questions:

1. Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?
 - More than \$102
 - Exactly \$102
 - Less than \$102
 - Don't know
 - Prefer not to say
2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy . . .
 - More than today
 - Exactly the same as today
 - Less than today
 - Don't know
 - Prefer not to say
3. Do you think the following statement is true or false? Buying a single company stock usually provides a safer return than a stock mutual fund.
 - True
 - False
 - Don't know
 - Prefer not to say

The first two questions investigate whether the respondents know about basic economic concepts which affect saving decisions. The third question assesses knowledge about risk diversification, which is important to make savvy investment decisions. Being unable to correctly answer all the Big Three questions has been found to be linked to important risky/costly behaviors and outcomes, such as paying high fees, taking on excessive debt,⁵ and low levels of wealth and well-being (see Gerardi et al., 2013; Hastings et al., 2013; Lusardi & Mitchell, 2014, 2023; Lusardi and Tufano, 2015; CFPB, 2017a, 2017b; Lührmann et al., 2018; Hasler et al., 2022, 2023). Financial knowledge has been found to reduce inequality across countries and over time (Lo Prete, 2013, 2018).

Table 1 (column 1) shows summary statistics on the three financial literacy questions reported above.⁶ About 78% of respondents correctly answer the question about interest rate (Panel A). Although a high percentage of respondents answer the interest rate question correctly, it is useful to note that 16% of people cannot do a simple 2% calculation or choose the DK option (6%). Approximately 75% of respondents understand the impact of inflation on purchasing power (Panel B). This may be explained by Singapore's history with

⁵ Hasler et al. (2023), discussing their in-depth interview findings, report that Asians often use their network of family and friends to support people in financial distress, borrow from their families to make ends meet, and address their needs when in financial trouble.

⁶ By using sampling weights, our findings are representative of the Singaporean population.

Table 1. Summary statistics on three financial literacy questions

	Full sample (%)	Age 25–65 (%)
(A) Interest question		
>\$102	77.7	77.3
=\$102	5.7	5.7
<102	9.7	10.1
DK	5.6	5.6
RF	1.2	1.3
(B) Inflation question		
More	6.1	6.8
Exactly the same	9.9	10.0
Less	74.8	74.2
DK	8.7	8.2
RF	0.5	0.7
(C) Risk question		
False	49.8	50.0
True	9.9	10.4
DK	38.4	37.8
RF	1.9	1.8
(D) Cross-question consistency		
Interest and Inflation	63.2	62.1
All correct	39.3	38.9
None correct	8.3	8.0
At least 1 DK	40.8	40.4
All DK	2.6	2.4
Number of observations	1,699	1,284

Note: All figures are weighted. DK indicates respondent does not know.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

inflation. The 1970s were marked by high inflation (see Figure A1 in the Appendix), which is very high compared to the 1980s when inflation fell below 0 and remained very low until the 2000s when it increased due to economic shocks. Inflation increased again during the Global Financial Crisis and then gradually declined with a dip during the COVID-19 pandemic. In 2022, the overall inflation rate was 5.3% with a projection of a moderate inflation rate of 3.8% in 2023, which is still above the pre-pandemic rates.⁷ Those who experienced inflation may have acquired knowledge about its effects. The results are different when it comes to risk literacy. Only half of the sample correctly answered the risk diversification question (Panel C). A staggering 38.4% of the sample indicated they did not

⁷ More findings reported here: <https://www.mas.gov.sg/-/media/mas-media-library/publications/macro-economic-review/2023/apr/mrapr23.pdf> (Last retrieved: May 5, 2023).

know the answer to this question. Overall, 39% of the population answered all the Big Three questions correctly in Singapore (Panel D).⁸

Upon closer examination, more than 60% of respondents correctly answered both the interest rate and inflation questions. Looking at the overall DK responses, 41% of respondents chose the DK answer option at least once, a finding which seems driven by a lack of risk literacy. Considering that in our sample the minimum age is 23 and that only 14% are older than 65, it is reasonable that we do not find much difference between the full sample (column 1) and the 25–65 sample (column 2). Our results show a higher level of financial literacy (39.3% answered the Big Three correct) compared to some other countries, including OECD countries (Lusardi and Mitchell, 2011b, 2014). One possible explanation is that Singapore is recognized for its educational excellence. Singaporean students have consistently demonstrated exceptional academic performance on a global scale. For example, Singaporean students secured higher scores in the Program for International Student Assessment (PISA) compared to those in the OECD countries. Across all topics assessed by PISA in 2018, 15-year-olds in Singapore scored well above the average in OECD countries (they scored 549 points in reading versus 487 points in OECD countries, 569 in mathematics compared to an average of 489 points in OECD countries, and 551 points in science versus 489 points in OECD countries).⁹ Singapore did not participate in the PISA financial literacy assessment. However, evidence from PISA 2018 suggests that financial literacy is positively correlated with numeracy,¹⁰ which is very high among Singaporean students. Additionally, Singapore is the sole Asian country to rank among the top ten performers in English proficiency, with a commendable 2nd place position in the 2022 EF English Proficiency Index, which encompassed 111 nations.¹¹

2.2. Who is financially illiterate?

With only 39% of the population able to correctly answer the Big Three questions, financial knowledge cannot be taken for granted, even in Singapore, a country with well-developed financial markets and a comparably highly educated population. Table 2a shows the distribution of responses to financial literacy questions across demographics. In line with previous literature in other countries, some groups display particularly low levels of financial literacy (Lusardi, 2019; Hasler et al., 2022, 2023; Yakoboski et al., 2022).

Our findings show that knowledge is mostly flat in Singapore across age groups. Interestingly, we do not observe an inverted U-shaped pattern of financial knowledge, as reported in other countries (Lusardi and Mitchell, 2011b). In line with previous evidence, the elderly seem to have a higher level of inflation knowledge compared to the young cohort (83% vs 70%), which can be due to having experienced more inflationary periods over their life cycle, as mentioned earlier. In fact, in the 1970s, those aged 65 and over were exposed to an inflation rate of 22% during their early adulthood.

We found a gender gap in the financial literacy of respondents across each financial literacy question. There is a large gender gap in the knowledge about risk: Only 44% of women correctly answer the risk diversification question, compared to 55% of men.

⁸ Klapper and Lusardi (2020) define financially literate as those who correctly answer three out of four questions about numeracy, interest compounding, inflation, and risk diversification, which is a broader and more flexible measure compared to the Big Three by Lusardi and Mitchell (2011b), which require the knowledge of interest, inflation, and risk diversification simultaneously. The definition of financial literacy and how it is measured affects the results and should be taken into account when comparing our results to previous evidence.

⁹ Further information is available here: https://www.oecd.org/pisa/publications/PISA2018_CN_SGP.pdf (Last retrieved: May 27, 2023).

¹⁰ Discover more here: <https://www.oecd-ilibrary.org/docserver/48ebd1ba-en.pdf?expires=1690404635&id=id&accname=guest&checksum=3F1FEAFD65239C1D97F5EA6694EF5B15> (Last retrieved: July 26, 2023).

¹¹ Discover more here: <https://www.ef.edu/epi/regions/asia/singapore/> (Last retrieved: July 17, 2023).

Table 2a. Distribution of responses to financial literacy questions by age, sex, education, and employment status (%)

	Interest		Inflation		Risk		Overall	
	Correct	DK	Correct	DK	Correct	DK	3 Correct	≥1 DK
<i>Age group</i>								
<35	81.0	4.5	70.0	8.7	51.6	34.9	41.2	38.1
36–50	75.4	5.7	73.6	8.5	48.2	39.4	36.9	41.5
51–65	75.4	6.7	76.6	8.8	48.8	41.7	37.8	44.0
>65	79.5	5.8	83.4	8.9	51.1	37.6	43.3	38.7
<i>Gender</i>								
Male	79.1	5.2	76.9	6.1	55.3	31.1	45.4	32.6
Female	76.2	6.1	72.6	11.3	44.1	46.0	33.1	49.1
<i>Education</i>								
High School/Less	67.3	10.1	65.7	17.1	30.1	55.1	20.6	58.5
Some College	75.2	6.7	70.1	10.6	43.8	47.0	32.7	49.8
College Degree/More	84.1	2.8	82.4	3.5	63.1	24.4	52.7	25.9
<i>Employment status</i>								
Employed	78.1	5.0	73.8	8.4	51.3	35.9	40.5	38.3
Not Employed (NLF)	76.6	7.8	73.8	11.0	41.4	52.1	30.2	55.3
Retired	76.4	7.7	84.6	8.2	47.6	42.5	41.4	43.1

Note: All statistics are weighted. DK indicates respondent does not know.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

Overall, only 33% of women answer all three questions correctly, versus 45% of men. A gender difference in financial literacy has been reported in almost every country around the world (Klapper and Lusardi, 2020). These findings are important, as lower financial literacy can prevent women from investing in the stock market or using other financial products (Bucher-Koenen et al., 2021; Ansar et al., 2023).

Looking across education groups, we find that people with higher levels of educational attainment show higher financial knowledge of each topic and for the Big Three (53% of those with at least a college degree can answer the Big Three correctly, compared to 21% of those with a high school diploma or less, and 33% of those with some college education). The percentages of the DK answers also vary widely across education groups. In line with previous evidence, the percentage of DK answers falls with higher educational attainment. People with low education choose the DK option (both across questions and overall) more often than those with a college degree or postgraduate education.

The response differences across employment status are overall small, apart from knowledge about inflation (approximately 85% of retirees answered correctly compared to 74% of employed respondents). As described above, elderly people have experienced several periods of high inflation that may have led them to learn the effects of inflation on their purchasing power.

2.2.1. Diving into Singaporeans' inflation knowledge

Since inflation is one of the Big Three topics Singaporeans know better, and given the sudden rise in inflation across countries recently, in this section we provide context and

Table 2b. Estimates of inflation knowledge based on socio-demographic characteristics in Singapore

	Inflation question correct
<i>Socio-demographic controls</i>	
36–50	0.052* (0.029)
51–65	0.120*** (0.031)
>65	0.187*** (0.041)
Female	–0.025 (0.022)
Some College	0.085** (0.035)
College Degree or More	0.234*** (0.035)
Not Employed, NLF	0.064* (0.038)
Retired	0.063 (0.040)
Constant	0.537*** (0.041)
Observations	1,699
R-squared	0.054

Note: Robust standard errors in parentheses

*** $p < 0.01$,

** $p < 0.05$,

* $p < 0.1$. All statistics are weighted. Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

investigate which factors are the determinants of that knowledge. One of the most likely explanations is the direct experience of inflation. The country's inflation was high a few times in the past, and it rose again during the pandemic.¹² Overall, Singapore has generally kept inflation lower than most advanced economies. High inflation can be consequential. For example, in the U.S., it led people to decrease or stop saving for retirement (Yakoboski et al., 2023).

In order to better understand inflation knowledge among Singaporeans, Table 2b reports the results from an ordinary least squares (OLS) regression of financial literacy on the demographic variables reported in Table 2a. As expected, inflation knowledge increases with age, even after accounting for other factors, such as education and

¹² Discover more here: <https://www.mas.gov.sg/-/media/MAS/Monetary-Policy-and-Economics/Education-and-Research/Education/Explorer/Economics-Explorer-2-Inflation.pdf> (last retrieved on May 23, 2023) and here https://www.mas.gov.sg/-/media/MAS/EPG/MR/2021/Oct/MROct21_SF_A.pdf (Last retrieved: May 5, 2023).

employment status. Those aged over 65 are 19% points (p.p.) more likely to correctly answer the inflation question compared to respondents younger than 36. Moreover, better-educated people are 23 p.p. more likely to correctly answer the inflation question compared to those who are less educated (High School or less).

Policies – such as grocery vouchers and rebates for utilities equivalent to a month’s cost for those living in four-room flats or for those in public housing – helped households deal with rising prices and could make them more aware of the effects of inflation.¹³ We replicate the analysis by controlling for additional characteristics. Other specifications of the model show that income also plays a significant role in understanding inflation.¹⁴ In the next section, we explore Singaporeans’ financial literacy levels by ESG literacy levels.

2.3. Financial literacy and ESG literacy

As mentioned earlier, the government of Singapore has been focusing on ESG principles, positioning the country as a leading hub for sustainable finance and ESG investing in Asia. Moreover, sustainability-focused organizations, industry associations, and research institutions in Singapore collaborate to drive ESG awareness, research, and implementation.

Considering this strong commitment to ESG, we further explore respondents’ financial knowledge and its relationship to ESG knowledge. Following Fernandez et al. (2023)’s approach, we measure ESG literacy with nine questions, three for each topic. Environmental topics include the leading causes of greenhouse gas emissions, food waste, and threats to wildlife. Social topics include the prevalence of poverty, the gender pay gap, and the leading causes of childhood malnutrition. Finally, governance topics include the goal of corporate governance policy, the main corporate governance stakeholders, and how to minimize conflicts of interest among companies’ boards of directors. ESG literates are those who correctly answer at least one question out of three for each single topic, in other words, they should correctly answer three questions out of nine.¹⁵

We find that those with higher ESG knowledge are also more financially literate compared to those who are ESG illiterate. This is true for each topic and for the Big Three. Moreover, the ESG illiterate display different patterns regarding the choice of DK when answering the financial literacy questions. To describe the findings in more detail, 89% of those with basic knowledge about ESG principles could correctly answer the interest question compared to 72% of those who are ESG illiterate. In turn, ESG illiterate respondents chose the DK answer option (7.5%) more often than ESG literate respondents (1.6%). Looking at the other questions, 90% of those who know the basics of ESG can correctly answer the inflation question, compared to only 67% of those who do not know the basics of ESG principles. Again, those who are ESG illiterate chose DK a lot more than those who know the basics of ESG. Risk diversification is still the most difficult topic to grasp, even among those who are ESG literate. The percentage of DK options chosen by both groups of respondents is much higher for the risk diversification question (31.9% vs 41.5%) compared to the DK answers to the interest and inflation questions. About 56% of ESG literate respondents are able to correctly answer all the Big Three questions, compared to approximately 32% of those who are ESG illiterate. These results speak to the

¹³ Discover more here: <https://lkyspp.nus.edu.sg/ips/publications/details/mitigating-the-impact-of-rising-inflation-rates-in-singapore> (Last retrieved: May 5, 2023).

¹⁴ These results are available upon request.

¹⁵ The exact wording of the ESG questions including the full survey can be found in our initial paper, which is available as a working paper with the title “ESG Knowledge and Interest: A Study among Householders in 8 Countries,” and is co-authored by David Fernandez, Carlo de Bassa Scheresberg, Andrea Sticha, and Annamaria Lusardi (Fernandez et al., 2023).

Table 3. Distribution of responses to financial literacy questions by ESG literacy (%)

	Interest		Inflation		Risk		Overall	
	Correct	DK	Correct	DK	Correct	DK	3 Correct	≥1 DK
ESG Illiterate	72.4	7.5	67.3	12.2	44.2	41.5	31.6	44.4
ESG Literate	88.7	1.6	90.5	1.3	61.5	31.9	55.7	33.0

Note: All statistics are weighted. DK indicates respondent does not know.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

strong positive relationship between being financially literate and having basic knowledge of ESG, which can influence investment decisions Table 3.

This evidence shows that exploring the relationship between financial literacy and ESG literacy is needed in order to inform policies and programs aiming to promote financial decisions in new areas of investment. In the next section, we examine the relationship between financial literacy and investment behavior, we plan to explore the importance of ESG knowledge for investment in future work.

3. Active investment behavior

We turn next to examining whether financial literacy matters by looking at the link between financial literacy and investment behavior, which can be important for financial well-being and retirement security. Although the official retirement age is 62, the Singapore government has recently raised the age limit for employment to 67. To better understand the retirement landscape that Singaporeans are facing, we note that Singapore's formal pension system used to require mandatory retirement savings through the Central Provident Fund (CPF). Like many countries, they introduced the opt-in option to actively invest money for retirement a few decades ago. Given this change, it is worthwhile to explore the relationship between active investing¹⁶ and financial literacy. It is also timely as, given the recent rise in inflation, households have to protect their saving.

In our sample, 29% get to choose how retirement savings are invested and considering investment outside private or employer-provided retirement accounts, 60% of our respondents in total are active investors meaning they get to choose how their money is invested. As mentioned earlier, Singaporeans were only allowed to choose how to invest their retirement savings a few decades ago.¹⁷ In fact, the CPF has allowed members to invest money from their Ordinary Accounts since 1986. In 2001, members were allowed to invest money, over a certain threshold, from both their Ordinary Account and their Special Account.¹⁸ Profits from these accounts cannot be withdrawn until retirement. In 2018, the system was enhanced by reducing sales charges and advisory, brokerage, and administrative fees, and also by introducing a self-awareness questionnaire that helps CPF members assess their own financial knowledge. The latter does not prevent members from investing. However, if members' financial knowledge is low, they are encouraged to leave their money in the fund.

We define active investors as those who own retirement accounts where they get to choose how the money is invested or as those who have other investments in stocks,

¹⁶ We followed a similar definition of "active investor" as proposed by Fisch et al. (2020). Active investors are approximately 60% of the respondents in our sample (see Table A1).

¹⁷ See Fong (2020) and CPF (2018) for more information.

¹⁸ The Ordinary Account (OA) is meant for housing, insurance, investment, and education, instead the Special Account (SA) is meant for old age and investment in retirement-related financial products. Discover more here: <https://www.cpf.gov.sg/member/cpf-overview> (Last retrieved: July 26, 2023).

Table 4. Financial literacy of those who are active investors and those who are not (%)

	Active investors (N = 783)	Non-active investors (N = 459)
Interest Question		
Correct	84.0	67.1
DK	2.2	10.7
Inflation Question		
Correct	81.8	61.5
DK	2.85	17.4
Risk Diversification Question		
Correct	63.2	30.0
DK	22.6	60.8
Summary		
Correct: Interest and Inflation	73.0	45.2
Correct: All Three	52.0	18.6
Number of Correct Answers	2.28	1.59

Note: All statistics are weighted. DK indicates the respondent does not know. The sample consists of 1,242 non-retired respondents aged 25–65.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

bonds, mutual funds, or other securities. Specifically, active investors are those who reply “yes” to at least one of the following questions:

1. Do you have any investments in retirement accounts where you get to choose how the money is invested?
 - Yes
 - No
 - Don't know
 - Prefer not to say
2. Not including private or employer-provided retirement accounts, do you have any investments in stocks, bonds, mutual funds, or other securities?
 - Yes
 - No
 - Don't know
 - Prefer not to say

Table 4 shows that being an active investor and being financial literate are strongly correlated in our sample. Those who correctly answered the Big Three questions are almost three times more likely to be active investors compared to those who are not financially literate. Among the three questions, the one related to risk diversification is the one where differences among active and non-active investors are most noticeable. However, risk literacy is low even among those who actively invest their money. Lack of knowledge about this topic is also evident in the large proportion of DK answers: approximately 23% of active investors and a staggering 61% of non-active investors chose this option. We further explore these findings with a multivariate regression analysis presented in the next section.

Table 5. OLS estimates of active investments on financial literacy in Singapore

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample			Age 25–65		
	Active investors	Active investors	Active investors	Active investors	Active investors	Active investors
<i>Financial literacy measures</i>						
All Big Three Correct	0.230*** (0.024)			0.225*** (0.028)		
N. of Correct Answers		0.123*** (0.013)			0.128*** (0.015)	
Inflation Correct			0.106*** (0.031)			0.080** (0.035)
Interest Correct			0.082*** (0.031)			0.108*** (0.036)
Risk Correct			0.169*** (0.026)			0.186*** (0.030)
<i>Socio-demographic controls</i>						
Age	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)	-0.007 (0.010)	-0.007 (0.010)	-0.008 (0.010)
Female	-0.053** (0.023)	-0.059** (0.023)	-0.056** (0.023)	-0.041 (0.027)	-0.044* (0.026)	-0.040 (0.026)
Some College	0.093*** (0.035)	0.085** (0.035)	0.084** (0.035)	0.105** (0.044)	0.097** (0.043)	0.094** (0.043)
College Degree/ More	0.210*** (0.038)	0.199*** (0.038)	0.195*** (0.038)	0.255*** (0.046)	0.245*** (0.046)	0.239*** (0.046)
Single/Not Married	0.031 (0.035)	0.024 (0.036)	0.026 (0.036)	0.039 (0.040)	0.035 (0.040)	0.040 (0.039)
Divorced/ Separated	-0.021 (0.053)	-0.028 (0.052)	-0.028 (0.051)	-0.024 (0.063)	-0.037 (0.063)	-0.034 (0.062)
Widowed	0.170 (0.110)	0.180 (0.111)	0.179 (0.110)	0.411*** (0.136)	0.407** (0.165)	0.425*** (0.158)
Income, 2 nd Quartile	0.124*** (0.034)	0.111*** (0.034)	0.108*** (0.034)	0.129*** (0.041)	0.106** (0.041)	0.109*** (0.041)
Income, 3 rd Quartile	0.128*** (0.035)	0.113*** (0.036)	0.113*** (0.036)	0.142*** (0.043)	0.116*** (0.044)	0.121*** (0.044)
Income, 4 th Quartile	0.282*** (0.037)	0.271*** (0.037)	0.269*** (0.037)	0.292*** (0.044)	0.268*** (0.045)	0.272*** (0.045)
Not employed, NLF	-0.077** (0.039)	-0.090** (0.038)	-0.089** (0.038)	-0.030 (0.049)	-0.040 (0.048)	-0.037 (0.048)

(Continued)

Table 5. (Continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample			Age 25–65		
	Active investors	Active investors	Active investors	Active investors	Active investors	Active investors
Retired	-0.053 (0.051)	-0.052 (0.050)	-0.053 (0.051)			
Has Children	0.017 (0.033)	0.012 (0.033)	0.013 (0.032)	0.037 (0.037)	0.041 (0.037)	0.040 (0.036)
Constant	0.434*** (0.163)	0.317* (0.164)	0.336** (0.164)	0.458* (0.255)	0.320 (0.257)	0.329 (0.255)
Observations	1,699	1,699	1,699	1,242	1,242	1,242
R-squared	0.222	0.226	0.229	0.243	0.252	0.256

Note: Robust standard errors in parentheses

*** $p < 0.01$,

** $p < 0.05$,

* $p < 0.1$. Other control includes age squared and district of residence. All regressions use weights. The reference values used are the following: <35, male, High School or less, married, income 1st quartile, employed, and has no children.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

3.1. A multivariate model of active investment behavior and financial literacy

To investigate the link between financial literacy and active investments, we run OLS regression models on the full sample. We repeat our analysis on a restricted subsample for non-retirees aged 25–65. We follow Lusardi and Mitchell (2011b) and control for age, age squared, gender, marital status, and having children. Other socio-demographic characteristics include income, district of residence, employment status, and educational attainment.

We measure financial literacy by using three different specifications: (i) a dummy variable that takes the value of 1 if the respondent correctly answers all Big Three questions, 0 otherwise; (ii) an indicator of the number of total correct answers to the Big Three; (iii) and three dummy variables indicating those who answer correctly to each of the Big Three questions. Table 5 reports the main findings from our analyses for both samples. Those who are financially literate, no matter the specification used, are more likely to be active investors compared to those who are not. The effect of financial knowledge is statistically significant even after controlling for several socio-demographic characteristics.

In more detail, results reported in column 1 show that those who are financially literate (all Big Three correct) have a 23 p.p. higher probability of being active investors compared to those who are not financially literate. Results in column 2 show that providing a correct answer in addition to the Big Three is associated with a 12 p.p. higher probability of being active investors. Column 3 shows that knowledge of each of the topics covered in the Big Three is important; each can be linked to investment behavior. Knowledge of risk diversification is particularly important, those who know this concept are 17 p.p. more likely to be active investors.

In line with previous evidence, we confirm that also in Singapore educational attainment and income are positively correlated with investing. Better-educated people and those with higher income are more likely to be active investors; these results are robust and hold for all specifications, regardless of how we measure financial literacy. In

addition, there is a gender gap, women are less likely to report being active investors compared to men in Singapore, and estimates are highly statistically significant, but only in the full sample. The pattern is inverted for widowed individuals, who are very likely to be active investors in the restricted sample, but we warn that the group is very small (columns 4 to 6). Finally, those who are not employed are about 8 p.p. less likely to be active investors compared to those who have a job. This result is no longer statistically significant in the restricted sample (columns 4 to 6).

Since financial literacy may be endogenous – those who want to invest may choose to increase their financial literacy – or suffer from measurement error (van Rooij et al., 2011), we further explore the relationship between financial literacy and investment behavior by considering a different and potentially more exogenous measure of financial knowledge. We use information on exposure to financial literacy via financial education offered in schools or at the workplace, regardless of whether people participated or not.¹⁹ The exact wording of the question is as follows:

- 1) Was financial education offered by a school or college you attended or a workplace where you were employed?
 - Yes, but I did not participate in the financial education offered
 - Yes, and I did participate in the financial education
 - No
 - Don't know
 - Prefer not to say

Table 6 reports the result of this model specification. Those who are exposed to financial education offered in school and/or at the workplace display a 12 p.p. higher probability of being active investors. Thus, even in this specification, financial literacy continues to be a good predictor for being an active investor. These overall results are in line with previous literature and hold for different specifications as well.

4. Discussion and conclusions

In this paper, we provide evidence of the financial literacy level in Singapore, according to the Big Three questions. Our results show that only 39% of the population can correctly answer all the Big Three questions, and there are specific groups that show even lower financial knowledge, such as women, the less educated, and those who are not employed.

Fortunately, financial education is becoming more accessible to the population and, in particular, the young. Classes and modules are becoming available at universities and polytechnic institutes. Good financial behavior and related concepts are taught in primary school, specifically in the Form Teacher Guidance Period, Character and Citizenship Education lessons, and the A-level economics curriculum.²⁰ Moreover, since 2003, Singaporeans have benefitted from initiatives in schools, workplaces, and communities that were part of the “MoneySense” program. This financial education program is coordinated and overseen by the MoneySense Council, which is co-chaired by the Monetary Authority of Singapore and the Ministry of Manpower. It comprises representatives from various government agencies.

Considering the low level of financial literacy in Singapore, financial education in schools may be a good way to improve Singaporeans' financial knowledge and provide

¹⁹ We could use this variable as an instrumental variable for financial literacy, but the F statistic is too low (3.48).

²⁰ See the reply of the Minister of Education to Member of Parliament Leon Perera (MOE, 2020) for more information.

Table 6. OLS estimates of active investments on exposure to financial education

Variables	(1)	(2)
	Full sample Active investors	Age 25–65 Active investors
<i>Financial literacy measure</i>		
Was Offered Financial Education	0.116 ^{***} (0.025)	0.119 ^{***} (0.029)
<i>Socio-demographic controls</i>		
Age	-0.002 (0.005)	-0.004 (0.010)
Female	-0.072 ^{***} (0.023)	-0.059 ^{**} (0.027)
Some College	0.115 ^{***} (0.036)	0.125 ^{***} (0.045)
College Degree/More	0.262 ^{***} (0.038)	0.305 ^{***} (0.046)
Single/Not Married	0.045 (0.036)	0.041 (0.040)
Divorced/Separated	-0.006 (0.055)	-0.015 (0.065)
Widowed	0.176 [*] (0.105)	0.346 ^{***} (0.112)
Income, 2 nd Quartile	0.160 ^{***} (0.034)	0.160 ^{***} (0.041)
Income, 3 rd Quartile	0.169 ^{***} (0.036)	0.176 ^{***} (0.044)
Income, 4 th Quartile	0.338 ^{***} (0.036)	0.343 ^{***} (0.044)
Not Employed, NLF	-0.075 [*] (0.039)	-0.024 (0.050)
Retired	-0.028 (0.053)	
Has children	-0.008 (0.033)	0.003 (0.037)
Constant	0.362 ^{**} (0.164)	0.381 (0.249)

(Continued)

Table 6. (Continued)

Variables	(1)	(2)
	Full sample	Age 25–65
	Active investors	Active investors
Observations	1,699	1,242
R-squared	0.187	0.211

Note: Robust standard errors in parentheses

*** $p < 0.01$,

** $p < 0.05$,

* $p < 0.1$. Other control includes age squared and district of residence. All regressions use weights. The reference values used are the following: <35, male, High School or less, married, income 1st quartile, employed, and has no children.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

broad access to financial education to young people. Given that being exposed to financial education positively affects individuals' financial well-being (Burke et al., 2023), starting early can help build the next generation of savvy financial decision-makers and investors.

As widely documented in other countries, in Singapore as well financial literacy differs across demographics. Tailored programs which address the needs and characteristics of different population groups can be a potential solution to fill the financial literacy gap across vulnerable groups in Singapore.

In addition, comprehensive financial education programs covering sustainable finance topics may contribute to more informed financial decisions. We find a positive link between financial knowledge and ESG literacy. In addition, future works should also explore the relationship between financial literacy, ESG literacy, and behavioral outcomes such as active investment behavior.

Finally, our estimates show that financial literacy matters. Our estimates show that having basic financial knowledge is positively associated with active wealth management. This is a desirable outcome since taking care of one's own finances is the first step toward financial well-being. Our estimates further show that to promote financial literacy and well-being, it may be useful to target vulnerable groups such as women and those not working. These targeted interventions should cover topics such as risk and risk diversification, where knowledge is particularly lacking.

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Appendix A

Table A1. Summary statistics in the Singapore total sample

	Obs	Mean	SD	Min	Max
Age	1,699	46.49824	15.52746	23	86
<35	1,699	0.295994	0.456623	0	1
36–50	1,699	0.294947	0.456153	0	1
51–65	1,699	0.262923	0.440351	0	1
>65	1,699	0.146136	0.353346	0	1
25–65	1,699	0.755432	0.429957	0	1
Male	1,699	0.507689	0.500088	0	1
Female	1,699	0.492310	0.500088	0	1
High School/Less	1,699	0.197305	0.380062	0	1
Some College	1,699	0.352179	0.47779	0	1
College Degree/More	1,699	0.450515	0.47268	0	1
Married	1,699	0.563481	0.4961	0	1
Single/Not married	1,699	0.363382	0.481115	0	1
Divorced/Separated	1,699	0.058591	0.234928	0	1
Widowed	1,699	0.014546	0.11976	0	1
HH 1st Quartile	1,699	0.285383	0.451729	0	1
HH 2nd Quartile	1,699	0.271885	0.445062	0	1
HH 3rd Quartile	1,699	0.232066	0.422275	0	1
HH 4th Quartile	1,699	0.210667	0.407903	0	1
Employed	1,699	0.788800	0.40828	0	1
Not Employed, NLF	1,699	0.120742	0.325923	0	1
Retired	1,699	0.090458	0.286921	0	1
Has Children	1,699	0.508607	0.500073	0	1
Active Investors	1,699	0.594683	0.491098	0	1
Retirement Investors	1,699	0.289835	0.453819	0	1
Other Investors	1,699	0.527534	0.499388	0	1

Note: All statistics are weighted.

Source: Authors' calculations using the 2022 SKBI-GFLEC Sustainable Investment Survey.

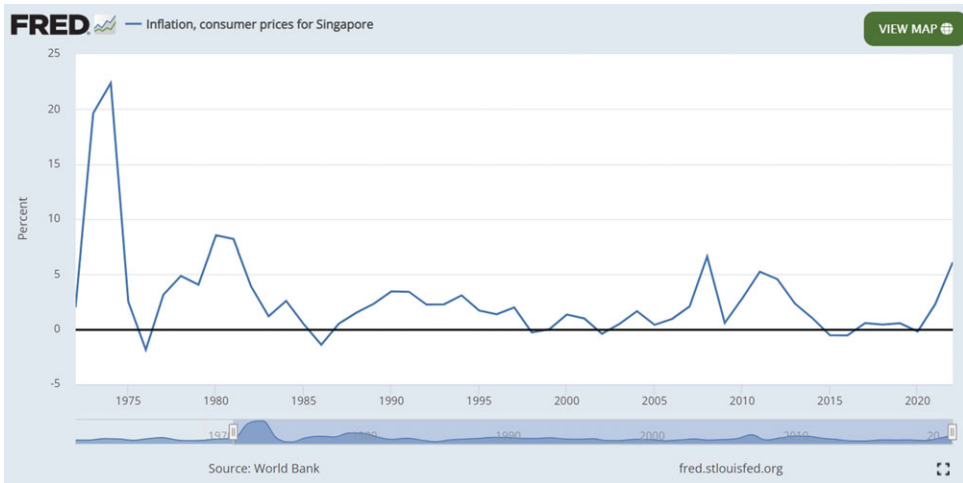


Figure A1. Inflation rates in the last 50 years in Singapore

Source: World Bank, Inflation, consumer prices for Singapore [FPCPITOTLZGSGP], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/FPCPITOTLZGSGP>, July 17, 2023.