



Determination of the Financial Literacy Characteristics of Prisoners: The Case of Turkey, a Developing Country

Mahpusların Finansal Okuryazarlık Özelliklerinin Belirlenmesi: Gelişmekte Olan Bir Ülke Örneği

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ABSTRACT

Increasing crime rates and prison occupancy are major problems for every country. Previous studies were conducted in countries with high national incomes. Therefore, there is a gap in the literature as to whether different results can be achieved in countries with different income levels. For this reason we aimed to determine whether the level of financial literacy differs between types of crimes, and, if there is a difference, which types of crimes are associated with low financial literacy. The quantitative data set consists of a survey conducted in February 2020, with 670 out of the 712 convicts incarcerated in the Manisa E-type closed penal institution in western Turkey who agreed to respond. Within the scope of the study, the basic and sophisticated financial literacy of convicts were measured and then basic and sophisticated literacy indices were created. There are 3 hypotheses in this context. H1: The convicts have lower financial literacy than the general public hypothesis is not rejected. H2: The level of basic financial literacy of convicts varies according to the types of crimes hypothesis is not rejected. H3: The convicts have lower levels of financial sophistication than other disadvantages groups hypothesis is rejected. Our financial literacy indices indicated that the prisoners' basic financial literacy levels were closely related to various demographic factors whereas the level of financial sophistication was weakly related to them. Individuals imprisoned for grievous bodily harm and murder had the highest financial literacy levels, and were similar to levels in the general Public. Regarding sophisticated literacy, all respondents had high literacy levels for asset pricing, risk diversification, fees and deductions, and concepts.

Keywords: Crime, Prison, Financial Literacy, Financial Sophistication, Criminology

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1. Introduction

After their release, prisoners and convicts have to try to follow a normal economic life by establishing relationships with other people. Sound economic knowledge, correct financial decision making, and high emotional intelligence are thus very important for them. In turn, it is extremely important to determine both the basic and sophisticated financial literacy levels of these individuals, individuals whom the general public will regularly interact with in their daily lives. However, only one study in the US has examined the basic and sophisticated financial literacy of convicts (Call et al., 2013).

The number of convicts in Turkey increased by 164% from 100,435 in 2008 to 264,842 in 2018 (Turk Stat, 2020). In addition, as in other countries, recidivism rates in Turkey are quite high (Uzuner & Geyikçi, 2021). For example, of the 670 convicts sampled in this study, 318 admitted committing two or more crimes, i.e., a 47.64% rate of repeat recidivism. While criminality depends on many factors, it is also likely that ex-convicts with greater financial literacy will re-integrate more easily into society. Financial literacy, which refers to both basic and sophisticated forms, is extremely important in financial decision making. If ex-convicts understand budgets, the time value of money, risk and return, financial planning, and cash management, then they can adjust more easily to social life. Accordingly, in this study, we measured convicts' basic and sophisticated financial knowledge and associated this to specific types of crimes. Thus, we aimed to determine whether the level of financial literacy differs between types of crimes, and, if there is a difference, which types of crimes are associated with low financial literacy.

Definitions of financial literacy vary. Mason & Wilson (2000) define it as the ability of individuals to collect, understand, and evaluate relevant information in their decision-making processes while Lusardi (2008) states that financial literacy includes basic financial concepts, such as figures, inflation, time value of money, interest rates, and risk. The Organization for Economic Co-operation and Development (OECD) provides the broadest definition: “*A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing*” (OECD 2005). Financial literacy is a fundamental requirement in the ability to make appropriate financial decisions (Karaa & Kuğu, 2016) while recent research on financial decisions demonstrates the importance of financial sophistication as a prerequisite for proper financial decision-making (Campbell, 2006).

Finance is steadily becoming a more important part of human life as individuals need to be financially sophisticated to act rationally on issues such as investment, debt, and other financial decisions. Thus, it has become essential to measure whether they have more in-depth knowledge, known as financial sophistication, beyond the basic financial decision-making competencies measured by financial literacy. For example, financial sophistication enables individuals to avoid investment errors (Laurent et al., 2009). Accordingly, after measuring convicts' basic financial literacy, this study evaluated their financial sophistication to assess their ability to make more complex financial decisions.

We developed three hypotheses for this study.

H1 predicts that convicts have lower financial literacy levels than the general public while **H3** predicts that convicts also have lower financial sophistication than other disadvantage groups, i.e., they lack higher levels of financial literacy. These two hypotheses are based on previous research (Marbey & Ferguson 2005; Clear, 2007; Martin, 2011; Lusardi, 2015; Glidden et al., 2018; Marbey & Ferguson 2005, Miellitz & MacDonald, 2016) which found significant effects of financial literacy on social order. While this literature has yielded similar results for various developed countries, the subject has not yet studied for the financial literacy of convicts in developing countries.

H2 is that convicts' basic financial literacy levels vary according to the types of crimes they committed. Previous research into the relationship between education level and criminality has evaluated all types of crime together in comparison with the general public's education level. These studies show that criminality decreases as education level increases (Irish, 1989; Sabol & Lynch, 2003; Lochner & Moretti 2004). However, other studies have found that this relationship varies with type of crime (Ehrlich, 1975; Lochner, 2004; Groot & van der Brink 2010; Lochner 2011; Veselak, 2015). That is, not every type of crime is associated with a low education level; rather, certain crimes require a high level of education. Similarly, some studies report that financial literacy and financial sophistication increase with education level (Kyrychenko & Shum, 2009; Huston et al., 2012). All these studies were conducted in countries with high national incomes. Therefore, there is a gap in the literature as to whether different results can be achieved in countries with different income levels. To address this, we examined the relationship between financial literacy and financial sophistication and types of crime in a developing country, using Turkey as the sample.

2. Literature Review

Studies of financial literacy and financial sophistication have increased considerably in recent years. Financial literacy covers a wide range of factors, including spending and savings, personal finance, taxes, credit card use, share prices, bond prices, and risky investments. Many studies have focused on issues like financial information, investment behavior, and decision making (Karaa & Kuğu, 2016; Lusardi et al., 2014; Allgood & Walstad, 2016; Chu et al., 2017; Lusardi et al., 2017; Japelli & Padula, 2013). Although many studies have used the concepts of financial literacy and sophistication interchangeably, in the present study, basic financial literacy denotes the level of basic financial knowledge whereas financial sophistication denotes the level of sophisticated financial knowledge.

Basic financial literacy and sophistication are highly correlated with demographic factors, such as age, educational level, and economic status (Chen & Volpe, 1998; Karaa & Kuğu, 2016; Glidden & Brown, 2017). Overall, financial literacy and sophistication levels are quite low in both developed and undeveloped countries. Regarding developed countries, one of the first studies conducted in the United States on this issue (Cutler; 1997), found that Americans have inadequate levels of financial literacy on insurance and social security issues. Subsequent studies in the US have confirmed these findings (Chen & Volpe, 1998; Moore, 2003; Johnson & Sherraden, 2007; Kadoya et al., 2018). Nicolini (2019) administered a 50-item financial literacy test in six European countries (Germany, Great Britain, France, Italy, Spain, and Sweden), finding that individuals with low levels of education in all six countries had similarly low levels of financial literacy while the overall level of financial literacy was also low. These findings have been supported by other research in Europe (van Rooij et al., 2011; Baglioni et al., 2017; Stolper & Walter, 2017).

Regarding developing countries, Kefela (2010) found inappropriate perceptions of risk-return relationships generally stem from low financial literacy. This is problematic because, in their everyday financial decisions, people in these countries must choose between alternatives with risky consequences yet lack the knowledge to make good decisions. Other studies in developing countries confirm these findings (John et al., 2012; Altintas, 2011; Klapper et al., 2013; Niu et al., 2020; Potrich et al., 2018).

Regarding underdeveloped countries, Abubakar (2015) found that access to finance is difficult in African countries due to low financial literacy, which is the biggest

obstacle to entrepreneurship. He concludes that, if financial literacy is developed, access to finance and entrepreneurship can develop more throughout Africa. Other studies on undeveloped countries report similar findings (Mouna & Anis, 2017; Kodongo, 2018; Assefa & P.V., 2018; Solomon, Nhete, & Sithole, 2018). Overall, despite differences between developed, developing, and underdeveloped countries, research indicates that financial literacy levels are generally low in countries, regardless of their development level.

Regarding demographic factors, low financial literacy and sophistication are highly correlated with income and education (Lusardi & Mitchell, 2007; Lusardi et al., 2014). More specifically, low financial literacy and sophistication are positively associated with non-investment in stocks (van Rooij et al., 2011; Al-Tamimi & Kalli, 2009; Janor et al., 2016), high-cost borrowing (Lusardi & Scheresberg, 2013; Huston, 2012; Sevim et al., 2012; (Miwako et al., 2019), and poor financial decisions (van Rooji, 2009; Carlander & Hauff, 2019). Other studies have investigated the relationships between financial literacy and sophistication and gender (Fletschner & Mesbah, 2011; Thapa & Nepal, 2015; Glidden & Brown, 2017), age (Lusardi et al., 2014; Mielitz et al., 2019; (Huston et al., 2012), race (Murphy et al., 2014; Mandel & Klein, 2007; Lusardi & Mitchell, 2007), marital status (Murphy et al., 2014; Glidden et al., 2018; Call et al., 2013), and income (Agarwalla et al., 2014; Monticone, 2010; Potrich et al., 2015).

Turning to research on convicts, Martin (2011) reported that convicts had a low level of financial literacy. However, their likelihood of reoffending decreased after financial literacy training at the penal institution while financial awareness increased (Koenig 2007; Call et al., 2013; Galchus 2014; Glidden 2018). Glidden & Brown (2017) found significant differences between the financial literacy levels of convicts and the general public in the US. The convicts' low financial literacy levels were associated with excessive borrowing and poor financial planning, which hindered capital accumulation and made recidivism more likely. Similarly, other studies (Lyons & Kass-Hanna, 2018; Lusardi et al., 2014; Murphy et al., 2014) indicate that economically vulnerable individuals fail in both their social life and economic decisions due to poor financial literacy. Finally, Mielitz & Marcum (2020) discovered that US convicts' level of financial literacy was positively related to time spent in prison, number of imprisonments, and types of crimes committed.

3. Materials and Method

The quantitative data set consists of a survey conducted between 1 and 27 February 2020 with 670 convicts incarcerated in the Manisa E-type closed penal institution in western Turkey. To conduct the survey, permission was first obtained from the Ethics Committee of Manisa Celal Bayar University (E.90989, dated 30/10/2019). Legal permission was then obtained from the General Directorate of Prisons and Detention Houses (GDPD) under the Ministry of Justice of the Republic of Turkey (57292265-204.06.033-E.11/1040, dated 03/01/2020). The study – the first such research in Turkey – greatly benefited from the GDPD’s contribution and the fact that one author is a correction officer.

We first measured the convicts’ basic financial literacy levels, using a 7-item questionnaire (see Table 1) of basic financial literacy, previously applied in 31 countries (OECD, OECD/INFE International Survey of Adult Financial Literacy Competencies, 2016). In their 2016 study of individuals aged 18-79, the OECD reported a mean financial literacy level in OECD countries of 62% while the mean level for Turkey was 58%. We administered the questionnaire to prisoners in the Manisa Type E Penitentiary Institution aged 18 and over. Of the 712 prisoners who agreed to participate, 670 returned useable questionnaires which were then included in the study. As Table 2 shows, our sample size was big enough. The OECD interviewed 3,003 respondents in Turkey and 24,701 respondents in the entire OECD, giving a representation rate of 0.00037% for Turkey. . In contrast, we surveyed 0.26% of Turkey’s total convict population (670 respondents among 264,842 prisoners in Turkey). Therefore, the representation adequacy of the study is quite high.

In the second part of the study, we adapted nine questions into Turkish from the US Health and Retirement Study (HRS) National surveys in 2008, which Lusardi, Mitchell, & Curto (2014) used to measure financial sophistication. These were grouped into four categories to assess knowledge of capital markets, risk diversification, fees, and numeracy. Since people in Turkey mostly focus on state-owned social security institutions because its private pension system is very new, we excluded one question from Lusardi et al. (2014): “*An employee of a company with publicity traded stock should have (a lot/little of none of) his/her retirement savings in the company.*” Thus, our questionnaire had 9 questions in 4 groups. Table 1 shows the distribution of responses for each question with the correct answer in bold text.

Table 1. Basic financial literacy survey: question codes, question wording, response formats, and question purpose

Item code	Item text Note: Words or phrases in <> can be edited to fit the national context.	Response format (bold = sophisticated answer)	Purpose
QK3	“Now imagine that the <brothers> have to wait for one year to get their share of the \$1,000 and inflation stays at <X> percent. In one year’s time will they be able to buy...”	“Multiple choice [Correct response = depends on inflation used]”	“To test understanding of how inflation impacts purchasing power”
QK4	“You lend \$25 to a friend one evening and he gives you \$25 back the next day. How much interest has he paid on this loan?”	“Open response [Correct response = ‘none’/0]”	“To test understanding of interest without difficult arithmetic”
QK5	“Suppose you put \$100 into a <no fee, tax free> savings account with a guaranteed interest rate of 2% per year. You don’t make any further payments into this account and you don’t withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made?”	“Open response [Correct response = \$102]”	“To test ability to calculate simple interest on savings”
QK6	“and how much would be in the account at the end of five years [add if necessary: remembering there are no fees or tax deductions]? Would it be...”	“Multiple choice [Correct response = More than \$110 but only taken into account if QK5 is correct]”	“To test awareness of the additional benefit of compounding”
QK7a	“An investment with a high return is likely to be high risk. If someone offers you the chance to make a lot of money it is likely that there is also a chance that you will lose a lot of money.”	“True/False [Correct response to both versions = True]”	“To test understanding of the typical relationship between risk and return”
QK7b	“High inflation means that the cost of living is increasing rapidly.”	“True/False [Correct response = True]”	“To test understanding of the meaning of inflation”
QK7c	“It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares. It is less likely that you will lose all of your money if you save it in more than one place.”	“True/False [Correct response to both versions = True]”	“To test awareness of the benefit of diversification”

Source: OECD, OECD/INFE International Survey of Adult Financial Literacy Competencies2016

Basic financial literacy demonstrates the ability of individuals to autonomously manage their own financial matters, make financial decisions, and show self-awareness of their financial literacy level. Regarding responses, 1 point was given for correctly answered

questions while incorrectly answered questions or those left blank were scored 0. Blank questions were considered incorrect based on the assumption that those who answer some questions do not know the answer to any questions they leave blank.

Before distributing the questionnaire, support was received from a certified translator in translating the questions into Turkish. Afterwards, 10 prisoners were pretested, and it was checked whether the questions worked or not. Since it was understood that there was no problem with the translated questions, the phase of applying the questionnaires has started.

4. Findings

Measurement of Financial Literacy

H1: Convicts have lower basic financial literacy levels than the general public.

As hypothesized and confirming the previous literature, the overall mean basic financial literacy level of the convicts was 55%, which is lower than the mean for Turkey (58%) and the OECD (62%). However, the convicts' performance varied according to specific questions and in comparison with the Turkish general public and OECD percentages (see Table 2, last three rows).

For Question QK3 about the relationship between inflation and the purchasing power of money, 53% of the convicts answered correctly, compared to 55% of the general public in Turkey and 66% overall in the OECD survey (OECD, 2016). Studies with convicts in the US produced lower percentages. Galchus (2014) reported 48.1% and Galchus (2015) reported 48.3% whereas Glidden, Brown, Smith, & Hughes (2018) reported only 18.47% correct answers.

For Question QK4 about the time value of money, 55% of the convicts answered correctly, compared to 84% of the general public in Turkey and 89% overall in the OECD survey (OECD, 2016). Glidden, Brown, Smith, & Hughes (2018) reported correct response rates for US convicts and general public of 57.96% and 69.55%, respectively whereas Galchus (2014) reported 31.5% correct responses for convicts and Galchus (2015) reported 33.11%.

For Question QK5 about the simple interest on savings, 51% of the convicts answered correctly, compared to the Turkish mean of 54% and the OECD mean of 65% (OECD, 2016). As expected, these results were similar to those for QK3.

For Question QK6 about compound interest over 5 years, only 29% of convicts

answered correctly, compared to 32% of the general public in Turkey and the OECD mean of 48% (OECD, 2016). Furthermore, only 18% of the convicts answered both the simple interest and compound interest questions correctly, which was close to the mean for the Turkish general public of 19% but considerably lower than the OECD average of 37% (OECD, 2016). Thus, this is an issue that needs to be emphasized because these extremely low levels of understanding are not just a mathematical deficiency but clearly indicate very poor financial knowledge about interest. Since compound interest is an important financial instrument, investors need to understand it before choosing products that use it. Addressing this shortfall will fill a significant gap, both for the financial system and for the participants.

For Question QK7a about risk and return, most convicts answered correctly (88%), compared to 90% of the general public in Turkey and higher than the OECD mean of 83% (OECD, 2016). Likewise, for Question QK7b about inflation, 96% of convicts answered correctly, which was a higher rate than both the Turkish general public (84%) and the OECD mean (81%) (OECD, 2016). The high level of accuracy may reflect the intense media interest in inflation-related issues in Turkey that increased the convicts' awareness and knowledge. In contrast, fewer convicts correctly answered Question QK7c about diversification (50%), and fewer than the Turkish general public (74%), who were above the OECD mean of 65% (OECD, 2016).

In sum, the convicts had a lower level of financial knowledge on many issues than the Turkish general public, although their knowledge of certain concepts, particularly inflation, was higher.

Table 2. Relation of Type of Crime to Basic Financial Literacy: Percentage Correct Responses

Type of Crime	Number of Respondents	Time value of money	Interest paid on loan	Calculation of interest plus principal	Compounding over 5 years actual response	Combined simple interest and compounding	Risk and return	Definition of inflation	Diversification	Overall Score
		QK3	QK4	QK5	QK6	QK5&QK6	QK7a	QK7b	QK7c	
Theft	147	52%	55%	39%	23%	14%	85%	96%	49%	52%
Narcotic Crimes	137	43%	58%	61%	26%	12%	85%	95%	47%	53%
Sex Crimes	104	50%	47%	46%	21%	15%	85%	93%	52%	51%
Grievous Bodily Harm	95	56%	60%	55%	36%	22%	95%	99%	59%	60%
Burglary	63	51%	46%	49%	25%	11%	89%	98%	46%	52%
Murder	59	54%	61%	61%	46%	34%	93%	98%	49%	62%
Fraud	23	91%	57%	43%	26%	22%	83%	100%	26%	56%
Mugging	15	67%	40%	60%	53%	27%	87%	100%	33%	58%
Forgery	4	50%	75%	75%	75%	75%	100%	100%	50%	75%
Actual Bodily Harm	3	67%	100%	33%	33%	33%	67%	100%	67%	63%
Cybercrime	3	100%	33%	33%	33%	0%	100%	100%	67%	58%
Drunk Driving	2	50%	100%	100%	50%	50%	100%	100%	100%	81%
Prostitution	2	100%	50%	0%	0%	0%	100%	100%	100%	56%
Smuggling	2	50%	50%	50%	0%	0%	100%	100%	100%	56%
Deprivation of Liberty	1	100%	100%	100%	100%	100%	100%	100%	100%	100%
Deportment	1	100%	100%	100%	100%	100%	100%	100%	0%	88%
Migrant Smuggling	1	0%	100%	100%	100%	100%	100%	100%	100%	88%
Human Trafficking	1	100%	0%	100%	100%	0%	100%	100%	100%	75%
Weapons Smuggling	1	100%	100%	100%	0%	0%	100%	100%	100%	75%
Kite flying	1	0%	100%	100%	0%	0%	100%	100%	0%	50%
Breach of Contract	1	0%	100%	0%	0%	0%	100%	100%	100%	50%

Table 2. Continue

Type of Crime	Number of Respondents	Time value of money	Interest paid on loan	Calculation of interest plus principal	Compounding over 5 years actual response	Combined simple interest and compounding	Risk and return	Definition of inflation	Diversification	Overall Score
Embezzlement	1	0%	0%	100%	0%	0%	100%	100%	100%	50%
Illegal Gun Possession	1	0%	0%	100%	0%	0%	100%	100%	0%	38%
Cigarette Smuggling	1	0%	0%	0%	0%	0%	100%	100%	0%	25%
Damage to Public Property	1	100%	0%	0%	0%	0%	0%	0%	100%	25%
Total convicts	670	53%	55%	51%	29%	18%	88%	96%	50%	55%
Turkey general public*	3,003	55%	84%	54%	32%	19%	90%	84%	74%	58%
Means in OECD countries **	24,701	66%	89%	65%	48%	37%	83%	81%	65%	62%

* (OECD, OECD/INFE International Survey of Adult Financial Literacy Competencies, 2016); ** Means, all countries and means, OECD countries report the mean of the country/economy percentages. Each country/economy is therefore given equal weight.

Distribution of Financial Literacy Scores by Type of Crime

H2: The level of basic financial literacy of convicts varies according to the types of crimes.

The 670 respondents in this study represented 25 different types of crimes. However, the following analysis focuses on the six types with the most respondents. Of those convicted of theft, 52% committed their first crime before 18 years old, which was the highest level of all types (see Table 3). Regarding re-offending, a majority of those convicted of theft (69%), narcotics offences (51%), and assault (59%) reported committing crimes two or more times, suggesting that crime was a profession for these respondents. In contrast, 80% and 71% of those convicted of sex offences and murder, respectively, reported that it was their first offence. Regarding education, 36% of sex offenders and 39% of murderers had finished high school or higher education. Regarding financial knowledge levels, sex offenders' knowledge was below average at 51%, while respondents convicted of murder had the same level of financial knowledge as the OECD mean (62%). Those convicted of assault also had a fairly high level of financial knowledge, at 60%. The results of the analysis reveal that the level of financial literacy of convicts varies according to the types of crimes.

Measurement of Financial Sophistication

H3. Convicts have lower levels of financial sophistication than other disadvantages groups.

Respondents demonstrated their financial sophistication regarding the following four areas. For each item, the correct answer is given in bold type face.

Knowledge of Capital Markets

a. *"If interest rates falls, bond prices will [rise / fall]"*

Rise

b. *"If you're smart, it is easy to pick individual company stocks that will have better than average returns"* [Yes / No]

No

Regarding the inverse relationship between asset price and inflation, 58% of the convicts answered correctly, which was better than the accuracy reported in studies with convicts in the USA: 33% in (Basu, 2020), 24.6% in (Van Rooji et al., 2011), and

Table 3. Distribution of Education Level, Age of First Crime, and Repeat Offending by Type of Crime

Type of Crime	Number of Respondents	Age of First Crime under 18	Age of First Crime 18 or above	First Crime	Repetition of Crime	Primary Education	High School	College	University	Post-graduate
Theft	147	52%	45%	18%	69%	76%	16%	1%	0%	0%
Narcotic Crimes	137	23%	72%	41%	51%	71%	20%	1%	3%	1%
Sex Crimes	104	10%	88%	80%	14%	56%	23%	4%	9%	0%
Grievous Bodily Harm	95	19%	76%	32%	59%	69%	19%	2%	3%	0%
Burglary	63	33%	62%	46%	41%	65%	27%	0%	5%	0%
Murder	59	3%	90%	71%	24%	53%	36%	0%	3%	0%
Fraud	23	22%	78%	26%	61%	78%	13%	0%	0%	0%
Mugging	15	33%	53%	47%	40%	47%	13%	0%	27%	0%
Forgery	4	0%	100%	0%	75%	50%	25%	0%	0%	0%
Actual Bodily Harm	3	0%	67%	67%	33%	100%	0%	0%	0%	0%
Cybercrime	3	0%	100%	0%	100%	100%	0%	0%	0%	0%
Drunk Driving	2	0%	100%	50%	50%	0%	100%	0%	0%	0%
Prostitution	2	0%	100%	100%	0%	50%	0%	0%	50%	0%
Smuggling	2	0%	100%	50%	50%	50%	50%	0%	0%	0%
Deprivation of Liberty	1	0%	100%	100%	0%	100%	0%	0%	0%	0%
Deforcement	1	0%	100%	100%	0%	0%	100%	0%	0%	0%
Refugee	1	0%	100%	0%	100%	100%	0%	0%	0%	0%
Human Trafficking	1	100%	0%	0%	100%	0%	0%	0%	0%	0%
Weapons Smuggling	1	0%	100%	0%	100%	100%	0%	0%	0%	0%
Kite Flying	1	100%	0%	0%	100%	100%	0%	0%	0%	0%
Breach of Contract	1	0%	100%	0%	100%	100%	0%	0%	0%	0%
Embezzlement	1	0%	100%	0%	100%	100%	0%	0%	0%	0%
Illegal Gun Possession	1	0%	100%	100%	0%	0%	0%	0%	100%	0%
Cigarette Smuggling	1	0%	100%	0%	100%	100%	0%	0%	0%	0%
Damage to Public Property	1	0%	100%	100%	0%	0%	0%	0%	100%	0%
Total	670	26%	70%	43%	47%	67%	21%	1%	4%	0%

44% in (Lusardi et al., 2014). The high level of knowledge of convicts in our study may reflect the media's continued focus on high inflation in Turkey. Conversely, only 21% of the convicts answered the second question correctly, suggesting a rather weak understanding of investments, and lower than the rates of 34.6% and 34.3% reported, respectively, by Lusardi et al. (2014) and Basu (2020).

Risk Diversification

c. *“You should invest [most of your money in a few good stocks that you select rather than in lots of stocks or in mutual funds/in either mutual funds or a large number of different stocks instead of just a few stocks].”*

“Invest most of your money in either mutual funds or a large number of different stocks instead of just a few stocks.”

d. *“When an investor spreads money between 20 stocks, rather than 2, the risk of losing a lot of money [decreases/increases]”*

Decreases

Another important indicator of financial sophistication is an understanding of risk diversification. A majority of the convicts in our study answered these two questions correctly, 58% and 54%, respectively, suggesting that many of them have a sophisticated knowledge of risk diversification as also found in previous studies (van Rooi et al., 2011; Lusardi et al., 2014; Murphy et al., 2014; Basu, 2020). As with inflation, the convicts' sophisticated understanding of risk diversification in Turkey may be due to frequent media coverage and a cultural preference in Turkey to discuss monetary issues.

Knowledge of Fees

e. *“If you invest for the long run, the annual fees of mutual funds are [important/unimportant]”.*

Important

f. *“It is [hard/easy] to find mutual funds that have annual fees of less than one percent of assets”.*

Easy

Of the convicts in this study, 76% answered the first question correctly but only 19% did so for the second question, confirming previous research findings (Hilgert et al,

2003; van Rooi et al., 2011; Lusardi et al., 2014; Murphy et al., 2014; Basu, 2020;). The main reason for this is that despite their incomplete knowledge of low-cost funds, respondents knew that fund costs should be low.

Savviness and Numeracy

e. *“To make money in the stock market, you [should not/have to] buy and sell stocks [too/ often]”*

Should not/too

f. *“Using money in a bank savings account to pay off credit card debt is usually a [good/bad] idea”*

Good

g. *“If you start out with 1,000 TRY and earn an average return of 10% per year for 30 years, after compounding, the initial 1,000 TRY will have grown to [more/ less] than 6,000 TRY.”*

More

A clear majority of the convicts in this study answered the first two questions correctly (62% and 67%, respectively) whereas only 31% answered the third question correctly. This was probably because most participants had a good understanding of financial terminology, so the first two questions were easy and understandable. Conversely, since the third question required arithmetic, it highlighted the participants’ poor numeracy level, as also reported by Murphy et al. (2014) and Lusardi et al. (2007).

Table 4. Financial Sophistication Questions

	First answer	Second answer
“Knowledge of Capital Markets”		
<i>“If the interest rate falls, bond prices will [rise/fall].”</i>	58%	38%
<i>“[If/Even if] you are smart, it is [easy/hard] to pick individual company stocks that will have better than average returns.”</i>	68%	21%
“Risk Diversification “		
<i>“You should invest [most of your money in a few good stocks that you select rather than in lots of stocks or in mutual funds/in either mutual funds or a large number of different stocks instead of just a few stocks].”</i>	58%	38%
<i>“When an investor spreads money between 20 stocks, rather than 2, the risk of losing a lot of money [decreases/increases].”</i>	54%	41%

“Knowledges of Fees”		
“If you invest for the long run, the annual fees of mutual funds are [unimportant/important].”	76%	19%
“It is [hard/easy] to find mutual funds that have annual fees of less than one percent of assets.”	62%	19%
“Savviness and Numeracy		
To make money in the stock market, you [should not/have to] buy and sell stocks [too/] often.”	35%	62%
“Using money in a bank savings account to pay off credit card debt is usually a [good/bad] idea.”	67%	25%
“If you start out with 1,000 TRY and earn an average return of 10% per year for 30 years, after compounding, the initial 1,000 TRY will have grown to [more/less] than 6,000 TRY.”	31%	50%

Note: correct response choices highlighted in bold font.

Constructing Financial Literacy and Financial Sophistication Indices

While questions about both basic financial literacy and financial sophistication provide some idea when examined individually, summary measurements are required to examine the answers as a whole. For this reason, indices were constructed separately from the answers given in both surveys. The approach used when constructing indices were “to simply sum the number of questions answered correctly, subtract it from the mean, and divide by the total number of questions: the result is centered on zero with a standard deviation of 0.2” (Lusardi et al., 2014). The method used by many previous pioneering studies was also used in this study, and it was aimed to follow a method compatible with the literature.

Regarding the distribution of basic financial literacy and financial sophistication among the convicts, Tables 5 and 6, respectively, show the multi-variable regression results with financial literacy and financial sophistication as the dependent variable. Significance levels in the tables are indicated by asterisks above the numbers. While performing the regression analysis, 4 issues are examined for each index, the sample of the variables examined in relation to basic financial literacy and financial sophistication is as follows: crime types 605, education level 628, crime commitment age 641 and marital status 659. The analysis by crime type reveals a very strong relationship between level of basic financial literacy and all types of crimes whereas, for financial sophistication, only those convicted of narcotics and sex crimes have a higher level than other respondents. Regarding education, convicts with a higher education qualification, have greater basic financial literacy, but not financial sophistication, than those with high school or lower levels of education. These findings are consistent with previous findings of the positive correlation

between convicts' educational levels and financial literacy (Carison, 2015; Glidden & Brown 2016; Mielitz et al., 2018). Regarding age of first offence, those who committed their first crime before the age of 18 had less basic financial knowledge, but there was no significant relationship with financial sophistication. This result was not unexpected since individuals who commit crimes at an early age are generally disconnected from education while the relationship between education level and financial knowledge is also evident from the responses. No significant relationship was found between financial sophistication and marriage, number of criminal convictions, age, occupation, gender, or income level. Overall, basic financial knowledge was positively associated with demographic factors like age and education whereas financial sophistication, which indicates a higher level of financial knowledge, had an extremely weak relationship with demographic factors. The main reason for this could be that basic knowledge is used in their daily lives and the depth of financial markets is low in developing countries such as Turkey. Especially in countries where capital accumulation is insufficient, and consequently the use of funds and capital market instruments are not sufficiently developed, the level of awareness of individuals towards advanced financial instruments is low. On the other hand, it is normal for sophisticated financial literature to be in low correlation with demographic factors, as well as high correlation between basic financial literature and demographic factors. In accordance with the situation of financial institutions and markets that are not sufficiently developed in developing countries, the level of knowledge on the subject cannot be settled in a certain systematic. Sophisticated financial literacy arises independently from demographic factors, depending only on the level of interest.

Table 5. Multivariate Regression Models Using the Basic Financial Literacy Index

	(1)	(2)	(3)	(4)
Theft	-0.4933***			
Narcotic Crimes	-0.4706***			
Sex Crimes	-0.492***			
Grievous Bodily Harm	-0.4183***			
Burglary	-0.4849***			
Murder	-0.4131***			
High School		0.0477**		
University		0.1329***		
First Crime under 18			-0.0608***	
Married				0.0452***
N	605	628	641	659
R-squared	0.3406	0.0173	0.0122	0.0082

Note: ***, ** and * means significance at 1%, 5% and 10%

Table 6. Multivariate Regression Models Using the Financial Sophistication Index

	(1)	(2)	(3)	(4)
Theft	.0270			
Narcotic Crimes	-.0618**			
Sexual Crimes	-.0624**			
Grievous Bodily Harm	-.0007*			
Burglary	-.0185			
Murder	-.0103			
High School		-.0059		
University		-.0298		
First Crime Under 18			.0114	
Married				.0193
N	605	628	641	659
R-squared	0.0207	0.0013	0.0009	0.0029

Note: ***, ** and * means significance at 1%, 5% and 10%

5. Discussion and Conclusion

This study found a rather striking lack of financial sophistication among convicts in Turkey. We divided the study into two sections. Both parts showed that the respondents had insufficient knowledge of financial matters. In the last part of the study, we tried to make a methodological contribution by combining the answers to the financial literacy questions into two indices. This can help determine which questions are more useful for future financial literacy studies on convicts.

Three hypotheses were tested.

H1: Convicts have lower financial literacy than the general public.

Although the convicts face many financial decisions, such as mortgages and loans, their understanding of asset pricing, portfolio selection, and pricing was very low. They scored highest on questions about risk diversification and mathematical calculations. In contrast, the proportion who understood risk and return was quite high (88%), similar to the general public (90%) and higher than the OECD mean (83%). Moreover, almost all participants (96%) understood inflation, which was higher than both the general public (84%) and the OECD average (81%). The accuracy of answers to the inflation question may be due to media interest in this issue in Turkey. On the other hand when evaluated in terms of all responses, convicts have lower basic financial literacy (55%) than the general public of Turkey (58%) and the means in OECD countries (62%).

Thus, the Null hypothesis is not rejected.

H2. The level of basic financial literacy of convicts varies according to the types of crimes.

Certain criminal groups demonstrated greater financial literacy than others. All criminal groups had below-average financial literacy apart from those convicted of murder (62%) and those convicted of grievous bodily harm (60%). (It would be useful to examine how these criminals gained their above-average financial knowledge and responded to questions more consistently than those who committed other types of crimes). The results obtained from the analysis show that the different types of crime have different levels of basic financial literacy in a developing country compared to the general public of Turkey and means in OECD countries.

Thus, the Null hypothesis is not rejected.

H3. Convicts have lower levels of financial sophistication than other disadvantaged groups.

In this study, financial knowledge was divided into basic and sophisticated financial knowledge (sophistication). In this hypothesis we analysed the financial sophistication. Because there is no sample representing the general public in Turkey or the OECD, we decided to compare our results with other disadvantaged groups. Contrary to the low level of knowledge found by previous literature on disadvantage groups, most of the respondents demonstrated knowledge about asset pricing, and a high level of financial knowledge about risk diversification, fees and deductions, and concepts, although, in line with the literature, they had poor numeracy. Compared to other disadvantaged groups, convicts in Turkey had a similar or even better level of knowledge on asset pricing. As a result of the analysis it was revealed that convicts have higher levels of financial sophistication than other disadvantaged groups in general.

Thus, Null hypothesis is rejected.

The results for the index created in the last part of the study will be valuable for those who want to investigate recidivism and crime prevention. The comparability of the results obtained by using the same statistical method with similar studies has been tried to be kept at a high level. In analysis based on different models, a basic level of financial literacy is associated with demographic factors, such as age and education, whereas financial sophistication has an extremely weak relationship with demographic factors. However, both the previous literature and this study show that the level of financial knowledge of convicts increases in line with level of education. This suggests that it

would be useful to prioritize financial literacy within basic education curricula to prevent crime while providing financial literacy training in prisons to prevent recidivism in most types of crime. Further studies can improve understanding of the issues addressed here by conducting further research based on the type of crime with larger sample audiences.

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